*Coronality, Velarity and Why They are Special**

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This paper addresses the problem of the representation of places of articulation of consonants in the framework of Government Phonology.[1] The emphasis will be on coronality and problems GP encounters when it has to give an account of the asymmetries in the behaviour of coronals. This is hypothesised to be a consequence of their unmarked nature, their lacking a specification of place of articulation. This hypothesis is supported by a number of phonological and non-phonological phenomena many of which are presented in Paradis & Prunet (1991). We will see if this idea can be expressed in GP, and what reshuffling this move causes to consonantal representations in the theory. Velarity will also be briefly discussed because this is the consonantal place the GP model suggests to be most unmarked and I conclude that there are serious problems with consonantal representations in the model.

Section **1** introduces the basics of GP crucial to the understanding of the later sections. In **2** evidence is brought up to prove that coronality is special among the other places of articulation: there is a coronal/non-coronal dichotomy. The problems GP faces in expressing this fact are discussed in **3,** with an investigation of what happens if the coronality element is discarded in **3.1.** The speciality GP tacitly attributes to velarity is pointed out in **3.2,** and some conclusions are drawn in **4.**

1 Some basic assumptions of Government Phonology

In the following, I will introduce the aspects of GP relevant to the discussions that follow. First, I talk about the representation of the "subskeletal" part of phonic material, then the organisation of what is above the skeleton will be discussed.

1.1 The representation of melody

Segmental melody is thought of as the fusion of elements in GP. There is a handful of such elements, each residing on its own autosegmental line

linking to and delinking from skeletal positions from there.[2] Elements are phonetically meaningful segments in themselves, which means that a representation of GP is phonetically interpretable at any level of the derivation. There are no default rules filling in unspecified feature values (or features in privative models) like in underspecification theories. All newly linking elements in a segment must come from a local source, which results in the non-arbitrariness of phonological changes.

(1) contains a list of elements standardly assumed to take part in building up the melodic part of the representation (Harris 1994 : 140):

(1) **Elements**

		Salient property	**Independent realisation**
Resonance:	**A**	uvular	[ɑ]
	I	palatal	[i]/[j]
	U	labial	[u]/[w]
	R	coronal	[ɾ]
	@	*none*	[ɯ]/[ɣ]
"Manner":	**ʔ**	occluded	[ʔ]
	h	noise	[h]
	N	nasal	[ɯ̃]
Laryngeal:	**H**	stiff vocal cords	[ˊ]/[ʰ]
	L	slack vocal cords	[ˋ]/[ˬ]

For those resonance elements that have two independent phonetic realisations, the first appears in nuclear position the second in non-nuclear position. In fact, in the case of these sounds the IPA symbols encode phonological, *i.e.* distributional facts by applying two symbols for what is essentially the same entity phonetically. The two laryngeal elements (**H** and **L**) are also interpreted differently in nuclear and non-nuclear contexts: in the first case they contribute high and low tone to the vowel, respectively, while **H** manifests itself as aspiration and **L** as voicing in consonants. What is peculiar about these two elements is that they seem to lack a truly *independent* phonetic realisation, neither high and low tone, nor aspiration and voicing can be uttered independently of a vowel or a consonant, making the symbols appearing next to these elements in (1) quite uninterpretable without comment.

If one element is linked to a certain slot, that slot will be interpreted as shown in the list. In case a slot is associated with two elements, one of them will be the head the other an operator, and in this complex segment the salient property of the operator overrides the property in question of the

head. (Conventionally the head is underlined when this is relevant.) To give an example: if **I** is linked to a nuclear head, it is interpreted as [i]; if both **I** and **A** are linked to a nuclear position then if **I** is the head the position's melodic content is interpreted as [e], a "uvular" (*i.e.* non-high [i]), if **I** is an operator and **A** the head then we get [æ], a palatal (*i.e.* front [ɑ]).

The neutral element, **@**, has a somewhat special status. It has no salient property; in articulatory terms, the vocal tract occupies neutral position with no special narrowing at any point. Since an operator contributes only its salient property to a complex segment, the neutral element does not manifest itself in any way when it is an operator, and the only way it can have an influence on a complex segment is by being its head. Kaye *et al.*, who call this element *cold vowel,* claim that if there is no other element in the intersection of a certain melodic tier and a skeletal position then **@** occupies the point (1985 : 308). This has an important consequence: if the neutral element is everywhere where there is no other element, then it does not have its own autosegmental line, since until a complex segment is posited which comprises all the elements[3] there is always an intersecting point of a melodic tier and a skeletal position that is "empty", *i.e.* accommodating **@**. Perhaps, this could be restrained by saying that the neutral element does have a tier and can only be a head on its own tier, just like any other element. Such a restriction, however, makes **@** just like one of the other elements. To the problem I return in **3.2.**

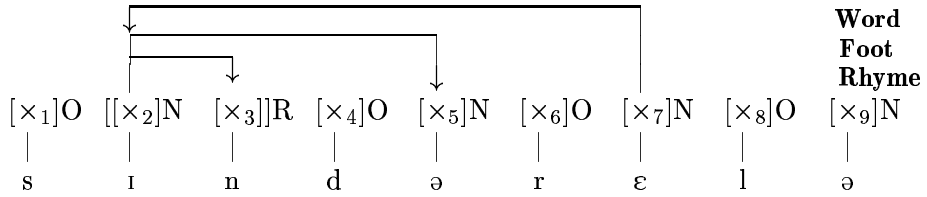
1.2 The representation of prosodic structure

Suprasegmental structure includes three maximally binary branching syllabic constituents, the onset, the nucleus and the rhyme, which latter dominates the nucleus and the coda. "Coda" is only an informal term used for the possible sister of the nucleus, the adjunct in the constituent headed by the nucleus, *i.e.* the rhyme. The coda is not a syllabic constituent: it does not branch. The syllable is not a recognised constituent either, so when referring to syllables an onset–rhyme sequence is meant. These syllabic constituents are present in the lexicon, there are no syllabification rules or templates. There is evidence that this must be so: a simplex segment like {**I**} has two different phonetic interpretations depending on whether it is linked to a nuclear or to a non-nuclear position and there are cases when this is unpredictable (*i.e.* is lexically determined), *e.g.* Hung. *fáj* [fa:j] 'it hurts' *vs.* *fái* [fa:i] 'his/her trees'. The fact that the string /faai/ is monosyllabic in the first but disyllabic in the second word cannot be produced by a syllable structure building process.[4]

There is a relationship between the slots on the skeletal tier, called *government*. Government is strictly directional: within constituents, the left slot, the head, governs the one to its right, its complement (in case there *is* such a slot, *i.e.* in case the constituent is branching; this is called *constituent government*), whereas between constituents, the right slot, which is the head of the constituent to the right, governs the left slot provided that this is not the nuclear head (this is *interconstituent government;* Kaye *et al.* 1990). Government is also strictly local, *i.e.* only neighbouring slots may be involved in the relationship. (More detailed accounts and evidence for these claims can be found in Charette 1990; Harris 1990; Kaye 1990)

Government relations define licensing paths. Licensing is indispensable for phonological elements: unlicensed elements are not interpreted by the phonetic component, and as a result remain unpronounced. In a given phonological domain (ranging from the individual skeletal position through syllabic constituents, feet, to phonological words and phrases), there may only be one unit that is not sanctioned by being licensed, and this is the head, which gets its licensing from outside the domain, from some other domain higher in the prosodic hierarchy (Itô 1986 : 2). Harris (1992) introduces the notion of licensing inheritance. The longer the route by which licensing reaches a unit, the weaker the licensing power that unit can endow on others dependent on it through government. The following (2) is his illustration of the idea, some licensing paths in the word *Cinderella*:

(2) **Some licensing paths in *Cinderella*** (Harris 1994 : 155)



The main-stressed nucleus ($\times_7$) is the unlicensed unit within this domain (a word). It licenses the first nucleus of the domain, which bears secondary stress ($\times_2$). This in turn is the licensor of both the unstressed nucleus ($\times_5$)—by virtue of being head of the foot—and the coda of its own syllable ($\times_3$)—by virtue of being head of the rhyme, as well. For the sake of clarity, several licensing relations are not shown on this diagram: the head of the whole domain ($\times_7$) also licenses the word final nucleus ($\times_9$) on the foot level, while each nucleus licenses the onset head before it ($\times_2 \rightarrow \times_1$, $\times_5 \rightarrow \times_4$, $\times_7 \rightarrow \times_6$ and $\times_9 \rightarrow \times_8$). In addition, the onset preceded by a coda ($\times_4$) is also

the licensor of this coda ($\times_3$). Summarised: nuclei with more prominence license nuclei with less prominence on the word and foot level (translated to a metrical tree notation: of two sister constituents the one assigned *s* licenses the one assigned *w*); nuclei also license codas following and onset heads preceding them;[5] onset heads license codas preceding them.

This kind of licensing, called *prosodic* (or *p-*) *licensing* is transformed into *autosegmental* (or a-) *licensing* at the level of the skeleton, where it designates the power of a certain slot to hold its melodic content. The a-licensing potential of a licensed position is inherited from its p-licensor. Therefore the unlicensed positions within a domain are capable of a-licensing more melodic elements (and consequently we find more contrast in these positions) than positions which are p-licensed within their domain and thus only inherit their a-licensing potential from some other position (see (5) below). The further down a licensing path a position is the weaker its a-licensing potential: each inheritor takes its share of it. The a-licensing potential a position inherits is, however, not wholly a quantum-like property, rather the opposite: if a position is p-licensed by two others, its a-licensing potential will not be more, in fact, it will be less than that of a position which is p-licensed by only one other position. To be less cryptic, this means that among consonantal positions the a-licensing potential of an onset will always be more than that of the coda of the same syllable, because while both are licensed by the same nucleus, that of the "syllable" they both are in (no matter how strong or weak the p-licensing potential of that nucleus might be), the coda is further licensed by the following onset.

One might ask: what if there is no following onset. GP's answer is surprising: there is no such case. According to the Coda Licensing Principle (3):

(3) **Coda Licensing Principle** (Kaye 1990 : 311)
Post-nuclear rhymal positions must be licensed by a following onset.

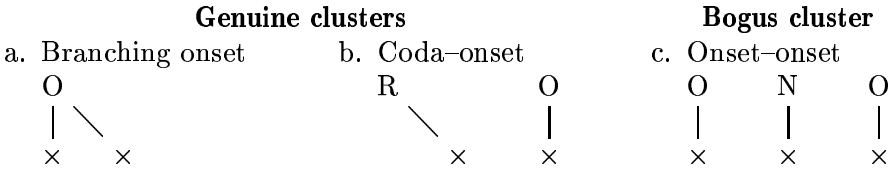
This principle excludes words ending in a coda, but it does not exclude words ending in a consonant (if this latter were the case we would not have to go far to falsify it): word final consonants are in onset position. But since onsets are licensed by nuclei following them, such words must contain an empty nucleus — without any melodic content — after this onset. The licensing of this nucleus is parameterised in languages: those that have consonants word finally set this parameter at on, those that do not set it at off. (For more details see Kaye 1990, Harris 1994 : 154–163.)

So although it is true that word finally consonants show up less contrasts than foot initially, this need not be attributed to their being in

coda position: their weaker a-licensing potential is the result of their licensor (the word final empty nucleus) being licensed by the Final Empty Nucleus Parameter, whereas the licensor of a foot initial onset is not licensed, at least within that foot (*cf.* Harris 1992). This conclusion is born out by the fact that word internally codas are much less capable of supporting contrasts than word finally: *e.g.* nasals cannot have a distinct place in nasal+stop sequences within a word, but they can word finally; obstruents do not show up laryngeal contrasts before other obstruents word internally, while this is possible (in many languages) word finally. This must evidently be the case if word final consonants are not codas at all.

The possibility of empty nuclei appearing between consonants classifies surface consonant clusters into two groups: (i) those that are either in the same constituent (which can only be the onset) or in two adjacent constituents (*i.e.* a rhymal complement and a following onset), and (ii) those that are in two consecutive onsets with an intervening empty nucleus. The former group may be called genuine (4a) and (4b), the latter bogus consonant clusters (4c) (the name comes from Harris (1994:67)):

(4) **Consonant cluster types**



The first two types of clusters involve obvious licensing relations: in (4a) the second slot, the complement of the onset inherits its a-licensing potential from the first, the head, while in (4b) the second slot, the onset head p-licenses the first, the coda, thus making it capable of a-licensing its melodic content. The type of licensing going on in a bogus cluster as in (4c) is not evident. I return to this problem at the end of this section.

As we have seen, the a-licensing potential of a slot is dependent on how "high up" it is in the prosodic hierarchy. This is stated by the Complexity Condition, of which a stronger version is formulated by Kaye *et al.* (1990:218), a weaker one by Harris. Since the first of these presupposes charm theory, which does not play a part in our discussion, I cite the weaker formulation in (5):

(5) **Complexity Condition** (Harris 1990:274)
Let α and β be segments occupying positions A and B respectively. Then, if A governs B, β must be no more complex than α.

In the light of the Licensing Inheritance Principle, we may probably translate "governs" as "licenses": a position p-licensed by another position will have a smaller a-licensing potential than its p-licensor. Brockhaus (1993) points out that the predictions the Licensing Inheritance Principle and the Complexity Condition make jointly are wrong when applied to the licensing connection between consonants and vowels, *i.e.* between a nucleus and the preceding onset and a nucleus and the following coda. In the first case, the nucleus is the licensor, the onset the licensee. But O–N sequences like [pi] are far from being uncommon, despite the fact that the onset licensee contains at least three elements (a stop (**ʔ**) that explodes (**h**) and is labial (**U**)), its licensor nucleus, on the other hand is a simplex segment containing only an **I** element. The nucleus–coda sequence in the word *scr**ipt*** exemplifies the problem in the latter case.

It must be seen that there are more obvious cases where the Complexity Condition runs afoul of nucleus–onset and nucleus–coda licensing: empty nuclei, whose complexity is 0, can, nevertheless license an onset before them and/or a coda after them (this coda can contain exclusively [s] in English). This takes us back to the problematic p-licensing of the first onset in a bogus cluster (as in (4c)). Guerssel (1990) discusses the licensing of such onsets and concludes that there are three possibilities for the p-licensing of an onset followed by an empty nucleus: (i) it may be licensed by the empty nucleus if that is word final, *i.e.* the nucleus itself is licensed parametrically, (ii) or if the empty nucleus is properly governed (by a phonetically expressed following nucleus), and (iii) such an onset may also be licensed by the second onset flanking the empty nucleus, provided that this onset has the complexity to license it. It is the third of these possibilities that will get some corroboration in **3.1.1.**

2 The speciality of coronality

There is plenty of evidence for claiming that coronality is special among the places of articulation a consonantal segment may have. This fact is captured in underspecification theories by leaving the place node empty in the lexical representation of (some) consonants that are to surface as coronal, the speciality of coronals then is that they have the unmarked place of articulation.

McCarthy & Taub (1992) list five pieces of evidence for the unmarked nature of coronals: (i) their frequency both in speech and in the lexicon, (ii) their appearance in cases of epenthesis, (iii) their distribution,

which is freer than that of non-coronals, (iv) their being assimilation targets, and (v) their possible transparency in vowel harmony systems. In the following I bring examples for some of these criteria, which will be readily explainable by the representation to be proposed for coronals.

2.1 Epenthesis

One place where we encounter consonant epenthesis in English is between a nasal and a following voiceless fricative in foot internal position (*i.e.* after a stressed vowel). Examples are: *prin*[t]*ce, ten*[tθ]. The place of the epenthetic consonant seems to be coronal but, in fact, is determined by the place of the nasal: *Am*[p]*sterdam, trium*[pf], *stre*[ŋkθ].

Another, probably the most obvious, site of consonant epenthesis is hiatus. The traditional notion of hiatus may be represented as an onset, a consonantal position without any melody associated with it. Such an onset has no licensing duties: the only thing it could license, a preceding coda, does not exist because if it did its melody would relink to the empty onset (onset maximising, *i.e.* intervocalic consonants go with the next syllable). It must, nevertheless, be present in the representation, lest the two flanking vowels should merge. Vowel coalescence is, in fact, one of the ways of coping with hiatus, which seems to be disliked by natural languages, *e.g.* in *fuel* the empty onset in the middle vanishes and the two vowels fuse: [fjuː.əl] → [fjʊəl]. The dot (.) indicates the place of the empty onset. An alternative, more careful pronunciation of the word is [fjuːwəl]. In this case the empty onset is filled by vocalic material that can be interpreted in consonantal positions. This shows that filling the empty onset by spreading melody from a neighbouring nucleus stabilises its position. Spreading, however, is only possible from local sources.[6] Examples: *s*[əʊ w]*it, n*[aʊ w]*and, s*[iːj]*ing, fl*[aɪj]*ing.* If there is no local source the hiatus is filled by a "default" glide, which is the coronal [ɹ]. Local source in English thus seems to mean a closing diphthong, *i.e.* one that ends in [ɪ] or [ʊ] (including [iː] and [uː]); a nucleus containing [ə], [ɑː], [ɔː] or a centring glide do not contain an element that could fill the consonantal position.[7] So the glide that fills the hiatus after these vowels is [ɹ], *e.g. s*[ɔː ɹ]*it, grandm*[ɑː ɹ]*is, Indi*[ə ɹ]*and.* Whether coronality is introduced into the representation or simply the absence of an element is interpreted as coronal, is not important at this point, coronality is special in either case.[8]

2.2 Distribution of coronals

There is a considerable number of phonotactic constraints in natural languages that treat coronals differently than non-coronals. The general tendency seems to be that coronal consonants are freer in their distribution than others.

2.2.1 Coronals word finally

The chart in (6) contains the frequency of stops in word final position in English:[9]

(6) **Approximate number of English words with final stops**

	labial		**coronal**		**velar**	
	p	**b**	**t**	**d**	**k**	**g**
_#	406	106	3251	1259	1416	159
of which: r_#	12	18	141	237	88	42
l_#	8	3	62	123	13	0
[+nasal]_#	43	0	658	285	70	0
s_#	11	—	305	—	33	—
f_#	0	—	43	—	0	—
p_#	—	—	50	—	0	—
k_#	0	—	129	—	—	—

(A dash (—) marks those clusters which are excluded by "strong" principles: a difference in voicing, or a prohibition of geminates; while '0' appears in those boxes where nothing seems to exclude the cluster, yet it does not occur.) Comparing the distributions of voiceless stops in word final position, we find that the chance for the labial /p/ to turn up is less than a third of that for the velar /k/, which in turn is less than half of that of the coronal /t/. In the case of voiced word final stops, the difference is more revealing: /d/ occurs almost eight times more often than /g/ and almost twelve times more often than /b/. (It must be mentioned that family names ending in *-berg* and *-burg* account for the surprisingly high frequency of *-rg*.) The contrast is more substantial in word final consonant clusters, where in nasal+voiceless stop clusters the coronal /nt/ is almost ten times as frequent as velar /ŋk/ or labial /mp/, and in addition the latter two occur exclusively in monosyllabic words, *i.e.* after a stressed vowel. (They may occur (in fact, only /ŋk/ does) in compound and quasi-compounds like *chipmunk,* but it is notable that the "unstressed", second vowel such words never reduces to [ə] (*cf.* Nádasdy, this volume). For voiced stops in such

clusters, the divergence is absolute: non-coronal nasal+voiced stop clusters are impossible in most English dialects. A glance at fricative+stop clusters provides further evidence for considering coronals to be special: it is only the "most coronal" fricative, /s/, that occurs before all the three voiceless stops, and there the ratio of the coronal /st/ to velar /sk/ is again almost 10 : 1 like for nasals, with labial /sp/ showing up in 11 cases only, [ə] never turning up before it. (The reason this is important is that stressed syllables carry more contrasts, while unstressed ones reduce these leaving only unmarked segments and clusters.) The other fricative possible before a stop in English word finally is the labial /f/, but only before the coronal /t/, and again never in an unstressed syllable (the data on [ə] are from Gimson (1989 : 251ff.)).

In word final—and for that matter word internal—stop+stop clusters the first place can be occupied exclusively by non-coronals, the second by coronals, /tk/ and /tp/ are impossible. Counterexamples like *Atkins, Rutgers,* probably all contain a bogus cluster (see (4c)), even if this is not obvious synchronically, *i.e.* there is no analytic boundary between the two stops. It is notable that all non-proper-nouns containing /tk/ and /tp/ are compound words with a word boundary between the two stops, which means all such clusters are definitely separated by an empty nucleus.

If English restricts the presence of non-coronal consonants in word final position, other languages may absolutely prohibit this. Classical Greek is one example: this language allows one of three coronals to occupy word final position: [n], [r], and [s]. (Proclitics, like *ek* 'from' and *ōk* 'not', are exempt from this constraint.) Latin has a very restricted set of words ending in a non-coronal, which is [k] in all of the cases: *lac* 'milk' is the only noun, accompanied by a few demonstrative pronouns like *hic* 'this' and three imperative verbal forms, *dic* 'say', *duc* 'lead' and *fac* 'do'.[10] Spanish also restricts the set of consonants in word final position: only [s], [l], [r], [n] and [ð], all of them coronals, may occupy this position. Finnish is another language that allows only coronals in word final position (Yip 1991 : 71).

2.2.2 Coronals before [j]

In a conservative version of the prestige British pronunciation, RP, [j] is excluded only from the position following a post-alveolar coronal (Wells 1982 : 206ff., 247ff.), *i.e.* **ch*[j]*ew,* **J*[j]*ew,* *[ʃjuː], *[ʒjuː], **r*[j]*ue.*[11] In the contemporary pronunciation, the environment not tolerating [j] after it is more extensive: the other coronal fricatives [s], [z], [θ], [ð] and [l] also join the group of consonants after which [j] disappears. The change, called *Yod-dropping* by Wells, seems to spread from the more frequently used words

to rarer ones, as it often happens in natural languages. That *s*[∅]*uit* type pronunciations occur more often than *s*[j]*uit,*[12] while *th*[j]*ew* is more usual than *th*[∅]*ew* reflects only the fact that words with historical [θjuː-] are rare, since in rare words containing historical [sjuː-] like *pseudo-,* the yodful variant is more frequent, according to Wells (1990) at least. It seems to be a historical accident that [ðjuː-] is non-existent in the language, but as with the case of hypothetical [ʒjuː-], we may presume that it would behave like [θjuː-]. General American excludes [j] in the environment of segments of a natural class again: yod-dropping occurs after all the coronals (*e.g. t*[∅]*une, d*[∅]*une, th*[∅]*ews, n*[∅]*ew vs.* RP *t*[j]*une, d*[j]*une, th*[j]*ews, n*[j]*ew*). In the East Anglian vernacular [j] does not occur after any consonant (*e.g. m*[∅]*usic, b*[∅]*eauty, v*[∅]*iew, f*[∅]*ew, p*[∅]*ew, c*[∅]*ute* (Wells 1982 : 207)), but there is no dialect that happens to select labials or velars to have the power (or weakness?) of excluding [j] from after them.

There is a very similar phonotactic constraint in Hungarian, morpheme internally obstruents and nasals can be followed by [j] only in case they are not coronal (Törkenczy 1994). It is not at all obvious how this peculiarity of coronals picks them out as unmarked and why post-alveolars are the first to undergo yod-dropping, I attempt an answer to these questions in **3.1.3.**

2.2.3 Coronals before [s]

In Greek and Latin alike, the singular nominative affixation of a certain class of nouns singles out coronal stems. The suffix in question is *-s*. The relevant data are listed in (7) and (8):

(7) **Suffixation of *-s* in Classical Greek**

Labial stems:			**Coronal stems:**		
gūp-s	→ gūps	'vulture'	ornīth-s	→ ornīs	'bird'
phleb-s	→ phleps	'vein'	kharit-s	→ kharis	'thanks'
Velar stems:			nukt-s	→ nuks	'night'
onukh-s	→ onuks	'nail'	gigant-s	→ gigās	'giant'
korak-s	→ koraks	'raven'	lampād-s	→ lampās	'torch'
aig-s	→ aiks	'goat'	rhīn-s	→ rhīs	'nose'
pharu[ŋ]g-s	→ pharu[ŋ]ks	'throat'	hal-s	→ hals	'salt'
sark-s	→ sarks	'flesh'	martur-s	→ martus	'witness'

(8) **Suffixation of *-s* in Latin**

Labial stems:			**Coronal stems:**		
op-s	→ ops	'power'	pariet-s	→ pariēs	'wall'
trab-s	→ tra[p]s	'timber'	pont-s	→ pons	'bridge'
urb-s	→ ur[p]s	'city'	art-s	→ ars	'art'
hiem-s	→ hiems	'winter'	custōd-s	→ custōs	'guard'
Velar stems:			frond-s	→ frons	'foliage'
duc-s	→ du[ks]	'leader'	sanguin-s	→ sanguis	'blood'
arc-s	→ ar[ks]	'fort'	flōr-s	→ flōs	'flower'
rēg-s	→ rē[ks]	'king'			

(There are no stems that end in *-m* in Greek. Stems ending in *-n* and *-r* (and *-l* in Latin) are more common without the *-s* nominative suffix.) Non-coronal stems undergo laryngeal neutralisation in their stems when suffixed with *-s,* but the resulting voiceless unaspirated stop is retained in all the cases. The stems ending in a coronal, on the other hand, lose their stem final coronal before the suffix, the only exception is the single stem ending in *-l* in Greek.

A similar dichotomy is present in the verbal paradigm as well. In (9), I only mention one laryngeal type of the three, stems ending in an aspirated stop since it is indicative of the others, unaspirated and voiced final stems, too. For first person singular, the "weak" aorist suffix is *-sa,* accompanied by an *e-* prefix, the passive perfect suffix is *-mai,* with a reduplication of the stem, while *-tos/-teon* creates "verbal adjectives" with the meaning 'to be done'. The last verb has only medial and passive voice formally (hence the different suffix for the aorist):

(9) **Suffixation of *-sa, -mai,* and *-tos* in Classical Greek**

Stem	**Aorist**	**Passive perfect**	**Verbal adj.**	**Gloss**
kruph- →	e-krup-sa	ke-krum-mai	krup-tos	'hide'
peith- →	e-pei-sa	pe-peis-mai	peis-teon	'persuade'
dekh- →	e-dek-sa-mɛ̄n	de-de[ŋ]-mai	dek-tos	'take'

Here again non-coronals pattern in a similar way as in (7) and (8): they neutralise or nasalise,[13] coronals in the meantime vanish before /s/, like in the nominal paradigm, or become /s/ themselves.[14] Latin exhibits a similar pattern in perfect stems with an *-s* suffix (the first member of the following pairs is 1sg. pres., the second 1sg. perf.): *scrī**b**ō* ∼ *scrī**p**sī* 'write', *te**g**ō* ∼ *tē*[**ks**]*ī* 'cover' *vs. lū**d**ō* ∼ *lū*[∅]*sī* 'play'.

2.3 Assimilation of coronals

Coronals are usually more prone to assimilate in place of articulation to a neighbouring segment than non-coronals.

2.3.1 Nasals assimilating

A well-known type of assimilation is that of nasals to the following stop in its place of articulation. Kiparsky (1985) is a classic account of the facts in Catalan. He observes that of the four underlying nasals in the language (/m, n, ɲ, ŋ/) only the coronal /n/ assimilates totally in place of articulation to the following stop, the labial /m/ does so only to /f/ yielding [ɱ], while the palatal and the velar nasal do not usually assimilate.

Such nasal-to-stop assimilation can be found in many other languages. The behaviour of the three underlying nasals (/m, n, ɲ/) of Standard Hungarian is similar to the case of Catalan nasals: it is only the coronal /n/ that takes part in the assimilation whole-heartedly, the labial /m/ assimilates only to /f/ and /v/ again yielding [ɱ] and the palatal /ɲ/ may assimilate in fast speech (Siptár 1991).

The palatal nasal assimilates in a very similar way as the coronal in some northern dialects of Hungarian spoken in Slovakia. The list in (10) gives some examples from my personal experience:

(10) **Palatal assimilation in "Northern" Hungarian**

Standard	**"Northern"**	**Gloss**
kö[ɲ]v	kö[ɱ]v	'book'
korm[aɲ]zó	korm[ãː]zó	'governing'
ké[ɲ]telen	ké[n]telen	'obliged'
asszo[ɲ]ka	asszo[ŋ]ka	'young wife'
k[oɲ]ha	k[õː]ha	'kitchen'

The cause of the different behaviour of palatals in the two dialects may lie in the difference of the palatals themselves: the Standard dialect having palatal consonants where the "Northern" has palatalised ones, which are basically coronal. But this, of course, is a pure conjecture. A more detailed discussion of nasal assimilation in the Standard dialect is given in **3.1.4.**

2.3.2 Stops assimilating

Jones (1975 : 227) and Gimson (1989 : 298) describe a phenomenon whereby word final coronal stops and nasals assimilate in their place of articulation

to the word initial stop or nasal of the following word. Some of Gimson's data are listed in (11):

(11) **Coronal assimilation in RP**

tha[p] pen	goo[b] pen	te[m] players
tha[p] boy	goo[b] boy	te[m] boys
tha[p] man	goo[b] man	te[m] men
tha[k k]up	goo[g k]oncert	te[ŋ k]ups
tha[k] girl	goo[g] girl	te[ŋ] girls

There are also cases when coronals do not suffer but induce place of articulation assimilation. The history of Italian offers an example for coronals being assimilation triggers rather than targets. The data in (12) exemplify the fate of the Latin non-coronal+coronal clusters in Italian (the gloss is for the Italian words, the Latin etymon usually has a similar meaning):

(12) **Latin non-coronal+coronal clusters in Italian**

Latin	**Italian**	**Gloss**	**Latin**	**Italian**	**Gloss**
Labial+coronal:			**Velar+coronal:**		
conce**pt**um	> conce**tt**o	'concept'	fa**[k]t**um	> fa**tt**o	'fact'
pro**mpt**us	> pro**nt**o	'ready'	pu**[ŋk]t**um	> pu**nt**o	'point'
abso**rpt**us	> asso**rt**o	'immersed'	a**r[k]t**icus	> a**rt**ico	'arctic'
a**bd**omen	> a**dd**ome	'stomach'	Ma**gd**alena	> Ma**dd**alena	a name
da**mn**are	> da**nn**are	'condemn'	fri**g(i)d**us	> fre**dd**o	'cold'
la**ps**um	> la**ss**o	'period'	ne**[ks]**us	> ne**ss**o	'connection'
			a**[ŋks]**ietas	> a**ns**ietà	'anxiety'

It is strange that in this case coronals seem to be the trigger of assimilation in a situation where non-coronals stay inactive. In **3.1.1.1,** I offer an analysis that proves assimilation to be only a descriptive term in this case for what is in fact lenition.

Curiously, fricatives and liquids do not usually take part in place of articulation assimilation processes either as targets or as triggers, while affricates may be triggers when in onset position, but not targets. This follows from the double-facedness of affricates: their stop part triggers the assimilation, but their fricative part resists being assimilated. To this I return in **3.1.1.2.**

2.4 Other pieces of evidence

It is noteworthy that consonantal assimilations may involve either laryngeal features (including nasality, *cf.* note 13) or coronality. Labials are not attested in phonological harmonies, while other places of articulation do not feature in any types of harmonies at all (Shaw 1991 : 128ff., Vago to appear). Coronals also often turn up as transparent consonants, *e.g.* in the *CC_iVC_i constraint (*cf.* Törkenczy, this volume).

There are also languages in which vowels can spread and fuse across coronals, while non-coronals block such processes, *e.g.* Fula, Guere and Mau (Paradis & Prunet 1989).

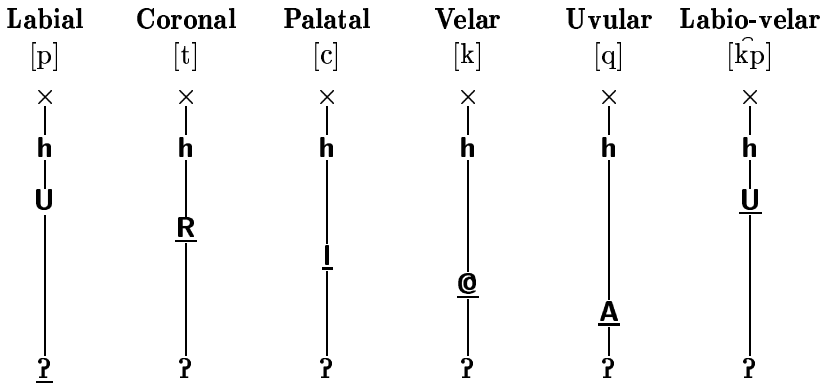
Maddieson sets up an implicational hierarchy for voiceless stops along the following lines: *t ⊃ k ⊃ p (where '*t' stands for an undistinguished dental/alveolar place) (1984 : 13). For nasals the relations are different: *n ⊃ m ⊃ ŋ, ɲ (*op.cit.* : 69); coronals are, nevertheless, first in both cases. If a language has only one fricative this is most likely to be [s], if it has two or three, [s] is one of them (*op.cit.* : 52–54). An overwhelming majority of liquids is coronal in the world's languages (*op.cit.* : 78).

All these facts lead us to treat coronals as the special place of articulation. It must be noted though that labials also show up as default consonants, *e.g. ingó-bingó* 'wavering' (the second element is a "meaningless reduplication"), *Anna* → *Panni, István* → *Pisti, András* → *Bandi* names and their diminutives with "unetymological" labials. Velars may also come to stage in the role of unmarked consonants, this is discussed in **3.2.**

3 Problems with representing place of articulation in GP

As has already been mentioned in **1.1,** there is supposed to be an element responsible for coronality, **R**. The place characteristics of other consonants are contributed by other elements. Let us consider the representations of six voiceless unaspirated stops of different places of articulation as in (13):

(13) **Representation of stops**



The labial [p] and the labio-velar [k͡p] are isomers: they are made up of the same set of elements differing only in the choice of the head. Aspirated stops include a further **H**, fully voiced ones a **L** element in addition to these, while in voiced aspirated stops we find both laryngeal elements.

Apparently, all six stops are equally complex, containing three elements. It is implicit in this statement that the neutral **@** element, which is omnipresent at the intersections of melodic tiers and skeletal positions where no other element resides (*cf.* **1.1**), does contribute to the complexity of a segment of which it is the head, while it is ignored in the complexity count in other cases. There is evidence, however, that the neutral element, **@**, does not add to the complexity of a segment be it a head or an operator. If this were not so, the vowel reduction cases mentioned in (15) below would not be lenitions but fortitions. It seems that "losing head" (which means gaining **@** as head) counts as simplification within a segment, and from this it follows that velarity is the odd man out among places of articulation. (More of this is to be said in **3.2.**) This then means that in terms of their licensing potential the five non-velar stops in (13) should not exhibit any difference, but this assumption is in conflict with the data on a number of occasions.

Let us recall that the distribution of the place of articulation of the consonants in English genuine voiceless stop+stop clusters, *i.e.* when the first stop is in coda, the second in onset position, is quite constrained: the only two possible clusters of this type are [pt] and [kt], *i.e.* the velar patterns together with the labial, and the coronal is exceptional. If these are to be genuine clusters (which they seem to be given the fact that there is a constraining template 'non-coronal+coronal', which indicates some kind of relationship between the elements), the one to the right, in onset position

should be more complex than the one to the left. Both Kaye *et al.* (1990) and Harris (1990) claim that the non-coronal member of such clusters is less complex by virtue of lacking an element: the **H** in Kaye *et al.*, the **h** in Harris. Kaye *et al.*'s account does not take into consideration the fact that there are languages (*e.g.* French) which exhibit the same phonotactic constraint on stop+stop clusters, yet do not appear to have an **H** element at all (*cf.* Harris 1994:133ff.). Harris's explanation fares better, but it will not stand up to Rice's critique, which will be discussed presently. According to Harris, in the case of voiceless unaspirated stops, the coronal is more complex, containing three elements (**h**, **R**, **ʔ**) than the preceding non-coronal, which has only two in the case of [p]: **U**, **ʔ**; or one in the case of [k]:[15] **ʔ** (recall, **@** does not count in the complexity).[16]

Rice (1992:82) mentions two problems with this account of the facts: (i) two sets of obstruents must be posited underlyingly: those that are released and those that are not and (ii) the fact that only the coronal stop can govern a preceding coda, and others can only govern tautosyllabically seems arbitrary. The first of these objections seems easily dismissable: GP does not really recognise any difference between underlying and surface representations, between deeper phonemic and more superficial phonetic levels. The second, however, is probably a strong blow, despite the fact that Rice's wording is misleading, labial and velar stops can govern a preceding coda as well, though this cannot be a coronal stop (neither any other stop, nor a coronal nasal for that matter, but it can be a coronal fricative or liquid). What should be there in the element **R** that should make complex segments containing it special? The representations of consonants at the different places of articulation, as in (13) do not hint at why it should be coronals of all that behave differently.

The phonotactic constraint on stop+stop clusters in English features in a number of other languages including French, Greek (Kaye *et al.* 1990) and Latin. Greek, for example, seems to apply the template even to bogus clusters (Guerssel's onset–onset licensing is probably at work here): of the stem *tek-* 'to bear young' imperfect reduplication forms *ti-tek-,* which undergoes syncope (or ablaut) yielding *ti-t*[∅]*k-*. Such a form obviously has an empty nuclear position between the stem consonants. Yet, we get *tiktɔ̄* 'I bear' on the surface. English can serve with another example: *enmity,* a word related to *enemy*, with a likely empty nucleus between the nasals, is pronounced, "incorrectly" as Wells (1990) says, *e*[mn]*ity.*[17]

The same phenomenon extends to certain stop+fricative clusters as well, [ps] and [ks] clusters do occur in all these languages, [ts] clusters do not (*cf.* the Greek and Latin data in **2.2.3**). We may wonder if these are

genuine clusters, but if they happened to be separated by an empty nucleus, the existence of such a strong phonotactic constraint would be even stranger.

3.1 A solution for coronal unmarkedness

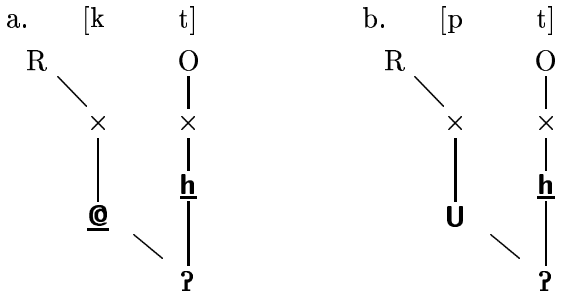
The idea of doing away with the coronal node of feature geometries might be parallelled by a very similar change in GP, the expulsion of the coronality element, **R**, from segmental representations.[18] It is very important to note that claiming that the element **R** is not present in the lexicon does not mean that it would be added to segments not containing a place element later on in the derivation. It means that there is *no* **R** element neither underlyingly nor anywhere else, the absence of a place element is interpreted as coronality under certain circumstances, which are worth considering but will not be discussed here. In the following, I will list evidence in favour of such a modification and also mention some of the difficulties this radical move brings about.

Harris & Lindsey (1993) admit that the single pattern signature of the element **R** identified in Lindsey & Harris (1990 : 366ff.) "has proved somewhat elusive", there is no firm phonetic evidence for positing an element that superimposes coronality on other elements or on which other elements superimpose their salient characteristic in the spectrogram of a coronal segment. It is also worth considering that while all the other "place defining" elements have an independent vocalic realisation of their own, **R** cannot be interpreted in a nucleus, *i.e.* while there is a labial vowel, [u], a palatal vowel, [i], a velar/neutral vowel, [ɯ] and a uvular vowel, [ɑ], there exists no coronal vowel.

If coronals are less complex than non-coronals, this explains why some languages (like Finnish and Greek) restrict word final position exclusively to them, while others (like English and Latin) prefer them to more complex non-coronals there. Licensing inheritance predicts word final position, before an empty nucleus to be a lenition site, and [t] may be seen as a lenited [p] or [k].

Let us see what the stop+stop clusters of English, French, Greek and Latin would look like if [t] were represented as {**ʔ** **h**} as in (14):

(14) **R-less representation of [kt] and [pt]**



(The laryngeal element is excluded again.) Two reasons for nominating **h** as head of the segment are that (i) [t] and [d] are much more prone to affrication than [p] and [b] or [k] and [g] and (ii) if **ʔ** were the head, labialised coronals would not be different from labials (*cf.* (13)), which, in fact, they are. The headness of **h** will also come handy in the [tj] → [ʧ] change in **3.1.3.** There is, however, a problem with **h** being the head of [t]: the coda [p] of [pt] will not have a head, since the **ʔ** element it shares with [t] cannot be a head (in [p]) and an operator (in [t]) at the same time. The representations in (14) conform to the Complexity Condition (5) in that the licensed coda position licenses only one element.[19]

3.1.1 Place spreading backwards

In order to account for the absence of [tp] and [tk] clusters, a principle is needed along the following lines (15):

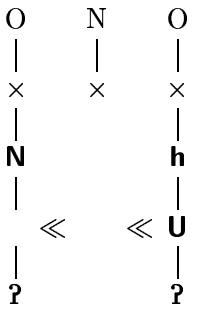
(15) **Place Spreading Backwards Principle**
The place element of an onset spreads to the preceding position licensed by it.

The question whether this principle is a universal one or only a parameter which at least English, French, Italian, Latin, Greek and Hungarian set at on needs further research. What is more interesting is that in some languages the "preceding position licensed by it [*scil.* the onset]" need not be a coda, it may be an onset head followed by an empty nuclear position. The fact that such spreading of a place element exists corroborates Guerssel's (1990) claim that there must be an onset to onset licensing relation.

English seems to be a language in which this kind of spreading may, at least optionally, happen. A derivation like, for instance, *moonbeam* becoming *moo*[m] *beam* is thus not accomplished by resyllabification, [mb]

turning into a coda–onset cluster. Instead, the place element **U** spreads from its original onset slot across the empty nuclear position to the final onset of the preceding word, as shown in (16):

(16) **Place element spreading in a bogus cluster**



A piece of evidence for the bogus status of this configuration, *i.e.* that it is different from a genuine, coda–onset cluster, comes from the fact that laryngeal elements do not spread in such a situation. Recall: *that boy* → *tha*[p] *boy, good boy* → *goo*[b] *boy.* The exact details of how laryngeal properties of consonants are represented are not to be discussed here, though. There is another consideration that points in this direction: English seems to have a parameter that bars the simultaneous spreading of certain elements between a coda and its licensor onset. In a less cryptic way this may be formulated as: there are no geminates in English. (In **3.1.1.2** I will attempt to show that geminates do not always share all their melodic material.) The only place to encounter a fake geminate in the language is when a domain final empty nucleus intervenes its two parts, *e.g. un#natural,* where the prefix being analytic (a level 2 prefix) constitutes a domain, at the end of which an empty nucleus is licensed in English. That the place element can spread across domain boundaries is further supported by the existence of forms like *u*[m]*#marked,* where we obviously have a fake geminate. The existence of the geminate in *goo*[b] *boy* implies then that there must be an empty nucleus between the two [b]'s here as well, across which the place element could, nevertheless, spread through.

3.1.1.1 Coda–onset clusters

In the following I will examine possible and impossible coda–onset (*i.e.* genuine interconstituent consonant) clusters of English to see what generalisation could be made about them. Liquids are excluded for two reasons:

they have neither an active nor a passive role in place of articulation assimilations and their segmental make-up has become rather uncertain with the death of **R**. "Voiced" obstruents are also excluded.

In (17) I give a tentatively exhaustive list of English coda–onset CC clusters (where C=voiceless obstruents and nasals):

(17) a. sp st sk sn sm sf sθ
b. pt kt ft mn
c. mp nt ŋk ɱf nθ ns nʃ ntʃ
d. pn tn tm kn θm θn ʃt ʃn ʃm
e. pθ tθ fθ
f. ps ks

(17a–c) contain the well-attested cases of coda–onset clusters, while (17d) is a list of marginal clusters, (17e) and (17f) are clusters whose coda–onset status is less and more dubious, respectively. Positing the three conditions in (18) together with the Place Spreading Backwards Principle (15) seems enough to filter out all the impossible clusters (without having recourse to charm theory as in Kaye *et al.* 1990) while allowing those in (17b) and (17c):

(18) **English Coda Constraints**
a. Coda cannot license a place element different from that of onset.
b. Coda must license some element independently from onset.
c. Coda's independently licensed element cannot be **h** or **ʔ**.

These constraints are posited here for English, but we will see that they hold for other languages, among them Hungarian, too (see **3.1.4**). The constraint in (18a) excludes coda–onset clusters like [pk kp fk mk], while it allows any coronal+non-coronal or non-coronal+coronal cluster provided that coronals do not have a place element. The only exception to this is the cluster [ʃm] (*e.g. schmooze*), which is very marginal in English anyway, we might as well decide not to cater for its existence. It is the job of (18b) to disqualify geminates and clusters like [fp], where the coda does not license any element on its own: both the **h** and the **U** element of the [f] in [fp] are shared with the [p].[20] This constraint also makes it impossible for coronal stop+non-coronal stop clusters to survive: if coronals do not have a place element, a coda position containing a coronal does not license any element independently of the following onset. (18c) effectively discards all coda–onset clusters where the coda is a fricative and the onset is not an obstruent, that is, the coda

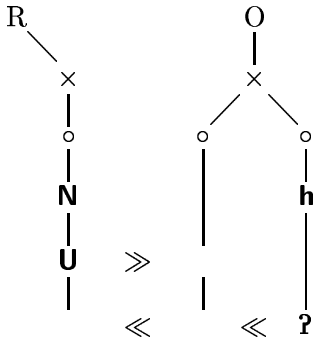
should license **h** on its own: [fn fm θn θm];[21] as well as clusters with a coda stop and non-occlusive onset, which would mean that the coda would have to license **ʔ** on its own: [ps ks pθ tθ].[22] Since the genuine status of [ps ks] is very questionable, the only problem here are the words *breadth, width* and *depth.* These all have a morpheme boundary within the cluster, the suffixation, nevertheless, does not seem to be analytical, witness the shortening of the nucleus. Coronal+non-coronal clusters are ruled out by the Place Spreading Backwards Principle.[23]

We are now left with one group whose genuineness is unquestionable, yet is ruled out: the [s]+C clusters in (17a). These defy both the Place Spreading Backwards Principle and the constraint that the coda must license some element of its own (given in (18b)). Coda–onset clusters with an [s] in coda behave very peculiarly anyway: this is the only type of coda–onset cluster that can occur with an empty nucleus before it both word initially (*e.g. street*) and word medially (*e.g. te*[ks]*t*) (*cf.* Kaye 1992). Further research is desperately needed here.

The Italian data presented in (12) can now also be explained quite simply, without having to suppose that the coronals, which apparently act as assimilation triggers would be actively participating in the process. Instead, we may presume that Latin, like English, allowed codas to license an independent place element, Italian, on the other hand, constrains (18c) further, prohibiting the independent licensing of a place element too by the coda, and this results in the Latin codas with an independent place element letting this element go, yielding placeless coronals in such codas in Italian.

In *promptus,* which contains an epenthetic [p] (the stem is *prom-*, the suffix *-tus*) the cluster [mpt] may be thought of as a genuine coda–onset sequence of the following form (19):

(19) **A genuine [mpt] cluster**

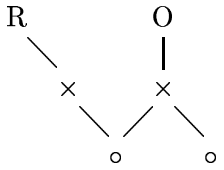


The new element of this representation is the inclusion of the root nodes (symbolised by "∘"), which make the appearance of the epenthetic [p] possible. (The arrowheads (≪ / ≫), which symbolised the "spreading" of elements in (16), do not stand for the same kind of spreading: this time "spreading" is not necessarily a process, as it was previously, instead it means that the elements are licensed by the slot they are under and are interpreted under the slots they "spread" to, like in (14) but the convention used there is impossible here for typographical reasons.) The formation of this structure is apparently due to the fact that the coda is not "strong" enough to license both its elements and has to pass over some of its duties to its licensor, the onset. When Italian constrained the set of elements licensable by the coda (excluding place elements), the **U** of the coda disappeared and a single **N** element was left, which could be handled by the licensed coda slot. The loss of the place element resulted in [nt], not [ntt], which would have been the case if the [p] were not only a joint venture of the coda and the onset, in which the onset helped the coda to license its place element. The evidence for representing [mpt] as in (19), which basically claims the presence of a coda [m] followed by an onset [t], is weakened considerably by the existence of [ŋkt] clusters as *e.g.* in Lat. *punctum* 'point' (> It. *punto*), as these imply original [ŋt] coda–onset clusters with an epenthetic [k].

3.1.1.2 Geminates

A short excursus must be made here on the problem of geminate consonants. These always form a heterosyllabic cluster, *i.e.* a coda–onset sequence, and are generally thought of as involving the sharing of the root node by two skeletal positions, the first linked to a coda the second to an onset. Whereas this may be true for all continuants, it is definitely not the case for affricates, in the case of which it is only the first root node that is shared by the coda and the onset, as shown in (20):

(20) **A geminate affricate**



The representation in (20) states that only the first (stop) phase of an affricate is interpreted under the coda slot, the second (fricative) phase

belongs exclusively to the onset. This means that instead of, for instance, [tʃtʃ] we get [ttʃ].

Something similar happens with stops as well, the explosion so characteristic of a stop does not occur twice in a geminate stop, which would be the case if the coda and onset slots shared the root node. Instead there seem to be two root nodes here, the first of which shares the **ʔ** and place and laryngeal elements with the second, which in addition contains **h**. Thus we are apparently forced to posit a universal constraint that prohibits interpreting **ʔ** and **h** simultaneously under a coda slot. This marks out these two elements as a natural class once again. Similarly, it is the marked case in consonants to have both laryngeal elements (**H** and **L**) interpreted in the same segment (resulting in voiced aspirates, like [b^h]), or to have two place elements (resulting in double articulation, *e.g.* [p^j k^w]).

We may consider abandoning the constraint in (18b), which required codas to license some element independently of the following onset, and positing instead something along the lines of (21):

(21) **English Coda Constraint [alternative]**
Place element may only be shared together with **ʔ**.

Without the constraint in (18b) [s]+C clusters would be safe and the alternative in (21) would make sure that the Place Spreading Backwards Principle could not be effective: [s] does not share the **ʔ** element with the onset following it. The cluster [fp] would still be ruled out by (21). The non-existing clusters we now let live are geminate stops and nasals, which share both the place element and **ʔ**. (21), nevertheless, is a constraint that seems to be universal: fricatives and non-nasal sonorants do not usually[24] indulge in place of articulation assimilations. (We may now wonder if [l] contains **ʔ**. The interpretation of the Hungarian data in **3.1.4** seems to suggest it does not.)

3.1.2 Place spreading forwards

If coronals are **R**-less a restricted version of the stipulation in (22), stated by Kaye *et al.* (1990 : 212) (who are not responsible for the name) can be maintained:

(22) **Onset Place Spreading**
Elements may not spread within an onset.

It has been attacked by Brockhaus (1990:282), who points out that (22), as it is, excludes thriving branching onset sequences like [tr] and [dr]. She proposes an alternative version, which runs like (23):

(23) **Onset Place Spreading** (à la Brockhaus)

Segments within a branching onset may not share more than one element.

This does come closer to the segregation aimed at: [tr] escapes with the sharing of one element (**R**), but [tl] is excluded, since the two consonants share both **R** and **ʔ**. Harris (1990:277ff.) notices that (23) still allows illegal onsets, like [pw]. If we now return to Kaye *et al.*'s version (22) with **R**-less coronals, [pw] is ruled out, as they share the place element, **U**, [tl] is ruled out as an instance of sharing **ʔ**, while [tr] is allowed, since the two consonants have no place element they could share. The problem now is that [kl] and [pl] are ruled out on the same basis as [tl] is, in both cases a **ʔ** element is shared. Escaping in the direction of saying that the two slots license two **ʔ**'s independently has the unwanted effect of letting in any onset cluster that conforms to the Complexity Condition (5), *i.e.* many stop+nasal, or extending the independent licensing possibility to **h**, stop+fricative clusters. This is clearly unwanted. Restricting Kaye *et al.*'s formulation, the principle might look like (24):

(24) **Place Spreading Forwards Principle**

A place element may not spread within an onset.

This statement curiously complements the Place Spreading Backwards Principle in (15). Though there is no explanation for why place elements should like to spread backwards but not forwards, this still seems to be a universal tendency of grammar. (Place elements can marginally spread forwards, see, for example (19), and cases like *happ*[ən] → *happ*[m̩], but never within an onset.)

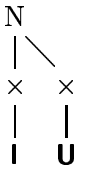
This restriction still allows [tl] as an onset cluster, as now there is no place element that the two segments share. The non-existence of [tl] is questionable, *cf.* the data of Jones and Gimson in **3.2,** but the cluster is surely very limited. If it must be excluded, the Complexity Condition (5) may be invoked, although I do not exactly see how, as the representation of [l] has become somewhat dangling with the vanishing of **R**. Yet it is certainly more complex than [r] (*cf. hurl vs. *hulr*), while [t] now is less complex than [p] or [k], which latter do license [l] as their onset complement.

3.1.3 Yod-dropping

The **R**-less representation of coronals and the Place Spreading Forwards Principle (24) jointly offer a partial explanation to yod-dropping, presented in **2.2.2.**

Post-consonantal [j] has a very restricted distribution in English, it almost exclusively occurs before a nucleus containing [uː].[25] This fact suggests that the [j] in this case is intimately bound with the nucleus itself: it is the first element of an [iu] diphthong, as historical evidence and other dialects (like *e.g.* in Wales, where [juː] is pronounced [ɪʊ]) show. The segment [ɪʊ] may be represented as in (25):

(25) **The segment [iu]**



Why the **I** should be forced out of the nucleus in most English dialects is unclear, but may have something to do with the merger of the **I**- and **U**-tiers, which is responsible, in the first place, for the emergence of those [iu] diphthongs of the language that are a reflex of ME [yː]. Besides, the complexity (or rather "simplexity") of the two segments make this an unstable diphthong.

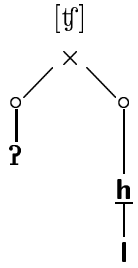
Once it escapes from the control of the nucleus it searches for a slot to anchor to. It has the possibility of relinking to a preceding empty onset in words beginning with orthographic *u,* as in *unit.* These words patterns similarly to words having a filled initial onset (*i.e.* words beginning with a consonant), as is proven by their choice of articles: *a unit, *an unit; th*[ə] *unit.* The first slot of the remaining branching nucleus is filled by the spreading out of its **U** element. If the preceding onset is filled, the now floating **I** has three choices: (i) fuse with the elements of this onset: *e.g. i*[ʃ]*ue, a*[ʒ]*ure,* [ʧ]*uesday;* (ii) remain floating and therefore phonetically unrealised: *e.g. ch*[∅]*ew, bl*[∅]*ew* or (iii) join the onset as its complement: *e.g. c*[j]*ure, b*[j]*eauty.*[26]

The element's choice is, however, far from being free. In case the onset is filled by a segment containing the **I** element itself, as in *chew,* joining the onset as a complement is prohibited by the Place Spreading Forwards Principle, and the choice between fusing with the onset's elements

and remaining floating is indistinguishable, since two **I**'s (if there was fusion) are interpreted in the same way as one (if the **I** remained floating). It must be mentioned here that /r/ in English patterns quite much like if it contained an **I**. Harris (1994 : 259) posits the elemental make-up {**I R**} for what he calls the "clear approximant /r/" as opposed to the "dark approximant /r/", on the one hand, which is {**@ R**}, and the tap [ɾ], on the other, which is the phonetic realisation of his coronality element (**R**) in itself. I will not be able to suggest an acceptable alternative to the representation of clear approximant [ɹ], even if **R**-less it is evidently not a single **I** element. A piece of evidence for the presence of an **I** in /r/ is the place assimilation of /sr/ to [ʃɾ], which is obligatory in word initial position, *i.e.* when the two consonants form a genuine coda–onset cluster (*e.g.* [ʃ]*ri Lanka,*[27]) and optional in bogus (onset–onset) clusters (*e.g. Mi*[ʃ] *Robins.*) This is exactly how place spreading backwards works in English, so there is no reason not to see it as the spreading of the place element **I**. Another fact that implies the existence of **I** in /r/ is that it behaves like obviously **I**-ful segments, [ʃ], [ʒ], [ʧ] and [ʤ]: the [j] does not have its say in the onset if it is occupied by /r/.

Coronals which are allegedly placeless either are complemented by the [j], as in *T*[j]*uesday,* or fuse with it, as in [ʧ]*uesday*. In the latter case, the result is a segment of the form in (26):

(26) **The output of the fusion of [t] and [j]**



The reason why the entrance of the **I** splits the segment is unclear, but the one in (26) is certainly the only configuration in English these three elements may occupy under one skeletal position. The same excuse can be brought up against an objection that misses the explanation of why [n] and [l] may not fuse with [j]: the resulting configurations would be unprecedented in English. A weak excuse it may be, still I have no other for the non-fusion of [θ] and [j] either. The make-up of [θ] is a mystery as well, Backley (1993 : 322) proposes {**h H**} but this needs further investigation. Coronals in General

American may be thought of as too week to license a following [j], after all, coronals do contain one less element now than non-coronals.

Non-coronals cannot fuse with [j], which is a place element, because they have a place element of their own. Instead, a new onset complement position is created in the Vergnaldian manner (see note 26), which accommodates the [j] expelled from the nucleus, *e.g.* *p*[j]*ure.* If the onset into which the [j] is to make its entrée is already complete, *i.e.* if it is branching, the [j] pushed out of the nucleus cannot crowd in as third, since the onset cannot license more than two segments, *e.g.* **bl*[j]*ew.*

3.1.4 Nasal+consonant clusters in Hungarian

Positing **R**-less coronals brings us closer to an explanation of the divergent behaviour of nasals in nasal+consonant clusters in Hungarian. The relevant data are presented in (27):

(27) **Nasal+consonant clusters in Hungarian**

[m]+C	Imre	→	[imrɛ]	a name
	rumli	→	[rumli]	'mess'
	MZ	→	[ɛm(b)zeː]	a motorcycle type
	tömzsi	→	[tøm(b)ʒi]	'stout'
	szomszéd	→	[somseːd]	'neighbour'
	kém#centrum	→	[keːmt͡sɛntrum]	spy-centre
	Sámson	→	[ʃaːmʃon]	name
	csámcsog	→	[ʧaːmʧog]	'munch'
	dumdum	→	[dumdum]	'dum-dum'
	teremt	→	[tɛrɛmt]	'create'
	omnibusz	→	[omnibus]	'omnibus'
	nyámnyila	→	[ɲaːmɲilɔ]	'puny'
	tömjén	→	[tømjeːn]	'incense'
	EMKE	→	[ɛmkɛ]	a location in Budapest
	lomha	→	[lomɦɔ]	'sluggish'
[n]+C	Henrik	→	[hɛ̃ːrik]	a name
	ajánl	→	[ɔjãːl]	'offer'
	pénz	→	[pɛ̃ːz]/[pendz]	'money'
	benzin	→	[bɛ̃ːzin]/[bɛndzin]	'petrol'
	enzim	→	[ɛ̃ːzim]/[ɛndzim]	'enzyme'
	cenzor	→	[t͡sɛ̃ːzor]	'censor'
	banzáj	→	[bɔ̃ːzaːj]	'binge'
	avanzsál	→	[ɔvɔ̃ːʒaːl]	'get to a higher rank'

	ENSZ	→	[ɛ̃ːs]	'UN'
	kliens	→	[klijɛ̃ʃ]	'client'
	kén#sav	→	[kẽːʃɒv]	'vitriol'
	mancs	→	[mɒn̲ʧ]	'paw'
	bonbon	→	[bombon]	'candy'
	szín#pad	→	[siːmpɒd]	'stage'
	konty	→	[koɲc]	a kind of hairdo
	rongy	→	[roŋɟ]	'rag'
	isten#nyila	→	[iʃtɛɲːilɒ]	'lightning'
	konjugál	→	[koɲ(ː)ugaːl]	'conjugate'
	Bán Jani	→	[bãːjɒni]	a name
	München	→	[mỹːɦɛn]/[myɲcçɛn]	'Munich'
	donhuán	→	[dõːɦuaːn]	'lady-killer'
[ɲ]+C	könyv	→	[køɲv]	'book'
	íny#re	→	[iːɲrɛ]	'to the gums'
	tény(#)leg	→	[teːɲlɛg]/[teːj̃lɛg]	'really'
	kény(#)szer	→	[keːɲsɛr]/[keːj̃sɛr]	'force'
	manysi	→	[mɒɲʃi]/[mɒj̃ʃi]	'Mansi/Vogul'
	íny#ben	→	[iːɲbɛn]	'in the gums'
	any#ja	→	[ɒɲːɒ]	'his/her mother'
	konyha	→	[koɲɦɒ]	'kitchen'
	lányka	→	[laːɲkɒ]	'little girl'

Whenever I knew of such, I picked words with genuine clusters (*i.e.* coda–onset clusters), in some words, nevertheless, there is a bogus cluster (*e.g. kén#sav* 'sulphur', 'acid'), marked "(#)" in case the presence of a domain boundary is debatable. This, however, does not seem to have an effect on the behaviour of the nasal, a fact which does not come as a surprise after having seen that place elements can spread across an empty nucleus, put alternatively, across a word boundary.

We see that those nasals that have a place element, **U** in the case of [m], **I** for [ɲ], retain this element in the coda or quasi-coda (*i.e.* first onset of the bogus cluster) position. What is more intriguing is the behaviour of coronals. Before occlusives (stops, nasals and affricates), the segments containing **ʔ**, all that nasals do is collect the place element of the following onset by place spreading backwards and the alternative coda constaint in (21).[28] When this onset does not contain a **ʔ**, that of [n] is also lost following the coda constraint in (18c), and the remaining **N** fuses with the preceding nucleus. This happens before [l] as well, in fact, since nasalisation may be lost *egyenlőre* and *egyelőre* are possible homophones, causing

a great deal of distress to prescriptivists. This fact seems to support the traditional classification of [l] that does not put it in the same group with occlusives, against the GP representation in which [l] is a segment allegedly containing **ʔ**. Sometimes, however, the **ʔ** of a placeless nasal is captured by the onset licensing it (this seems to happen only in case of genuine clusters). In Hungarian, this may happen mostly before voiced fricatives (*e.g. pénz*; exactly when is unclear, examples are scarce), while in English only before voiceless ones (*e.g. prince*).

To sum up, the coronal interpretation of a placeless nasal seems possible only in case its **ʔ** element is licensed. If this license is withdrawn, in coda position when the following onset is not occupied by a **ʔ**-ful segment (and Hungarian [l] does not seem to be such) or in an onset position that is licensed by an empty nucleus, which in turn is not utterance(?) final, the placeless nasal reduces to a single **N** element that fuses with the preceding nucleus to form a nasalised vowel (*e.g.* [klijɛ̃ːʃ], [kɛ̃ːʃɒv], but [keːn] 'sulphur'). This fact corroborates the coda constraint in (21): the **ʔ** element can stay in a nasal only if a place element is present in the segment, be it there underlyingly or acquired by place spreading backwards.

3.1.5 Problematic coronal representations

The radical doing away with the element responsible for coronality, **R**, leaves the representations of coronals in a serious situation. The problem basically is that segments which used to be distinguishable in the orthodox framework by the coronality element now merge in their representations, which may occasionally be plausible, but, on the whole, is an unwanted turn. In the following, I put forward some suggestions for new representations, but most of these need further research.

To start with, trills, flaps, alveolar and post-alveolar approximants have lost their most important element. According to Brockhaus (1993), even [ʀ] contains the coronality element, despite its being uvular. This consequence might come handy at an explanation of hiatus filling [ɾ]: the hiatus is, in fact, not filled, but an empty position is interpreted as [ɾ] (see **2.1**). Backley (1993 : 318–320) discusses at length Haitian French Creole, where word initial empty onsets are filled by [r]. He claims that [r] is the neutral element, **@**, as it is interpreted in non-nuclear positions. This shares Harris's (1994 : 259ff.) insight that an English preconsonantal or word final [r] (the **@** element) is licensed under the nucleus preceding it; if it is captured by a following empty onset position (prevocalically in traditional terms), it is interpreted as [r], if it stays in the nucleus it may surface as [ə]. There are

at least three problems with "non-syllabic" **@** being [r]: (i) in languages that have syllabic [ɾ] this will merge with [ə] (whether this really is a problem has to be seen), (ii) instead of an [r]-sound, the pre-final step of one velar lenition trajectory is [ɣ] (*e.g.* in Spanish, Modern Greek), which is supposed to be non-nuclear **@** in (1), (iii) an empty onset might also be filled with [ʔ], *i.e.* **ʔ** (*e.g.* in German and Arabic, perhaps in any language optionally). It is all too obvious that many empty onsets are not interpreted as a coronal approximant, although this would follow from the neutral element being [r].

Unreleased [t˺], [ʔ] and [l] merge in their representation containing a single **ʔ**. This might not be a problem for the first two, but [l] surely needs something to contrast it with them. It must be noted that [l] seems to have some element that [t] does not, since there are processes involving [l] to which [t] is transparent, *e.g.* Latin *milit-alis* → *militaris.*

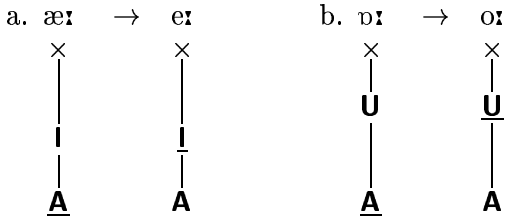
The representation of [s] has also reduced, the single **h** element should be responsible for it. This may bring us closer to an explanation of the special behaviour of [s], which seems to turn up in coda position with an empty nucleus preceding it, *e.g. stop, slip, te*[ks]*t.* Such a change calls for a new element responsible for [h], for which role **H** is a possible candidate. Backley (1993 : 314–316), on the other hand, argues quite convincingly for {**@ h**} being the elements producing [h] on the basis that [s] → [h] is an attested lenition (see the following section).

3.2 Is velarity the special place of articulation?

The representation of stops in (13), in fact, suggest that if any then it is the velar place of articulation that is special, since it has the neutral element as its head, the element without salient properties.

Recall that the presence of this element is detectable only when it is the head of a segment (see **1.1**), only then do its inherent properties manifest themselves phonetically with the salient properties of its fellow elements in the segment added. Harris (1994 : 106) discusses a type of change in the history of English which involves a change in the dependency relationship of the elements: the raising of long low vowels, a part of the Great Vowel Shift can be represented as an exchange of heads that may be termed head-switching as in (28):[29]

(28) **Two changes in the Great Vowel Shift**



Head-switching does not seem to be an uncommon change, there are numerous examples for vowel shifts in languages. Vowel reduction may also involve this phenomenon, (29) provides examples with elemental make-ups:

(29) a. [ɑ] → [ɐ], *i.e.* {**A** (**@**)} → {**A** **@**}
b. [i] → [ɪ], *i.e.* {**I** (**@**)} → {**I** **@**}
c. [u] → [ʊ], *i.e.* {**U** (**@**)} → {**U** **@**}

The crucial point in (29) is that head-switching in a simplex segment yields apparently complex segments that are simplex only in the respect that their "complexity" is not manifested phonetically. They all contain a recessive **@** element that emerges by becoming a head through head-switching. Since, however, the phonological processes in (29) are all reductions, typically taking place in environments which have a reduced a-licensing potential, a segment like [ɐ] must be even more "simplex" than [ɑ] in that it even lacks a head, while the latter at least has one (*cf.* Backley 1993 : 316).

Following Backley's representation of [h], the well-attested lenition [s] → [h], which is a consonantal change this time, also involves an exchange of heads: the **h** head of [s] passes its prerogative to **@** in [h] as shown in (30):

(30) [s] → [h], *i.e.* {**h** (**@**)} → {**h** **@**}

Since any segment contains a recessive **@**, there is no reason why we may not suppose a head-switching operation that results in this element becoming head in a consonant, and thus contributing a velar place of articulation to the segment. Changes like the following in (31) are in no way less likely according to their representations (which again excludes the laryngeal specification) than the reductions in (29) and (30):

(31) a. [t] → [k], *i.e.* {**ʔ** **h** (**@**)} → {**ʔ** **h** **@**}
b. [p] → [k], *i.e.* {**ʔ** **U** **h** (**@**)} → {**ʔ** **h** **@**}
c. [kʷ] → [p], *i.e.* {**ʔ** **U** **h** **@**} → {**ʔ** **U** **h** (**@**)}

Of these changes, only the last one (31c) is attested (*e.g.* Proto-Indo-European to Greek and Latin to Rumanian), the others are at least extremely uncommon. These strange "reductions", however, point to the unmarkedness of velars in Trubetzkoyan terms: velars lack an element that other places of articulation posess, they are headless.[30]

One way of overcoming this problem (if it is a problem and it is not indeed the case that velars are the unmarked place of articulation) is to prohibit latent **@**'s from becoming head of a complex segment. Such a prohibition makes it impossible for consonants to neutralise in velars, but it also excludes the well attested reductions in (29) and (30) from among possible changes.

Another fact of English (and many other languages) that points towards treating velars as unmarked is the neutralisation of the difference between coronals and velars in branching onsets whose complement is occupied by [l]. This can be seen as the ill-formedness of syllable initial [tl] sequences, but there is, in fact, reason to think this is not true. In their descriptions of RP, Jones (1966 : 75) and Gimson (1989 : 167) note that there are speakers who pronounce clusters spelt *-cl-* and *-gl-* as [-tl-] and [-dl-]. It is only Jones who gives examples ([tl]*ean* and *con*[tl]*usion*), both of which contain the two consonants in a branching onset. This means that [tl] is not impossible as a case of intraconstituent government, it merely does not contrast with [kl]. The suspension of some contrast in a certain environment is exactly what neutralisation is, and the member of the contrasting pair which turns up in the suspending environment is the unmarked one. (In this case, it is probably only a statistical priority that gives [k] the unmarked status, not an absolute exclusion of [t], very much like it was the case word finally in English, in (6), in **2.2.1.**) Jones also mentions that the acoustic signal of [kl] is very much the same as that of [tl].

The latent problem with designating **@** as the velarity element is that it is thereafter treated as a "normal" element. From what Kaye *et al.* (1985), for example, say about their cold vowel, it follows that **@** is more like a place holder than like an element like the others. The fact that **@** is only manifest in a segment when it is its head means that such segments have no head and this is represented by putting a place holding element into head position. If this is true then GP predicts that to license a [k] needs less a-licensing potential of a skeletal position than to license a [t]. This is not born out by the facts (*cf.* Paradis & Prunet 1989, specifically on this issue).

The fact that **@** *is* treated as a place element is obvious when it is thought to provide velarisation to consonants. Among secondary places of

articulation we find labialisation, for which **U** is responsible, palatalisation, done by **I**, pharyngealisation by **A**, velarisation, allegedly contributed by **@** and the absence of coronalisation is a further piece of evidence for dismissing the **R** element (*cf.* Backley 1993 : 307). But if these elements enter a segment as operator, **@** will have no effect, hence velarisation as a secondary place of articulation should be impossible.

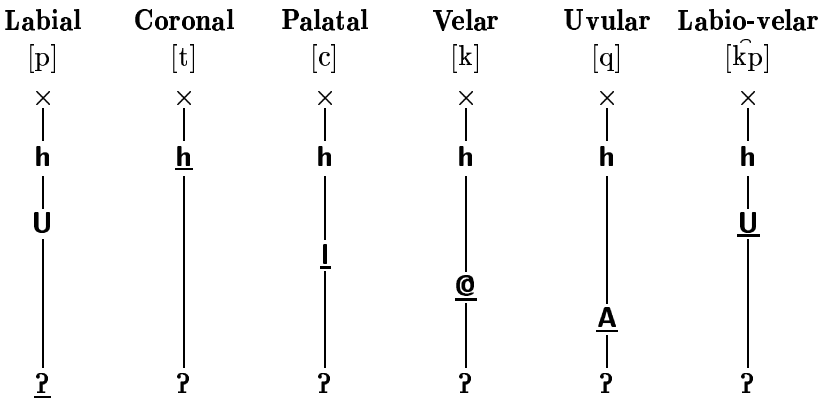
4 Conclusion

I have tried to show that there are serious troubles with the representation of the places of articulation in GP. The most important proposal made was to abandon the **R** element, thus rendering coronals less complex than other places of articulation and, what is more important, placeless, which means behaving differently in assimilations affecting or triggered by place, and this is born out by an impressive amount of evidence. We have also seen that velars are also special as regards their representation in GP, a fact that is backed by little empirical support.

It may be considered if positing a new velarity element, say **K**, and making coronals **@**-headed would solve the problem. There are, however, at least two arguments against such a move: (i) this would separate nuclear and non-nuclear segments: what vowels could **K** be an element in, and (ii) creating such a new element is an *ad hoc* solution, which permeates throughout the framework with a number of other undesirable consequences.

Finally, let us consider the revised version of the stop representations in (13) given here as (32):

(32) **Revised representation of stops**



The intriguing fact in this chart is that none of the three stops with the most common places of articulation are headed by "place elements": [p]'s head is **ʔ**, [t]'s is **h** and [k]'s is **@**. It is three less usual places that have place elements in head position: **I** in [c], **A** in [q] and **U** in [k͡p]. We may conclude that as opposed to vowels, where the unmarked case is to have a place element as head (*i.e.* [i], {**I**} is less marked than [ɪ], {**@ I**}; [u], {**U**} than [ʊ], {**@ U**}), in consonants place elements typically act as operators.

Why this is so is to be worked on.

NOTES

* This paper grew out of my university degree thesis in Theoretical Linguistics, titled *The special status of coronal consonants*. I have excluded, on the one hand, much of what was not crucial for the discussion, and added, on the other, things that I have learned since submitting the thesis in spring 1994. I profited much from discussions by Péter Rebrus and László Kálmán. I also owe very much to Wiebke Brockhaus, who has taken the trouble to point out all the inconsistencies, typos and other mistakes in the previous version, and to Péter Siptár, who has done the same with this one. What remains is caused by my stubbornness.

[1] The name Government Phonology (or alternatively, Government and Charm Phonology) for the framework I am going to assume is somewhat a misnomer. Many of the assumptions I accept stem from GP, nevertheless, neither the notion of government, nor of charm play a pivotal role in the discussion. In want of an established term, I will refer to this framework as Government Phonology.

[2] More presicely it is not the slot in the skeleton that elements link to, but a root node which is necessary to represent affricates and light (a.k.a. rising) diphthongs, which have two root nodes linked to one skeletal position, and geminates, which have one root node linked to two skeletal positions. Harris also proposes a melodic geometry to capture natural classes (segments defined by elements belonging to one node), which consist of the root node, to which is linked a place node and a laryngeal node (1994 : 127–133). The elements in (1) are grouped according to this geometry, *"Manner"* elements link to the root node directly, *Resonance* elements (except **@**) are place dependent.

[3] This seems quite impossible, it would mean — if markedness does have its say in the structure of segment inventories — a language contrasting 2^x segments, where x is the number of melodic tiers.

[4] It must be admitted that there is a trick here: *fái* contains a morpheme boundary between the two vowels, *fáj* does not. There are, nevertheless, some monomorphemic examples, like *mágia* [maːgiɒ] 'wizardry' *vs.* *máglya* [maːgjɒ] 'pyre' (example by courtesy of Péter Siptár).

[5] The nucleus–onset licensing is very problematic in the light of the Complexity Condition discussed below.

[6] Introducing melody from outside the representation must be a last-resort solution, but the stop element, **ʔ**, resposible for an "abrupt and sustained decrease in overall amplitude [of the speech signal]" (Harris 1994 : 140), seems to be an element that can turn up in non-nuclear positions without any internal motivation. The prescriptivist stand against filling hiatus with [ɹ] and other reasons as well make some speakers of English fill it with [ʔ], *i.e.* **ʔ** (Jones 1966 : 113). The intervocalic strengthening of Latin [j] to Italian [ʤː], *e.g.* *ma*[j]*or* → *ma*[ʤː]*ore,* can also be only analysed as involving the introduction of a stop element from outside the representation (Harris 1990 : 294, 1994 : 132).

[7] Technically speaking, there apparently has to be an **I** or **U** element in head position immediately preceding the empty onset. [ɔː] does contain the element **U**, but then it is not in the head of the segment.

[8] Harris (1994) offers an alternative analysis that posits a floating [r] after the vowel when the hiatus is filled by this glide. He thus has the local source. However, if the glide is predictable, which it is the dialect I am describing (Harris's dialect C), then it is more economical not to burden the lexicon with it. Alternatively, it might be the case that the element responsible for [ɾ] in consonantal positions takes part in building up the group of vowels followed by [ɾ] in hiatus (*cf.* Backley 1993 : 318).

[9] These data are far from being accurate. I have been using a computer file containing almost 24 000 English words in standard orthography. What I am comparing is the number of words matching the criteria stated. Therefore it is, for one thing, the lexical and not the speech frequency of the consonants that I am comparing, for another, I am ignoring those words that have a very unusual spelling. Still, the significant differences in the figures seem to be reason enough for assuming that a more accurate comparison of the data would not change the outcome radically.

[10] Word final orthographic *m* probably marks the nasalization of the preceding vowel: *forum* [forũ] 'marketplace' (Allen 1978 : 30ff.).

[11] Three comments are due here: (i) the fact that modern [ʃuː] sequences derive from historical [sjuː] or [ʃuː], never [ʃjuː] and that [ʒjuː] never occurred in the language do not invalidate the observation, (ii) /r/ is a post-alveolar approximant ([ɹ]) in RP, and (iii) the fact that [j] is also excluded after consonant+[l] sequences is due to syllable structure: there are two positions in the onset (this is the universal maximum) and the [j] simply does not fit in as a third (*cf.* *bl*[∅]*ew vs.* *sl*[j]*ew,* where the *s* does not belong to the onset (Kaye 1992)).

[12] 72% of Wells' (1990) poll panel prefer the yodless ([suːt]), 28% prefer the yodful version ([sjuːt]).

[13] Nasalisation might be a case of laryngeal assimilation, which is obligatory in Greek if the onset is occupied by an oral stop: stop+stop clusters are both aspirated, both voiceless unaspirated or both voiced. Geminates seem to be exceptions, but this might also be a consequence of an orthographical convention.

When the onset is occupied by a nasal, the preceding stop also becomes a nasal, a phenomenon that can be brought under the cover term of laryngeal assimilation in case the **N** element were among the laryngeal elements, a proposal I heard of from John Harris (p.c.).

[14] The deletion of coronals before a consonant is preceded by a stage when the coronal stop lenites to [s], as attested by Homeric Greek. It is therefore a degemination rule that finally removes the remnants of the coronal. If this lenition to a fricative is seen as possible only for coronals because [s] is the only fricative in Classical Greek, *i.e.* [p] and [k] could not lenite to [f] and [x], respectively, since this would yield non-existent segments, then the fact that there exists only a coronal fricative in the language is what is peculiar.

[15] The fact that there are significantly more cases of [kt] than of [pt] clusters (461 : 225) may be a result of complexity difference preferring velar+coronal clusters.

[16] It is interesting to note that [pt] and [kt] clusters are significantly more frequent than [bd] and [gd] clusters. The latter do not turn up word finally at all, and in word internal position there are three (apparently) genuine cases of [gd] (in rather marginal words: *amygdaloid, Magdalene, Ogden*) and eleven of [bd] (in words of Latin–Greek origin: *e.g. abdicate, abdomen, Charybdis, lambda, molybdenum, obdurate*). Since English basically contrasts voiceless aspirated and voiceless unaspirated stops, it may be thought of as possessing only an active **H** tier, the other laryngeal tier, that of **L** not being active in this language (Harris 1994 : 133ff.). The difference in the frequency of voiced and voiceless stop clusters follows from the fact that in a voiceless cluster the licensing segment contains four elements ([t]: **h**, **R**, **ʔ**, **H**) as opposed to the two or one of the licensee (as in the text), whereas in the "voiced" clusters (which are phonetically voiceless unaspirated) the licensor has only the three elements of an unaspirated stop (as in (13)), but the licensee has two or one again: the complexity difference is much more preferable in the first case. This difference is retained even if the shared elements of a coda and an onset are thought of (as they will be in **3.1.1.**) as being licensed only under the onset slot, and shared by the preceding coda. In this case, in voiceless clusters the onset licenses **{h R ʔ H}** ([t]) *vs.* the coda's **{U}** in [p], and nothing(?) in [k], while in "voiced" clusters this is **{h R ʔ}** ([d]) *vs.* **{U}** ([b]), and again no elements licensed for [g].

[17] The reverse of this phenomenon shows up in Hungarian. The medieval Latin word *lectio* [lekt͡siō] 'reading' got established in the language as *le*[t͡s]*ke* 'lesson', while German [zak] 'sack' and the diminutive suffix [ʧoː] yield *zacskó* [zɒʧkoː] 'pouch'.

[18] Backley (1993) comes to the same conclusion when trying to find out why [s] behaves so specially: when in coda it can be licensed by anything in onset position.

[19] Despite what Harris (1990 : 280) claims, I think the coda stop in stop+stop clusters does not contain an independent **ʔ** element, which should be needed to maintain the contrast between [pt] and [ft]. Instead, [pt] the **ʔ** is shared by the onset and the coda, while in [ft] it is the **h** element of the stop that the coda

and the onset share. A [p] in coda position is not "noisy", but an [f] in the same position is.

[20] The claim that whatever element is common within a coda–onset cluster is also shared by them may be based on OCP, since these clusters never evolve during the phonological derivation but are already present lexically.

[21] The constraint is perhaps too strong, [θn θm] do exist in some words (*e.g. ethnic, ethno-, arithmetic, asthma, logarithmic*), as well as [ðm] (*e.g. algorithmic*). It is worth considering if these words contain a bogus cluster.

[22] If we accept the view that **N** is a laryngeal element, (see note 13) then the two elements **h** and **ʔ** form a natural class: these are the two elements linking directly to the root node. This natural class is featured in a restriction on geminates as well (see **3.1.1.2**).

[23] (18b) and (18c) may be unified to give a constraint along the following lines:
(18b′) Coda must license *exactly one* element of its own: either **N** or a place element.

[24] There are examples of fricatives assimilating in place in Hungarian, but then the trigger and the target must both be sibillants (which means only two paces (dental and alveo-palatal) are involved, and even here it is rare if the trigger is an affricate (*cf.* Siptár 1994).

[25] The exceptions include *fjord* and *p*[j]*ano,* both of which, however, have alternative pronunciations with a syllabic [j], *i.e.* [i], a fact suggesting that the initial consonant and the [j] in these words occupy two successive onset slots with an empty nucleus, the anchor of "syllabic [j]", between them. In addition, the pronunciation [fjɔːd] is reconcilable with underlying [fjuːrd], *cf. your.*

[26] Creating such an onset complement position is not a trivial matter. Kaye (1985 : 301) quotes a convention of Vergnaud's "to the effect that a segment attached directly to a syllabic constituent [. . .] produces an intervening skeletal point." This is probably reconcilable with the Projection Principle, since the new onset complement slot will be a dead end in the licensing path, and will not severely interfere with governing/licensing relations.

[27] Kaye (1992 : 303) brings evidence that [s]+C clusters *never* form a branching onset, even if the sonority profile were normal as in an [sr] sequence.

[28] The case of *n+j* is quite peculiar: in case of a genuine cluster they yield [nːʲ], *i.e.* the coda [n] spreads both its **ʔ** and **N** elements to the onset; while in the case of a bogus cluster the [n] is totally absorbed in the preceding nucleus, a phenomenon not normally encountered word finally for [n] in the language. At the same time, it is arguable if genuine *n+j* clusters exist at all. The Complexity Condition suggests that they should not.

[29] The idea of vowel shift being a change in dependency relations is present in Dependency Phonology, an example is the treatment of vowel shifts in English by Jones (1989).

[30] Ádám Nádasdy and Huba Bartos have called my attention to the fact that in some southern Chinese dialects consonants do neutralise historically in a word final velar. This obviously calls for further study.

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