Laryngeal contrasts and problematic representations

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This paper examines some aspects of expressing laryngeal activity in current phonological theory. First, a bird's-eye view survey is given of the development of phonological features distinguishing types of laryngeal activities involved in human speech. In the second half of the paper, Government Phonology, especially its theory of segmental make-up, is confronted with the minimum number of laryngeal distinctions found empirically necessary in the previous section and its own claims of the status of sound components. It will turn out that the way out of the first problem leads GP into even deeper trouble. A solution is then proposed to partly repair the framework. This last section of the paper is rather speculative awaiting later corroboration or refutation.

1 Traditional representations of laryngeal contrasts

Besides place and manner of articulation, laryngeal activity is a third dimension along which consonants (practically always obstruents) contrast. In the discussion that follows the contrast will be restricted to stops, as affricates and fricatives display a more limited set of possible laryngeal contrasts.

The most typical contrast on this dimension is binary, more than half of the UPSID[1] languages have two sets of stops distinguished by the behaviour of the vocal folds. There is also a considerable group which lacks such a contrast (15.8%), and one of every four languages have three series (data from Maddieson 1984 : 26).

The SPE proposed the feature [±voiced] to create the basic opposition. This reflects the traditional view about this contrast, which is also probably the most widespread type of laryngeal contrast in language. To represent a contrast involving more than two types a second feature is needed, for which role [±aspirated] is conventionally applied (*cf.* Durand 1990 : 57). Translated into a unary framework, these two features ([voiced] and [aspirated]) would account for the following markedness relations:

(1) a. languages with only one series have voiceless unaspirated stops
  b. languages with two series have either
    i. voiceless unaspirated *vs.* voiced unaspirated stops or
    ii. voiceless unaspirated *vs.* voiceless aspirated stops
  c. languages with three series have voiceless unaspirated *vs.* voiced unaspirated *vs.* voiceless aspirated stops
  d. languages with four series have voiceless unaspirated *vs.* voiced unaspirated *vs.* voiceless aspirated *vs.* voiced aspirated stops.

(1a) represents a set without any marked laryngeal specification, and indeed, languages with no such contrast almost exclusively have a voiceless unaspirated stop series (the one exceptional UPSID language is apparently incorrectly described; Maddieson 1984 : 27). It is also true that practically all languages possess this series. Turning to (1b), the two types expected here are such that contrast the presence of one of the features versus its absence, that is either voicing (as in (1bi)) or aspiration (as in (1bii)) with the basic voiceless unaspirated set. Almost 90% of the UPSID languages conform to this pattern; the remaining languages contrast (pre)nasalized or ejective with the voiceless aspirated stops. The voiceless–voiced contrast of (1bi) is four times as frequent as the unaspirated–aspirated contrast of (1bii). This, however, may simply cover a misanalysis in a number of languages resulting from the fact that the binary laryngeal contrast is traditionally viewed as a contrast of voicing rather than of aspiratedness.

The UPSID languages defy the prediction given in (1c) more significantly: only a quarter of the languages involved have the contrast expected, while most of the others include an ejective set in addition to the two sets of (1b).

The prediction in (1d) is about as much borne out by the UPSID languages as that in (1c), which is not very promising. It is nevertheless noteworthy that it is only languages that do have the four-way contrast of (1d) that have it in all places of articulation, other types of laryngeal contrast only occur in partial systems (*op.cit.* : 30), which can be taken to mean that voicing and aspiration are still less marked than other types of laryngeal activity.

If four were the maximum number of contrasts a language could produce the two features [voiced] and [aspirated] would be enough to represent this, though their phonetic grounding would have to be sacrificed. The same feature would have to be made responsible for, say, voicing in one language and ejectiveness in the other. Such a move is in itself unwanted but it would not even satisfy all possible languages: there is a small group of UPSID languages which contrast five or even six laryngeal types.

A solution in the orthodox feature framework is offered by Halle & Stevens (1971). They dispense with [voiced] and [aspirated] and introduce the following two pairs of features instead: [±stiff vocal cords]/[±slack vocal cords] and [±spread glottis]/[±constricted glottis]. The massive overgeneration these four features produce — 16 different laryngeal types — is reduced somewhat by claiming that the pairs [+stiff, +slack] and [+spread, +constricted] are physiologically impossible. With these two feature cooccurrence restrictions we are still left with 9 laryngeal types, displayed in (2) after Durand (1990 : 55), the need for some of which is debatable.

(2)	**+stiff, −slack**	**−stiff, −slack**	**−stiff, +slack**
+spread **−constr**	Voiceless aspirated plosive [pʰ]	Voiceless partially aspirated plosive $\mathrm{p_k}$	Voiced (breathy) aspirated plosive [bʰ]
−spread **−constr**	Voiceless unaspirated plosive [p]	Lax voiceless plosive $\mathrm{b_l}$	Voiced unaspirated plosive [b]
−spread **+constr**	Ejective [p’]	Implosive [ɓ]	(Pre)glottalized or laryngealized obstr. [ʔb], [b̰]

The configuration [−stiff, −slack, +spread, −constricted], for example, is posited for the alleged partially aspirated plosives of Korean ($\mathrm{p_k}$), which contrast with a strongly aspirated set on the one hand and an unaspirated set on the other. This one set of stops is fairly weak justification for the necessity of the features, especially in the view of subsequent research that has shown that this set of stops is in fact ejective (Kenstowicz 1994 : 40). The feature combination [−stiff, −slack, −spread, −constricted] distinguishes "lax voiceless plosives" from voiceless unaspirated plosives, which are [+stiff], and from voiced unaspirated plosives, which are [+slack]. This tripartite contrast is also deemed unnecessary by most current researchers, as Harris states: "the allegedly 'voiced' *b/d/g* series in English [the "lax voiceless plosives" above] [. . .] is to all intents and purposes identical to the neutral *p/t/k* series of French [the [+stiff] voiceless unaspirated plosives]" (1994a : 134), since there does not seem to be any language that has these two sets in contrast.

To cut back the possibilities stemming from four distinct features Kenstowicz (1994 : 40–41) proposes a return to [±voiced] replacing [±stiff] and [±slack], [−voiced] being equivalent to [+stiff] and [+voiced] to [−stiff]. This discards the middle column of the chart in (2), the first two boxes of which were either reanalysed or the distinction implied was thought to be needlessly detailed. Implosives Kenstowicz specifies as [+voiced] thus abolishing the difference between them and (pre)glottalized or laryngealized, *i.e.,* creaky voiced stops.

As far as mainstream phonological theory is concerned, the state of the art is then that the three features [spread], [constricted] and [voiced] are responsible for characterizing laryngeal activity and expressing contrasts particular languages show up in this respect. Whether these features are equipollent or privative does not influence the distinguishing capacity of the framework, but in either case the cooccurrence of [spread] and [constricted] must be excluded by some stipulation. (In a binary framework this, of course, means the exclusion of [+spread, +constricted].)

Let us now turn to the way Government Phonology tries to cope with the same set of problems.

2 Laryngeal specification in GP

This section will first give a review of the claims GP makes about elements, *i.e.,* the units of which segments of a phonological representation are composed. The second part of the section will be devoted to problems that GP faces when it tries to account for laryngeal distinctions. A partial solution is then offered to the problem encountered.

2.1 GP's theory of segmental make-up

GP sees the building blocks of melody as a handful of elements, each of which is independently pronounceable. That is, all sounds are seen as being either simplex, containing only one element, or complex, built up of two or more basic sounds. This idea is radically different to that of equipollent or even privative features making up sounds in that in these models the primes of the phonological representation are themselves below the level that can be phonetically interpreted: a feature like [+high] or [high] is not in itself pronounceable. GP, on the other hand, has phonological primes which are sounds, therefore a segment and the elements that make up this segment do not differ in kind, only in complexity. This move renders concepts such as underspecification and default feature value filling meaningless, since it is not only a fully specified set of features that can be interpreted. A single element can be realized phonetically; in fact, a position on the skeleton without any element linked to it has a phonetic realization under certain circumstances (*cf.* especially Harris 1994a : 94–96 and Harris & Lindsey 1995 : 46–49).

Each element has a so-called salient feature, which is the marked value of the opposition the feature establishes. This should not be taken to mean that its salient feature is a component part of an element. Rather it is the characteristic acoustic signal the element possesses in isolation and the property it contributes to the complex segment it happens to participate in. When elements combine, their relationship is asymmetrical: one is the head, the other(s) the operator(s). The salient properties of the operators add to the properties of the head. It follows from the privativeness of the elements that no two elements have conflicting salient properties — this would constitute an equipollent opposition—, which means that a complex segment will be characterized by the salient properties of both its head and its operators and all the other non-salient properties of its head. In other words, the non-salient properties of the head of a segment, which are all unmarked properties, are manifest unless some operator overrides them by its marked property. To illustrate this with an example: given the two elements **U** and **h**, where **U** is [u]/[w] (depending on its position in the syllable) with labiality as its salient feature and **h** is usually thought of as [h] (but perhaps it is [s], see section **2.3**) with noise as its salient feature and marking headness by underlining, {**U**.<u>**h**</u>} will be [f], *i.e.,* a labial noise, while {**h**.<u>**U**</u>} will be [ʍ], *i.e.,* a noisy labio-velar (*cf.* Harris & Lindsey 1995 : 70). As can be seen, the velarity of the **U** element is only manifest when it is the head of the segment. **U** as an operator only contributes its labiality to the complex segment.

There are several criteria to be met when one tries to collect the set of elements that participate in the construction of a certain segment. One is the same as in most current phonological frameworks: the phonetic properties of the elements must somehow add up to those of the segment in question. There is, however, a characteristic of GP, which makes it quite unlike many current theories: elements are neither exclusively instructions for the articulators, nor acoustic units, they are instead claimed to be cognitive objects that can be mapped to acoustic images or to articulatory properties. A second criterion for making hypotheses about elemental make-ups, also shared by frameworks aiming at some degree of naturalness in their explanations, is that segments triggering a certain kind of assimilation are supposed to contain the element involved in the assimilatory process. Voicing assimilation, for example, ought to be triggered by segments that contain some explicit reference to their own being voiced. It must be noted though that there are processes which can be reinterpreted in such a way that they do not involve the spreading of a feature from the trigger, but the delinking of one from the target (*cf.* Harris & Lindsey 1995 : 44). The third criterion to be considered when postulating element make-ups follows from the fact that all elements are phonetically interpretable in themselves: lenition processes, *i.e.,* the simplification of a segment, should pass through a phase prior to complete loss of the sound that exposes an element in itself, a simplex segment, and this element is obviously assumed to be contained in the complex segment that was the starting point of the lenition process. As the null hypothesis, we may expect that all elements of a segment can thus be isolated.

2.2 The laryngeal elements of GP

Kaye *et al.* propose two elements to "control (non-spontaneous) voicing properties in consonants and represent tone on vowels": H^{-} (stiff vocal cords) and L^{-} (lax vocal cords) (1990 : 216). They also acknowledge the inspiration of Halle & Stevens (1971) in the phonetic interpretation of these elements.

The index of these two elements contains their charm value. Charm theory, originally proposed by Kaye *et al.* (1985) and further developed in Kaye *et al.* 1990, was meant to serve as an explanation for both phonotactic restrictions and likely element combinations, *i.e.,* possible segments and segment inventories. Tense and low vowels are supposed to be positively charmed, consonants containing a laryngeal element negatively charmed, other sounds, lax and non-low vowels, sonorants and obstruents without any laryngeal element, neutral. This organization broadly matches standard sonority hierarchies, the sonorous end corresponding to positive charm, the non-sonorous to negative charm with charmlessness in between. The charm value of a segment could be computed from the charm values of its component elements. It was then posited that charmed segments could govern while they could not be governed. Certain syllabic positions are governing positions others governed, the charm value of a segment thus has a direct bearing on what position the segment can occupy in the syllable. Of two neutral or, alternatively, charmless segments it is the more complex (*i.e.,* the one made up of more elements) that can govern the less complex. The combination of elements of like charm is deemed, if not utterly impossible, but highly unlikely. This would produce a prediction not matched by the facts: while it is true that low tense vowels are non-existent (allegedly explained by the positive charm of both the uvularity element $\mathbf{A}^{+}$ and the supposed ATR-ness element $\mathbf{+}^{+}$), languages are quite content with possessing segments that contain both negatively charmed laryngeal elements (voiced aspirated obstruents, as we will see below). It must nevertheless be admitted that this laryngeal type is very marked.

The insight that segmental complexity is decisive in defining possible governing relations between charmless segments is extended by Harris (1992) to any two segments entering this relation thus dispensing with the idea of charm. Kaye *et al.* introduced the negatively charmed laryngeal elements $\mathbf{H}^{-}$ and $\mathbf{L}^{-}$ to account for the double behaviour of voiceless stops: they are very good governors on the one hand, but can also be governed on certain occasions. They claim that it is their charm contributed by the laryngeal elements that makes them good governors, while when governed they lack an independent laryngeal specification, which they have to share with their governor (voicing assimilation). However, even without charm properties contributed by the laryngeals, stops thus specified are more complex than others lacking this element, which in itself is enough to explain their different governing properties. Also, if the two laryngeal elements alone were held responsible for the (non-)governability of stops, the asymmetrical behaviour of coronals and non-coronals in this respect (*pt, kt vs. *tk, *tp* in many languages; in coda–onset clusters the onset governs the coda) could only be explained by a stipulation, namely that in languages where the coronals are not governable they must always have some laryngeal element.[2]

What remains of Kaye *et al.*'s proposal is then the two elements, **H** and **L** that produce laryngeal distinctions in obstruents as displayed in (3), where [p] represents the complex of the manner and place elements of the labial stop:

(3)
[p]: voiceless unaspirated, *i.e.,* [p]
H——[p]: voiceless aspirated, *i.e.,* [p$^{\mathrm{h}}$]
L—[p]: voiced unaspirated, *i.e.,* [b]
H—**L**—[p]: voiced aspirated (breathy), *i.e.,* [b$^{\mathrm{h}}$]

Applying the notion of line fusion (Kaye *et al.* 1985), which means the fusion of the autosegmental lines two elements reside on thus making their simultaneous appearance impossible, the language types in (1) can be predicted straightforwardly: in some languages both laryngeal lines are inactive (1a), in others either the **H** (1bi) or the **L** (1bii) line is inactive, in a fourth type of language the two autosegmental lines are fused, thus either **H** or **L** may link to an obstruent, but not simultaneously (1c), while the most marked case appears to be when both lines are active and independent of each other (1d) (John Harris, p.c.). It seems to be the case then that it is less marked for certain lines to be fused than not to, hence the greater frequency of (1c) type languages than that of the (1d) type. We come to the same conclusion in connection with the **I** and **U** lines, for palatality and labiality, respectively: they are fused in the default case, thus rendering front rounded vowels a speciality.

Although Kaye *et al.* (1990) say that the phonetic interpretation of these two elements was inspired by Halle & Stevens (1971), the segments in which **H** is present in (3) are those which are specified [+spread] in (2), a chart based on the inspirers. GP elements, which are primarily cognitive objects, still should encode instructions for articulatory movements and if these were indeed stiff and slack vocal cords their simultaneous presence in a segment ought to be physiologically impossible (as Halle & Stevens suggest). Therefore, the salient property of **H** is probably not stiffness of the vocal cords but spreadness of the glottis.

It is also noteworthy in passing that following earlier researchers Kaye *et al.* (1990) propose that pitch contrasts in vowels be expressed by the same two elements, **H** for high pitch and **L** for low (this is in fact the source of the symbols). Following this idea rising pitch and falling pitch will probably be represented as the contours **LH** and **HL**, respectively. Yet we find no parallel to this in non-nuclear positions (see note 5 for an attempt at an explanation).

The two laryngeal elements of GP are insufficient to express all the possible distinctions languages can produce by laryngeal activity. A situation very similar to the one described in section **1** arises: the two traditional features [±voiced] and [±aspirated] were not enough for the same purpose. Besides and, crucially, *before* introducing new features or elements, GP has an additional device to overcome such difficulties—heavily criticized by Coleman (1995 : 345ff) and also Pulleyblank (1995 : 18): headedness, already referred to in section **2.1.** This notion is less powerful than dependency since of two elements one is always the head, the other the operator.[3] It has to be seen whether this device overgenerates and if it does whether this can be restricted in some principled, non-stipulative way. In (4) I list the logically possible laryngeal types if headedness is included. Denoting '[p]' as the head is to mean that the head is one of the "manner" or resonance (place) elements (in [p] it happens to be **ʔ** responsible for occlusivity), not any laryngeal element.

(4) [$\underline{\text{p}}$]: voiceless unaspirated, *i.e.*, [p]
H——[$\underline{\text{p}}$]: voiceless aspirated, *i.e.*, [pʰ]
$\underline{\textbf{H}}$——[p]: ?
L—[$\underline{\text{p}}$]: voiced unaspirated, *i.e.*, [b]
$\underline{\textbf{L}}$—[p]: ?
H—**L**—[$\underline{\text{p}}$]: voiced aspirated (breathy), *i.e.*, [bʰ]
$\underline{\textbf{H}}$—**L**—[p]: ?
H—$\underline{\textbf{L}}$—[p]: ?

What makes the identification of the segment types marked by the question mark difficult is that if the laryngeal element is the head of the segment, even though some of its unmarked properties are overridden by the **U**, **ʔ**, **h** elements of [p], many others ought to be uncovered.

A very severe problem crops up at this point concerning the two laryngeal elements. While all the other elements are usually listed with their phonetic realization and/or unmarked properties in the relevant literature, these two are not (*cf.* Brockhaus 1995a : 196, 1995b : section 3.3.1). That is: the manner elements, which participate in the composition of consonantal segments, have consonantal phonetic realizations: **h**=[h] (but see below), **ʔ**=[ʔ], **N**=[ŋ] (but note that **N** is alternatively claimed to be vocalic: [ɯ̃]); the resonance elements, which combine with other elements both in vowels and consonants, typically have both a vocalic and a consonantal interpretation (the homorganic approximant): **I**=[i]/[j], **U**=[u]/[w], **A**=[ɑ]/[ʁ], **@**=[ɯ]/[ɣ] and perhaps **R**=[ɾ];[4] but the two laryngeals are never accompanied by an independent phonetic realization, they therefore look as if they were not sounds in themselves but abstract, feature like entities.

2.3 A proposal for **H**

In searching for an explanation for the exceptional behaviour of [s], Backley (1993) suggests that [s] is a simplex segment: it is the phonetic interpretation of the element **h**.[5] This, however, leaves [h], which was the phonetic manifestation of **h** hereto, without a representation. Backley proposes {**h**.$\underline{\textbf{@}}$} to solve the problem, but thus runs into the problem of merging the representations of [h] and [x]. As long as these two sounds show no contrast in any language this might not be a problem (*op.cit.* : 315), but there are 38 (12%!) UPSID languages that do have such a contrast (Maddieson 1984 : 232–234). Backley's escape hatch is positing the presence of **H** in [x]:

(5) [h]={**h**.$\underline{\textbf{@}}$}
[x]={**Hh**.$\underline{\textbf{@}}$}.

This route, however, is free only if all of these languages can be independently proven to have an active **H** element.

Facing the same problem, the loss of a representation for [h], I tentatively proposed the element **H** to have the phonetic manifestation [h], in Szigetvári 1994. Even without the restrictions caused by the dispensing with the coronality element, **R**, the position that **h**, the noise element, is [h] is untenable because [h] is not noisy. On the other hand, [h] appearing typically in the pre-deletion stage of lenition trajectories is best conceived of as a simplex segment, *i.e.,* one consisting of a single element. That there exists a sound looking for an element and the lack of an independent phonetic realization of the laryngeal element **H** invites the idea that these two objects be paired.

This move has several advantages and, of course, an unhappily large set of disadvantages, too. Starting at the bright side, removing **h**[6] from the representation of [h] takes the glottal "fricative" out of the natural class of fricatives and even of that of obstruents, of which **h** is the defining element. This is a felicitous development since [h] does not pattern with obstruents in many respects (*cf.* Siptár 1994 : 213, 265–268; 1995; this volume, for Hungarian data), it does not have the typical laryngeal contrasts obstruents show up, its distribution is rather limited in, for example, English, *etc.*

The phonetic manifestation of aspiration is the voicing lag, which makes (part of) the vowel following the aspirated obstruent voiceless. This is percieved as, and as a result conventionally symbolized by, [h]. Since it is the presence of the element **H** that distinguishes aspirated from non-aspirated obstruents, the most obvious source of the following [h] is this element. Grassmann's law also supports the interpretation [h] for **H**. In Classical Greek — a language of the type represented in (1c), *i.e.,* having three sets of stops: voiceless unaspirated (*tenues*), voiced unaspirated (*mediæ*) and voiceless aspirated (*aspiratæ*) — the onsets of two adjacent syllables cannot both be aspirated. This triggers the delinking of the **H** of the first aspirated onset segment. Consider the examples listed in (6):

(6)	a. $\mathrm{p^he\text{-}p^heuga}$	→	$\mathrm{pe\text{-}p^heuga}$	'flee-PERF-1SG'
	b. $\mathrm{t^hrik^h\text{-}s}$	→	$\mathrm{t^hriks}$	'hair-NOM'
	c. $\mathrm{t^hrik^h\text{-}a}$	→	$\mathrm{trik^ha}$	'hair-ACC'
	d. $\mathrm{hek^h\text{-}\bar{e}}$	→	$\mathrm{ek^h\bar{e}}$	'has'
	e. $\mathrm{hek^h\text{-}s\text{-}\bar{e}}$	→	$\mathrm{heks\bar{e}}$	'have-FUT-3SG'

In (6a) the reduplication of a stem beginning with an aspirated stop is illustrated. Since reduplication copies the root node of the first consonant, it is reasonable to presume that the prefix contained an aspirated stop and it is the effect of Grassmann's law that its aspiration is lost. (6b–c) illustrate a doubly aspirated stem: the aspiration of the first consonant ([t]) can surface only if the aspiration of the second ([k]) is suppressed by the nominative suffix, which neutralizes laryngeal distinctions. The verbal stem in the last two cases, (6d–e), patterns exactly like the preceding nominal stem: the stem initial [h] is realized only when the aspiration of the stem final [k] is suppressed by the future suffix. The phenomena in (6) can be given the same explanation only if we assume that the representation of [h] is **H**.

There are two drawbacks that may immediately be pointed out if **H** were to be treated as [h]. The first is similar to the one proposed against Backley's distinguishing [h] and [x] by **H**, displayed in (5). If **H** is phonetically manifest as [h] then we would expect only languages that have an active laryngeal **H**, *i.e.,* aspirated obstruents, to possess [h] in their phoneme inventory. This expectation makes the correct predictions for, *e.g.,* English and French, the former has both a set of aspirated stops and [h], the latter has neither, but there is another group of languages, including Hungarian, which have a voiceless–voiced contrast side by side [h]. Hungarian presents another phenomenon that causes difficulty for this account: [h] and [x] are positional variants, but here they have lost all formal connection. It has to be seen whether this is indeed problematic.

The [h]={**H**} hypothesis makes another prediction, which may easily turn out to be false. The segment [h] is the pre-deletion stage of a large set of consonantal lenition trajectories. If we were to posit **H** as this simplex segment, it should only be aspirated obstruents, containing this element at the first stage of lenition, that end up as [h] right before total dissolution. If this corroborates or refutes the claim made here is the topic of further investigation, but the well attested [s] → [h] ({**h**} → {**H**}?) lenition is definitely difficult to imagine now.

3 Conclusion

I have tried to put my finger on a weak point of Government Phonology: its representation of laryngeal activity. The two laryngeal elements proposed in the framework proved to be insufficient without invoking the notion of headedness. This, however, led to the discovery that the laryngeal elements do not have an independent phonetic manifestation in GP, despite the claims perpetually made that all elements are pronounceable. I have then proposed an interpretation for one of the two laryngeal elements, leaving an adequate number of issues open for further study.

NOTES

[1] UPSID is an acronym for the UCLA Phonological Segment Inventory Database, which contains the phoneme inventories of 317 languages from all over the world, presented and discussed extensively in Maddieson 1984.

[2] An attempt at an alternative explanation is made in Szigetvári 1994 : 200ff.

[3] One may wonder whether this is really true: the mutual dependency relationship of Dependency Phonology may be modelled to some extent by empty headedness in GP, producing the following "equivalent" expressions: {**A**.**<u>B</u>**} ≈ {|b;a|} (**B**/b is head), {**B**.**<u>A</u>**} ≈ {|a;b|} (**A**/a is head) and {**AB**.**<u>@</u>**} ≈ {|b:a|} (mutual dependence).

[4] The only exception without a vocalic interpretation is **R**, but then it may well be a non-existent element, *cf.* Backley 1993, Harris 1994b, Szigetvári 1994.

[5] Backley's conclusion that this means that **h**-headedness can no longer be the representation of stridency because this "manifests the set of formant transitions associated with coronal gesture" (1993 : 310) is probably wrong for two reasons: (i) in the absence of a coronal element other sounds like, say, [n], ought to manifest coronality without explicit reference, leaving the element **N** (of nasality) coronal, this does not inhibit other resonance elements with other salient place properties from overriding its coronality (as it frequently happens in place of articulation assimilations), and (ii) even within a system including the coronality element, **R**, there is the occlusive **ʔ**, which in itself is glottal, *i.e.*, [ʔ], but its place is overridden by, for example, the labiality of **U** in [p]. What's more one may envisage **h**-headedness, *i.e.*, stridency, to be the representation of affricates (*cf.* Lass 1984 : 90), by this move both dispensing with the need for consonantal contour segments—an explanation for the absence of **LH** and **HL** contours on consonants—and accounting for the relative markedness of non-coronal affricates, given that **h** is inherently coronal. Affrication is head switching under these circumstances. Another advantage of designating **h** for head is that this move uses a device, headedness, already shown to be unavoidable, instead of involving a new one, contour segments.

[6] If [h] is no more associated with **h** the mnemonic loses its "iconicity". Selecting the symbol **S** to replace **h** seems justifiable by two reasons: its phonetic manifestation came to be [s] and it may also remind one of its envisaged new salient property, stridency (see previous note). The symbol **H** also acquires an additional meaning component: besides being reminiscent of high tone, it is also interpreted as [h]. And finally all Roman-letter element symbols become capitals.

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