Péter Őri: Same Element, Different Processes
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Debreceni Egyetemi Kiadó
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Same Element, Different Processes*

Abstract

Hungarian and English exemplify two different laryngeal systems: the former is referred to as a true voicing language, in which voiced obstruents contrast with voiceless ones, whereas the latter can be categorized as an aspirating language, which has aspirated and unaspirated obstruents. Current analyses normally assume two laryngeal elements available for the phonological representation to create two-way contrasts: |L|, responsible for voicing, and |H|, associated with aspiration. In the present paper, I argue that one element, namely |H|, is enough to distinguish the two obstruent series in both language types. Furthermore, I propose that the typological divide be drawn along the different kinds of phonological processes targeting |H|. The result is a simpler analysis of languages with two-way laryngeal contrasts.
Keywords: laryngeal features, laryngeal assimilation, true voicing vs. aspirating languages, Laryngeal Relativism, Element Theory

1 Introduction

Besides differing in their place and manner of articulation, obstruents can usually vary in a third respect as well: they can have different laryngeal features due to the vocal cord activities in the larynx.

Whereas there are languages with obstruents of only one phonation type (e.g. Hawaiian has only one stop series: [p, k, ʔ], which are voiceless and unaspirated), the maximum number of laryngeally contrastive consonant series within a language seems to be six (e.g. the phoneme inventory of Igbo includes voiceless plosives: [p, pʲ, t, k, kʷ], voiced plosives: [b, bʲ, d, g, gʷ], voiceless aspirated plosives: [pʰ, pʲʰ, tʰ, kʰ, kʷʰ], voiced aspirated plosives: [bʱ, bʲʱ, dʱ, gʱ, gʷʱ], voiceless implosives: [ɓ̥, ɗ̥], and a voiced implosive: [ɓ]). However, the majority of the languages (more than 50% of the UPSID languages[1]) apply only one distinctive feature to create a twofold laryngeal contrast (see Figure 1) (Maddieson 1984).

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1 A collection of languages representative of the world's languages whose phoneme inventories are listed in the UCLA (University of California, Los Angeles) Phonological Segment Inventory Database (UPSID) (Maddieson 1984).

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Traditionally (see e.g. Lombardi 1995, 1999), this contrast in languages such as English and Hungarian is represented by the phonological feature [voice], which refers to vocal cord vibration. According to this analysis, the stops of Hun. *bécsi* 'of or relating to Vienna' and Eng. *bases* include [voice] (or [+voice] in a binary system[2]), while those of Hun. *pécsi* 'of or relating to Pécs' and Eng. *paces* are laryngeally unmarked, lacking this feature (or they are specified as [−voice] if the feature is bivalent). Nevertheless, it has been pointed out that the two series of obstruents in word-initial position have different characteristics in English than their "counterparts" in Hungarian. In the latter language, the articulation of voiced stops involves vocal cord vibration during the closure phase, i.e. the obstruent has a negative voice onset time (VOT). In the case of voiceless stops, the vocal cords begin to vibrate upon or shortly after the release of the sound, resulting in zero/short lag VOT. In English, on the other hand, the /b/ of words like *base* is not necessarily voiced; in other words, its VOT value can be identical to that of a Hungarian /p/. What distinguishes it from a word-initial /p/ such as the one in *pace* is that an English /p/ in this position is regularly aspirated: there is a considerable amount of time passing between the release of the stop and the beginning of vocal cord vibration, which is perceived as a little puff of air (a short [h]) following the stop, so these sounds are characterized by positive VOT (see Figure 2).

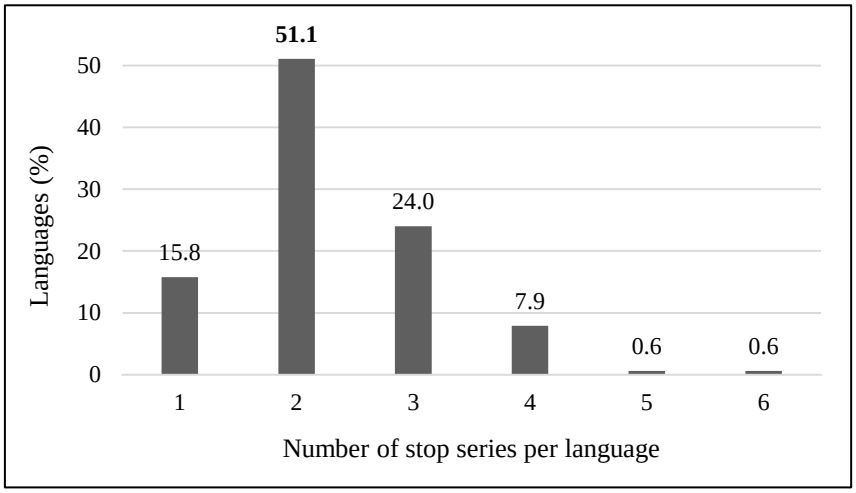

Figure 1. The distribution of the UPSID languages according to the number of their stop series

This difference in the realization of laryngeal contrast in the two languages is reflected in the analyses of, for example, Halle & Stevens (1971), Iverson & Salmons (1995) and Beckman, Jessen & Ringen (2013). In this view, the feature [voice] continues to be present in Hungarian. As in this language, the production of /b, d, ɟ, g/ does require active vocal cord vibration, it seems indeed appropriate to make them the marked stop series and to assign them higher complexity in their representation. In English, however, it is the phonemes /p, t, k/ that are taken to be the marked obstruents because of the extra effort necessary for the spreading of the glottis needed for the production of aspirated stops: [p^h, t^h, k^h] (Halle & Stevens 1971)—as opposed to the plain [p~b̥, t~d̥, k~g̊] series, the realizations of the phonemes /b, d, g/, which are only passively voiced if they occur in a voicing environment (in intersonorant position). Therefore, /p, t, k/ can be treated as consonants containing the distinctive feature

[2] For a discussion on the advantages of assuming unary/monovalent distinctive features over binary ones, see e.g. Harris & Lindsey (1995).

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[(±)spread glottis] or, simply, [(±)aspiration]. Table 1 summarizes the laryngeal representation of obstruents in this nontraditional approach.

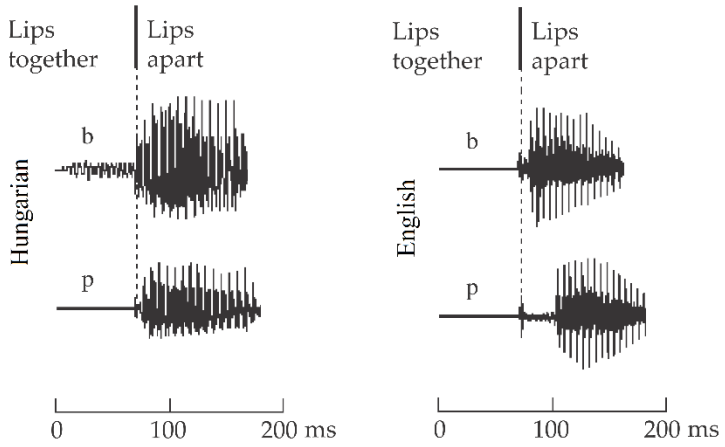

Figure 2. Waveforms of the word-initial stop+vowel sequences in words like Hun. bécsi *'of or relating to Vienna' and* pécsi *'of or relating to Pécs' as well as in Eng.* bases *and* paces *(Ladefoged & Disner 2012: 138)*

	[voice]	[Ø][3]	[aspiration]
Hungarian	/**b**, **d**, **g**/	/p, t, k/	
English		/b, d, g/	/**p**, **t**, **k**/

Table 1. The representation of laryngeal contrast in Hungarian and English (the marked obstruents are in bold)

Furthermore, the phonological behavior of the different obstruent types in the two languages also seems to support the idea of analyzing these languages as different laryngeal systems. In the phonology of Hungarian, the feature [voice] plays an active role as it can spread to another segment, making it voiced (e.g. in *mos~mosd* [moʃ~moʒd] 'wash-INF~wash-2SG-IMP-DEF'). As for English, it follows from the representation that such voice assimilation is not possible (e.g. *washed* cannot be pronounced as *[wɔʒd] since /d/ does not contain a laryngeal feature to spread). It has also been observed that in words like *plain* and *twain* the sonorant following the aspirated stop undergoes devoicing systematically ([pl̥]*ain* and [tw̥]*ain*), which can be considered the spreading of the voicelessness of the obstruent (Backley 2011). The decision to take /p, t, k/ to be laryngeally specified, i.e. to be the marked obstruent type, is in accordance with these facts.

The terms *voiced* and *voiceless* can be used in a phonological sense for Hungarian because it also reflects the behavior of the given obstruent type. Languages using active vocal cord vibration as a distinctive feature are called true voicing languages. Further examples of this laryngeal system typically include Romance languages (e.g. Italian, Spanish and French), and Slavic languages (e.g. Polish, Russian and Serbo-Croatian). In English, on the other hand, the stops /b, d, g/ can become voiced only in intersonorant position and are phonologically inactive in laryngeal assimilations; therefore, they are normally referred to as lenis consonants and their aspirated counterparts as fortis consonants in the phonological literature. Languages

[3] Note that, despite the difference in spelling and phonemic transcription, the realizations of the unmarked obstruents in word-initial position tend to be identical in the two languages, i.e. [p, t, k].

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with such obstruent series are called aspirating languages. Most Germanic languages (e.g. German and Icelandic) and, for instance, Mandarin belong here. Almost 90% of the UPSID languages with two-way laryngeal contrasts are either voicing or aspirating (Szigetvári 1996).

Throughout the paper, instead of the distinctive features [voice] and [aspiration], I will mostly use the melodic elements |L| and |H|, respectively, as applied in Element Theory (ET) (see e.g. Backley 2011). This choice will, however, not affect the present analysis. (For a comparison of distinctive features and melodic elements, see e.g. Harris & Lindsey (1995).)

In the subsequent sections, I will aim to show that, contrary to the current trend in laryngeal analysis described above, it is unnecessary to assume two laryngeal elements to distinguish obstruents in languages with two-way laryngeal contrasts—|L| for true voicing languages and |H| for aspirating languages. We will see that the regularities concerning the behavior of the two elements are only tendencies, not an ideal basis for typological categorization. Therefore, I will argue that the same element, namely |H|, should be held responsible for laryngeal contrast in languages with two obstruent series (both aspirating and voicing)[4] and that the laryngeal typology of languages should be created along the differences in the phonological processes targeting this element. A further assumption is that the physical realizations of the marked and unmarked obstruent series may vary across languages as the phonetic interpretation of a given phonological representation should be considered language specific. I will show how this reanalysis[5] is possible through the following cases: the two main dialects of Polish; Southern American English dialects and Swedish, which have been claimed to have both |H| and |L|; and, finally, Hungarian, a typical representative of L-languages.

As a result, we will end up with a simpler laryngeal analysis: the number of elements available for distinguishing two obstruent series will be reduced to one,[6] while the phonological processes operating on it will only include the types identified so far in the literature. Also, taking the relationship between phonological representation and its phonetic interpretation to be arbitrary will not make the picture more complex since even in current analyses it is inevitable to accept a certain degree of arbitrariness in the physical interpretation of the two laryngeal elements assumed.

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4 In laryngeal systems like Thai and Hindi, which contrast three and four series of obstruents, respectively, it seems necessary to utilize both |H| and |L| in order to be able to represent the voiceless unaspirated, the voiceless aspirated and the voiced unaspirated obstruents in Thai as well as the additional voiced aspirated (breathy voiced) set in Hindi. The idea that only |H| should play a role in creating two-way contrasts and that the presence of |L| in a system implies that of |H| may be supported by the fact that in Thai and Hindi voiceless aspirates (containing |H|) are acquired earlier than their voiced counterparts (which have |L|), suggesting that the latter can be regarded as more marked (Vaux & Samuels 2005).

5 For other analyses in which the same feature/element is taken to be responsible for the two-way laryngeal contrast in both aspirating and voicing languages with the voiceless/fortis obstruents forming the marked series, see van der Hulst (2015) and Schwartz (2016). The most important respect in which their proposals differ from that of the present paper is practically that the said authors encode the distinction between the two types of laryngeal systems in the phonological representation. Here, it will be claimed that the difference is not representational but purely computational (i.e. can be defined in terms of the phonological processes characteristic of the given languages), accompanied by the language-specific phonetic implementation of the contrast.

6 Removing |L| from the laryngeal analysis of languages with two sets of obstruents is intended to be a contribution to the enterprise of decreasing the number of melodic elements in Element Theory in order to reduce redundancy in the representation—for a comparison of the element inventories in different versions of ET, see Backley (2012).

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2 The reanalysis of Polish

2.1 Two laryngeal systems?

Let us consider the examples in (1), where "S" stands for sonorant (Cyran 2011). Based on the phonetic characteristics of the laryngeally contrastive obstruents, i.e. the fact that Polish has fully voiced and voiceless obstruents word-initially and -medially if they are followed by (a sonorant consonant plus) a vowel, as shown in (1a–b), it seems reasonable to assume that it is a true voicing language with word-final devoicing (see (1c)).

(1)	a.	#__(S)V	[pʲ]ić	'to drink'
			[bʲ]ić	'to hit'
			[p]łotem	'fence-INSTR'
			[b]łotem	'mud-INSTR'
	b.	V__(S)V	ry[s]a	'scratch'
			ry[z]a	'ream'
			o[k]nie	'window-LOC'
			o[g]nie	'fire-PL'
	c.	__(S)#	by[k]~by[k]a	'bull-NOM-SG~bull-GEN-SG'
			wa[k]~wa[g]a	'scale-GEN-PL~scale-NOM-SG'
			ka[t]r~ka[d]ra	'personnel-GEN-PL~personnel-NOM-SG'

Moreover, the data in (2), also from Cyran (2011), illustrate regressive voice assimilation: due to word-final devoicing, which can be thought of as the delinking of the laryngeal element |L|, both *rad* and *rzut* end in a voiceless [t], which becomes voiced once followed by a voiced obstruent (see (2a)). This phenomenon provides further support for analyzing Polish as an L-language since a phonetically voiced obstruent should be assumed to contain |L| if voice is a phonologically active feature, being able to spread to the preceding obstruent.

(2)	a.	rzu/t b/agnetem	→	rzu[d b]agnetem	'bayonet throw'
		ra/d g/łupich	→	ra[d g]łupich	'silly advice-GEN-PL'
	b.	rzu/t p/oziomy	→	rzu[t p]oziomy	'horizontal plan'
		ra/d p/rzyjacielskich	→	ra[t p]rzyjacielskich	'friendly advice-GEN-PL'

Things become more puzzling though when a final obstruent is followed by a sonorant segment in the next word. As we expect, the obstruent will be voiceless in word-final position, which is the end of the story in Warsaw Polish (WP): there is no laryngeally specified segment following it, so it will not undergo voicing. However, in Cracow Polish (CP), this laryngeally unmarked obstruent tends to become voiced. (3) exemplifies this difference between the two dialects:

(3)			WP	CP	
	rzu/t ɔ/ka	→	[t ɔ]	[d ɔ]	'glimpse'
	ra/d ɔ/jcowskich	→	[t ɔ]	[d ɔ]	'fatherly advice-GEN-PL'
	rzu/t m/łotem	→	[t m]	[d m]	'hammer throw'
	ra/d m/atczynych	→	[t m]	[d m]	'motherly advice-GEN-PL'

Cyran (2011, 2014, 2017) accounts for this dialectal difference by taking WP and CP to represent different laryngeal systems. Whereas WP is a schoolbook example of an L-language, he argues that voicing in CP can be explained most effectively if it is treated as an H-system.

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To make such a phonological analysis possible, we need to accept an approach which is different from the one assuming that there is a direct relation between the laryngeal marking of an obstruent and its phonetic realization, i.e. that the marked obstruents of a Hungarian-type language must contain |L|, and those of an English-type language |H|, a view termed "Laryngeal Realism" by Honeybone (2005). Indicating its position relative to Laryngeal Realism, Cyran calls the alternative view Laryngeal Relativism. Its main principle is that "[b]oth the marked and the unmarked series of obstruents are subject to arbitrary assignment of phonetic qualities respecting the principle of sufficient phonetic distance between the two series" (Cyran 2011: 60). In other words, the phonetic characteristics of obstruents are not supposed to play a role in deciding either which are the marked and the unmarked series in a given language or whether the language is an L- or H-system: the presence or absence of an underlying laryngeal element in an obstruent and the physical realization of the segment should be considered to a great extent independent,[7] with the natural criterion that the two obstruent series should be phonetically different enough in order to be clearly distinguishable. It follows that we can identify the phonological make-up of an obstruent only by examining its behavior in the language in question. Figure 3 illustrates the arbitrary relationships between the phonetic properties of laryngeally contrastive obstruents and their phonological representation, the marked member of the pair being represented by a filled circle and the unmarked one by an empty circle.

If we compare, for instance, the first with the fifth language type in Figure 3, what we see is that in the Laryngeal Relativism view, the same phonetic form can have different phonological representations. In this case, both languages have fully voiced and voiceless unaspirated obstruents; however, in type 1, exemplified here by French, the fully voiced obstruents constitute the marked series, containing the element |L|, whereas in type 5, the voiceless unaspirated obstruents are the laryngeally marked consonants, assumed to contain |H|. Cyran suggests that the Cracow dialect be taken to belong to this category so that sandhi voicing (voicing across morpheme boundaries) before sonorants can be properly explained.

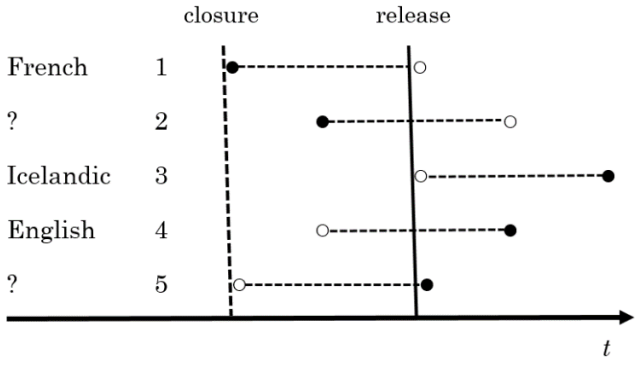

Figure 3. The phonetic realizations and the phonological representations of laryngeally contrastive obstruents in the Laryngeal Relativism approach (Cyran 2011)

According to this analysis, the word-initial plosive of /p^{H}/*łotem*[8] 'fence-INSTR' in CP is laryngeally marked, but the |H| in it does not result in actual aspiration but rather in the stable

[7] Of course, it does not mean that anything goes. As |H| is typically associated with vocal cord vibration starting around or after the release of plosives, taking it to be responsible for voicing would be ungrounded (Cyran 2011: 57).

[8] The "H" in superscript denotes that the given obstruent contains the element |H|; the "0" in superscript shows that the obstruent is laryngeally unmarked/delaryngealized.

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voicelessness of the consonant ([p]*łotem*). The phoneme /b^0/ is unspecified for a laryngeal element in this dialect. The natural realization of such an unmarked obstruent is typically a voiceless unaspirated segment (based on Maddieson 1984: 27), which is what we can observe in *by*/k^0/ 'bull-NOM-SG' and *wa*/g^0/ 'scale-GEN-PL': neither the /k/ nor the /g/ contains a laryngeal element, the former having undergone delaryngealization in word-final position, the latter never having had one, so their phonetic realization is [k]: *by*[k] and *wa*[k]. In the case of /b^0/*łotem* 'mud-INSTR,' on the other hand, the |H|-less word-initial plosive is pronounced as [b] because it is subject to passive voicing, a phenomenon typical in H-languages, since it is in a voicing environment. Similarly, the laryngeally unmarked final obstruents of (*rzu*/t^0/ →) *rzu*[t] 'throw' and (*ra*/d^0/ →) *ra*[t] 'advice-GEN-PL' will be voiced if they are followed by a sonorant in the next word, e.g. *rzu*[d] *oka* 'glimpse' and *ra*[d] *ojcowskich* 'fatherly advice-GEN-PL.' Cyran labels this type of voicing "enhanced passive voicing" as in a phonological sense, it is the same as passive voicing, but phonetically, it is identical to active voicing, i.e. the full voicedness of an obstruent. As for WP, which is analyzed as an L-language, enhanced passive voicing will not occur in unmarked obstruents, otherwise they would become phonetically too similar to and therefore indistinguishable from the actively voiced marked ones containing |L|. This is what explains that cross-word presonorant voicing is not characteristic of this dialect.

In conclusion, it seems justifiable to analyze WP and CP as different laryngeal systems. Despite the fact that their two series of obstruents are phonetically identical, sandhi voicing before sonorants in CP can be accounted for if WP is considered an L-language and CP is reanalyzed as an H-language in the Laryngeal Relativism view.

2.2 Or rather one laryngeal system?

The principles of Laryngeal Relativism make it possible to recategorize WP as well and consider it an H-system, just like CP.

If both dialects are assumed to be H-languages, then the phonetically voiceless obstruents, like the one in /p^H/*łotem*, are the laryngeally marked series in both varieties, while the ones in /b^0/*łotem*, *ra*/d^0/ and *rzu*/t^0/ are unspecified for a laryngeal element (either originally or as a result of word-final delaryngealization). As for their phonetic realization, the /b/ of /b^0/*łotem* is pronounced fully voiced because it occurs in a voicing environment, a condition not applying to the final obstruents in *ra*/d^0‖/ and *rzu*/t^0‖/ as well as to the ones in *ra*/d^0 p^H/*rzyjacielskich* and *rzu*/t^0 p^H/*oziomy*, which is why they remain voiceless.

The only thing the two dialects differ in is whether the obstruents of *ra*/d^0/ and *rzu*/t^0/ undergo voicing if they are followed by a sonorant in the next word, and this difference seems to lie in what exactly qualifies as a voicing environment in each dialect. Since the phonological representations of the segments are now identical in CP and WP, if the two systems are computationally the same, the reason for this variation should be looked for in the phonetics.

I argue that the difference in the phonetic realizations of the same unmarked obstruent depends on how strong an environment the given dialect requires to trigger voicing.[9] CP is the

[9] In fact, we can find other examples of H-languages whose respective unmarked obstruents have different physical realizations in the same environment in terms of their voicedness. This must mean that these languages need environments of different strengths to trigger phonetic voicing. For instance, in Icelandic, lenis obstruents remain voiceless even in intersonorant position (see Figure 3 and Árnason 1980: 9), an environment which tends to be sufficiently strong to make a lenis obstruent voiced in a typical H-language like German (Beckman, Jessen & Ringen 2013: 12, 18). English seems to be a step even farther away from Icelandic because its word-

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least strict in this respect: its laryngeally unspecified obstruents are pronounced fully voiced before any vowel, sonorant consonant or voiced obstruent (e.g. in *rzu*/t^0 ɔ/*ka*, *rzu*/t^0 m/*łotem* and *rzu*/t^0 b/*agnetem*). In WP, however, the final obstruent of *rzu*/t^0/ does not undergo voicing before /ɔ/*ka* or /m/*łotem* unlike the /b/ of /b^0/*łotem*. Even though in all of these cases the unmarked obstruent is in a voicing environment, the resistance of the /t/ in *rzu*/t^0 ɔ/*ka* or *rzu*/t^0 m/*łotem* to voicing can be considered the result of phonetic analogy,[10] which insures that the forms of *rzut* in these environments remain phonetically similar to the one pronounced in isolation. Such paradigm uniformity effects cannot be detected in the pronunciation of *rzu*/t^0 b/*agnetem*, where enhanced passive voicing occurs in the final obstruent. These data suggest that voicing in WP requires a stronger voicing environment to be triggered, which is provided in *rzu*/t^0 b/*agnetem*: phonetically, the voicing of /b/ is "a sort of compensation by an *active gesture or gestures* in the face of intra-oral air pressure build-up, which due to obstruent stricture, has an inhibitory effect on vocal fold vibration" (Cyran 2011: 55, emphasis added), whereas the articulation of spontaneously voiced sonorants like /m/ and /ɔ/ does not involve such an active effort, i.e. their voice-inducing capacity is weaker.[11]

In sum, my goal in this section was to show that although Polish is traditionally taken to be an L-language, it can also be analyzed as an H-language based on the Laryngeal Relativism of Cyran. He suggests that the difference in the voicing of word-final obstruents in the two main dialects of Polish be accounted for by treating the two varieties as different laryngeal systems. However, we could simply assume that they represent the same language type, both being an H-language, and explain the different behavior of their obstruents in certain environments in terms of differences in their phonetic realizations.

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initial unmarked obstruents are often considerably voiced in spite of the relatively weak voicing environment (Hunnicutt & Morris 2016: 222–223).

[10] A similar instance of the effect of phonetic analogy is the physical realization in American English of *militaristic* [mɪ̀lətərístɪk], *[mɪ̀lərərístɪk], where, in spite of the fact that the necessary conditions are met, flapping fails to apply in order for the phonetic form of the derivative to remain closer to that of the root *military* [mɪ́ləthɛri]. This makes the realizations of the members of the paradigm more uniform. A further example is from French: the duration of the occlusion phase in /d/ has been shown to be longer in *pas de rôle* 'no role,' where the plosive is in prevocalic position, than in *pas drôle* 'not funny.' However, in *pas d'rôle*, a form in which the vowel following the plosive has been elided, leaving it in preconsonantal position (just like in *pas drôle*), the /d/ maintains its phonetic quality (Steriade 2000).

[11] The difference between the two Polish varieties may seem to be the result of dialect-specific idiosyncratic properties which can be simply defined as CP having an SPE-type arbitrary rule to voice unmarked obstruents before sonorants across word boundaries, as opposed to WP, which lacks it. However, it is argued in the present paper that this case is rather similar to the difference in the physical realizations of word-initial unmarked plosives in English vs. German: despite these segments having identical phonological representations in two aspirating languages, their voicedness varies across these languages (see footnote 9 too), which should be considered a phonetic issue. As for Polish, it has been shown that the voicing of word-final unmarked obstruents caused by a following voiced segment in the next word is, in fact, not a homogenous phenomenon: besides the tendency that the distinction between underlyingly voiced and voiceless word-final obstruents is not completely neutralized, whatever follows the segments (Slowiaczek & Dinnsen as cited in Cyran 2017: 485), Strycharczuk's research (as cited in Schwartz 2016: 114) has found that in CP, more voicing is observable before actively voiced obstruents than before spontaneously voiced sonorants. These variations suggest that the voicedness of final obstruents is indeed a scalar property, and, based on Strycharczuk's results, it is also reasonable to distinguish different degrees of strength in the voice-inducing capacity of speech sounds. Now, what CP and WP differ in is that the range of sandhi voicing environments in WP appears to start later along the continuum of potential voice-triggering segments extending from "actively voiceless sounds" through "spontaneously voiced sounds" to "actively voiced sounds," a slide resulting from the interplay between voice induction and paradigm uniformity effects responsible, in the present case, for voice inhibition in WP.

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3 Languages with two-way laryngeal contrasts containing |H| and |L| at the same time?

Having examined the peculiar case of the Polish dialects and the possibility of reanalyzing both as H-systems, let us look into two languages in which we can find traces of both aspiration and voicing. I will argue that |H| is enough for the representation of laryngeal contrast in these cases too.

Tables 2 and 3 show VOT values of word-initial plosives in Alabama and Mississippi English (henceforward Southern American English) and Swedish, respectively. In both languages, fortis plosives are strongly aspirated at the beginning of a word. Lenis obstruents in Swedish are always significantly prevoiced, and the same tendency can be observed in the English dialect in question: about 78% of its lenis obstruents have a negative VOT word-initially. It is precisely the unmarked (i.e. voiceless unaspirated) obstruent series that is missing from these languages, which is extremely unusual.

		bilabial	alveolar	velar
Lenis	negative VOT (77.8%)	−92.6	−96.9	−85.7
	short lag VOT (22.2%)	11.7	15.7	22.6
Fortis	(positive VOT)	69.2	81.4	77.3

Table 2. VOT values of word-initial plosives in Southern American English (in ms) (Hunnicutt & Morris 2016)

		bilabial	alveolar	velar
Lenis	(negative VOT)	−111.7	−86.3	−81.3
Fortis	(positive VOT)			74.5

Table 3. VOT values of word-initial plosives in Swedish (in ms) (Beckman, Helgason, McMurray & Ringen 2011)

The data in (4) show the laryngeal characteristics of plosives and plosive clusters in Swedish.

(4) a. kö[^{h}p]a~kö[p]a — ‘to buy’
kö[^{h}pt]e~kö[pt]e ← kö/p#d/e — ‘buy-PAST’
kö[^{h}pt]~kö[pt] ← kö/p#t/ — ‘buy-SUP’
b. vä[g]a — ‘to weigh’
vä[gd]e ← vä/g#d/e — ‘weigh-PAST’
vä[^{h}kt]~vä[kt] ← vä/g#t/ — ‘weigh-SUP’

According to Beckman & Ringen (2004), Ringen & Helgason (2004) and Hunnicutt & Morris (2016), whose analyses are done within the framework of Optimality Theory (OT),[12] both of the distinctive features [spread glottis] and [voice] should be made use of in order to represent the two-way laryngeal contrast in these languages. The tableaux in (5), (6) and (7) illustrate how the analysis of Beckman & Ringen (2004) works.[13] They say that the reason for the necessity of

[12] For details on OT, see e.g. McCarthy (2002).

[13] The constraints used in Ringen & Helgason (2004) for this analysis: SPECIFY$_{[Lar]}$: stops must be specified for a laryngeal feature; *VOI/SG: segments specified as both [voice] and [spread] are prohibited; *VOI: segments specified as [voice] are prohibited; *SG: segments specified as [spread] are prohibited; FAITH$_{[voi]}$: an input [voice] segment must be [voice] in the output; FAITH$_{[spread]}$: an input [spread] segment must be [spread] in the output; AGREE: obstruents in clusters must agree in laryngeal specifications.

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
DOI: 10.34103/ARGUMENTUM/2020/12

both features in the phonology of these languages is that "if we take seriously the OT tenets of Richness of the Base and Lexicon Optimization, we will be forced to assume both [voice] and [spread] in input representations" (2004: 113). Richness of the Base states that there are no language-specific restrictions on the input, i.e. "[a]ny input that meets universal well-formedness criteria … is a possible input to the grammar of the language; it is the task of the language's grammar, by means of constraint ranking, to map any input onto a well-formed output." As for Lexicon Optimization, it insures that out of the several possible input forms that could be mapped to the desired output form, the one whose mapping to the output is the most harmonic (i.e. which is closest to the output form) should be assumed in the underlying representation (Beckman & Ringen 2004: 104–105).

Thus, as a result of accepting the above principles, the underlying representation of [k^{h}]*ub* and [g]*ap* should be /k^{h}/*ub* and /g/*ap*, respectively. This is also supported by the facts that word-initial plosives are phonetically either significantly prevoiced or strongly aspirated and that the amounts of voicing and aspiration are in proportion to speaking rate, an indicator of their also being phonological in nature (see Beckman, Helgason, McMurray & Ringen 2011 and Lehnert-LeHouillier 2009).

(5) Swedish [k^{h}]*ub* 'cube'

/k^{sg}/ub	SPECIFY	*VOI/SG	FAITH$_{[spread]}$	FAITH$_{[voi]}$	*SG	*VOI
[k]ub	*!		*			
[g]ub			*!	*		*
☞ [k^{sg}]ub					*	
[g^{sg}]ub		*!		*	*	*
/g^{sg}/ub	SPECIFY	*VOI/SG	FAITH$_{[spread]}$	FAITH$_{[voi]}$	*SG	*VOI
[k]ub	*!		*	*		
[g]ub			*!			*
☞ [k^{sg}]ub				*	*	
[g^{sg}]ub		*!			*	*

(6) Swedish [g]*ap* 'mouth'

/k/ap	SPECIFY	*VOI/SG	FAITH$_{[spread]}$	FAITH$_{[voi]}$	*SG	*VOI
[k]ap	*!					
☞ [g]ap				*		*
[k^{sg}]ap			*!		*	
[g^{sg}]ap		*!	*	*	*	*
/g/ap	SPECIFY	*VOI/SG	FAITH$_{[spread]}$	FAITH$_{[voi]}$	*SG	*VOI
[k]ap	*!			*		
☞ [g]ap						*
[k^{sg}]ap			*!	*	*	
[g^{sg}]ap		*!	*		*	*

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
DOI: 10.34103/ARGUMENTUM/2020/12

(7) Swedish *kö*[$^{(h)}$p]*a* + [d]*e* → *kö*[$^{(h)}$pt]*e* 'buy-PAST'
vä[g]*a* + [t] → *vä*[$^{(h)}$kt] 'weigh-SUP'

kö/p^{sg}+d/e	AGREE	SPECIFY	*VOI/SG	FAITH$_{[spread]}$	FAITH$_{[voi]}$	*SG	*VOI
kö[pt]e		*!*		*	*		
kö[p^{sg}d]e	*!*					*	*
kö[bd]e				*!	*		**
☞ kö[p^{sg}t^{sg}]e					*	**	
vä/g+t^{sg}/	AGREE	SPECIFY	*VOI/SG	FAITH$_{[spread]}$	FAITH$_{[voi]}$	*SG	*VOI
vä[k^{sg}t]	*!	*		*	*	*	
vä[gt^{sg}]	*!*					*	*
vä[gd]				*!			**
☞ vä[k^{sg}t^{sg}]					*	**	

Nevertheless, it can also be argued that there is no need for both laryngeal features in the phonology of Southern American English and Swedish, even in OT with its theory-specific principles, and we can assume that it is only [spread glottis] that insures the two-way laryngeal contrasts.[14] In this analysis, the marked stops are pronounced voiceless aspirated, and the unmarked ones as voiced. As to the fact that a laryngeally unspecified obstruent is phonetically realized as a voiced segment, it should be accounted for in the phonetics of the given language.[15]

Actually, Lexicon Optimization seems not to provide a strong basis for the necessity of two laryngeal features in the underlying representation either. According to McCarthy (2002: 78),

> [a]s a learning strategy rather than as a principle of grammar, it is decisive only in situations where the learner has no evidence in the primary data about which potential underlying form is the 'actual' one. In fact, when there is real evidence for the underlying form—such as alternations within a paradigm—learners must attend to that evidence and ignore lexicon optimization. …
>
> Because lexicon optimization is only a learning strategy to be invoked when the evidence fails, it is illegitimate to use it to draw inferences and construct arguments about the synchronic grammars of adults.

Based on the above description, we can see that Lexicon Optimization is not a criterion that has to be met at all costs, which is why it might not be too advantageous to use it as an argument for

[14] There *are* tendencies cross-linguistically for minimality requirements, e.g. regarding the minimum size of content words or the obligatory specification of consonants for place of articulation, probably for perceptual reasons (Péter Rebrus and Katalin Mády, personal communication); however, demanding that obstruents be specified for a laryngeal feature or element and redundantly representing contrasts in the phonology at the cost of sacrificing the principle of economy (see Beckman, Helgason, McMurray & Ringen 2011: 17–18) are a different issue. On the one hand, it would be unreasonable to assume a laryngeal feature or element in a language with only one obstruent series, whatever their physical realization. On the other hand, if a language has a two-way contrast, and even if the phonetic distance between its two sets of plosives is greater than usual, like in Swedish, it is not true that two distinctive features or melodic elements in the phonological representation can encode the contrast itself more effectively than one.

[15] Significant degrees of phonetic variations in the realizations of unmarked obstruents in the same phonological environment have been empirically attested across languages that have been considered as prototypical examples of aspirating languages—see footnote 9 as well. It appears then that the explanation for these differences should not have to do with the phonological representation, which, in these cases, is unarguably the same.

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
DOI: 10.34103/ARGUMENTUM/2020/12

the assumption of a laryngeal system, which would be extremely rare and would also violate the principle of economy.

Furthermore, negative support for the absence of voicing in the phonological representations in these languages can be that this feature does not play a phonologically active role in either language. Whereas laryngeal assimilation is not characteristic of Southern American English, the examples in (4) show that in Swedish, this process is restricted to the spreading of voicelessness/aspiration: in both *kö*/pd/*e* and *vä*/gt/ it is the "voiced" obstruent that undergoes assimilation regardless of its position relative to the other obstruent: their realizations will be *kö*[^{h}pt]*e*~*kö*[pt]*e* and *vä*[^{h}kt]~*vä*[kt], displaying both regressive and progressive assimilation.

Also, the data in (4) can be handled in OT as well without assuming [voice]. The tableaux in (8), (9) and (10) show an alternative analysis: SPECIFY$_{[Lar]}$ no longer needs to be ranked high (if it is necessary at all to assume this constraint to be universally present in languages), and *VOI is ranked higher in order for voiced obstruents not to be required outputs in the language. Finally, the winning candidates that are unspecified for a laryngeal feature (i.e. the outputs of the tableaux in (9)) will be subject to phonetic voicing.

(8) Swedish [k^{h}]*ub* 'cube'

/k^{sg}/ub	*VOI/SG	*VOI	FAITH$_{[spread]}$	*SG
[k]ub			*!	
[g]ub		*!	*	
☞ [k^{sg}]ub				*
[g^{sg}]ub	*!	*		*
/g^{sg}/ub	*VOI/SG	*VOI	FAITH$_{[spread]}$	*SG
[k]ub			*!	
[g]ub		*!	*	
☞ [k^{sg}]ub				*
[g^{sg}]ub	*!	*		*

(9) Swedish [g]*ap* 'mouth'

/k/ap	*VOI/SG	*VOI	FAITH$_{[spread]}$	*SG
☞ [k]ap				
[g]ap		*!		
[k^{sg}]ap			*!	*
[g^{sg}]ap	*!	*	*	*
/g/ap	*VOI/SG	*VOI	FAITH$_{[spread]}$	*SG
☞ [k]ap				
[g]ap		*!		
[k^{sg}]ap			*!	*
[g^{sg}]ap	*!	*	*	*

↳ voicing of the unmarked plosive in the phonetics

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
DOI: 10.34103/ARGUMENTUM/2020/12

(10) Swedish *kö*[$^{(h)}$p]*a* + [d]*e* → *kö*[$^{(h)}$pt]*e* ‘buy-PAST’
vä[g]*a* + [t] → *vä*[$^{(h)}$kt] ‘weigh-SUP’

kö/p^{sg}+d/e	AGREE	*VOI/SG	*VOI	FAITH$_{[spread]}$	*SG
kö[pt]e				*!	
kö[p^{sg}d]e	*!*		*		*
kö[bd]e			*!*	*	
☞ kö[p^{sg}t^{sg}]e					**
vä/g+t^{sg}/	AGREE	*VOI/SG	*VOI	FAITH$_{[spread]}$	*SG
vä[k^{sg}t]	*!			*	*
vä[gt^{sg}]	*!*		*		*
vä[gd]			*!*	*	
☞ vä[k^{sg}t^{sg}]					**

All in all, I hope to have shown in this section that even in OT, which has principles that appear to dictate the assumption of overspecification, we have no serious reason really to force two laryngeal features into the phonology of languages like Southern American English and Swedish. Although their plosives are indeed phonetically strongly aspirated or significantly voiced, the feature [spread glottis] or the element |H| will suffice to represent this contrast and to account for the potential laryngeal assimilations—for Element Theory-based analyses in Laryngeal Relativism applying one melodic element to distinguish the two obstruent series in Swedish, see Cyran (2017) and Balogné Bérces & Huszthy (2018).

4 The case of Hungarian—from an L-language to an H-language

Finally, let us examine the laryngeal characteristics of obstruents in Hungarian, used here to represent technically all languages traditionally categorized as L-systems.[16]

The examples in (11) illustrate why it appears self-evident that Hungarian should be analyzed as a true voicing language: On the one hand, word-initial, -medial and -final obstruents are phonetically either prevoiced or voiceless unaspirated (Maddieson 1984), as shown in (11a). On the other hand, as we can see from (11b–c), adjacent obstruents must agree in their laryngeal features (Szigetvári 1998), which can be achieved via the assimilation of an obstruent to the one following it, a phonological process in which voicing seems to play an active role—a voiced obstruent causes a preceding one to undergo voicing (see (11b)).

(11) a. [p]ár ‘pair’ – [b]ár ‘bar’
a[p]a ‘father’ – A[b]a ‘Aba (proper noun)’
lá[p] ‘swamp’ – lá[b] ‘leg’

b. lá/b/ + /ʒ/ák → lá[bʒ]ák ‘shoe cover’
ké/p/ + /g/aléria → ké[bg]aléria ‘picture gallery’

[16] Those L-languages that display word-final devoicing such as Russian can be considered as a laryngeal system identical to one of the two Polish dialects discussed above.

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
DOI: 10.34103/ARGUMENTUM/2020/12

c. lá/b/ + /f/ej → lá[pf]ej ‘foot’
ké/p/ + /k/eret → ké[pk]eret ‘picture frame’

Phonetically, both voicing and voicelessness are capable of spreading in Hungarian; however, in the phonology of the language only one element, namely |L|, is assumed to represent laryngeal contrast in obstruents. That is, *ké*/pg/*aléria* → *ké*[bg]*aléria* can be understood as the spreading of the laryngeal element to the preceding obstruent unspecified for it (see (12a)). As for *lá*/bf/*ej* → *lá*[pf]*ej* though, the lack of the laryngeal element cannot spread.

To account for assimilation to voicelessness, Lombardi applies the constraint formulated in (13a), which states that the laryngeal node in an obstruent can be licensed only if the segment is followed by a sonorant in the same syllable (1995, 1999). If this condition is not fulfilled, the obstruent undergoes delaryngealization and will be realized as voiceless. In languages without word-final devoicing, an additional constraint will be needed to insure that an obstruent remains voiced at the end of a word even though the constraint in (13a) would not allow it. This is referred to as Final Exceptionality and abbreviated as in (13b). In the case of Hungarian, both of these constraints have to be slightly modified to fit the data. As |L| is licensed in the /g/ of Hun. *dogma*, for instance, where /g/ and /m/ do not belong to the same syllable, the licensing constraint applying in Hungarian should be the one in (14a). Also, the /b/ in *lá*/b#f/*ej* is delaryngealized to give the phonetic form *lá*[pf]*ej* (see (12b)), which means that Final Exceptionality does not protect its laryngeal element from being detached from the obstruent. In fact, the domain whose right edge Final Exceptionality refers to is not the word but the utterance; therefore, (14b) provides a more accurate description of the situation.

(12) a. k e: p g ɔ l e: r i ɔ → k e: b g ɔ l e: r i ɔ
L L

b. l a: b f ɛ j → l a: p f ɛ j
L L

(13) a. σ
[Root] [+son]
• Laryngeal node

b. Lar]$_W$

(14) a. × ×
[Root] [+son]
• Laryngeal node

b. Lar]$_U$

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
DOI: 10.34103/ARGUMENTUM/2020/12

Since, based on their position, obstruents in Hungarian trigger and undergo voice assimilation symmetrically,[17] the alternative analysis illustrated in (15) would work just as fine to account for the data. Here, the voiceless consonants contain |H|, and their voiced counterparts, unspecified for a laryngeal element, constitute the unmarked series. As for the relationship between the laryngeal specification of an obstruent in the phonology and its physical realization, it should be considered arbitrary as long as the two series of obstruents are phonetically well distinguishable. In Hungarian, segments with |H| are simply voiceless (and not distinctly aspirated), just like in Polish, whereas the realization of |H|-lessness is phonetic voicing.

The constraints in (14) apply in (15) as well. In this analysis the spreading of "voicing" can be understood as the |H| in an obstruent not being licensed before another, laryngeally unspecified, obstruent, resulting in its delaryngealization and its phonetic realization as a voiced segment (see (15a)). If, however, the second member of an obstruent cluster contains the laryngeal element, it can spread to the first one, making it voiceless. Assimilation to voicelessness is exemplified in (15b).

(15) a. k e: p g ɔ l e: r i ɔ → k e: b g ɔ l e: r i ɔ
H H

b. l a: b f ɛ j → l a: p f ɛ j
H H

In this section, I claimed that Hungarian can be reanalyzed as an H-language, along with other languages traditionally considered as L-systems. In fact, in the case of these languages, it seems not to matter which obstruent series is taken to be laryngeally marked as, phonetically speaking, the spreading of both voicing and voicelessness occurs symmetrically; so, one process can be analyzed as the spreading of a laryngeal element, whereas the other as the lack of its licensing.

5 Consequences

The possibility of assuming (only) |H| in languages with two-way laryngeal contrasts has been investigated above—in "well-behaved" L-systems, like Hungarian, where it means the replacement of |L|; in languages such as Southern American English and Swedish, in which cases |L| can be gotten rid of, leaving only |H| in the system; and in the two main Polish dialects, which can be uniformly analyzed as H-systems, despite the potential difference in the realizations of their word-final obstruents. The clear advantage of this reanalysis is that one element is sufficient to represent a laryngeal contrast between two obstruent series in any

[17] There are three consonants in Hungarian which participate in laryngeal assimilation only partly: /h/ triggers devoicing but does not undergo voicing before a voiced obstruent; /v/ cannot cause another segment to become voiced, but it can get devoiced; and /j/ seems to behave as an obstruent and becomes voiceless if it is preceded by a voiceless consonant and not followed by a vowel. (For a detailed discussion on these segments, see Szigetvári 1998). The behavior of these consonants does not complicate the situation further in the alternative analysis to follow.

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
DOI: 10.34103/ARGUMENTUM/2020/12

aspirating and voicing language. Now, for example, Hungarian and English no longer differ in their laryngeal elements but in the phonological processes targeting |H| in the two languages.

Normally, if a system is simplified in one respect, it becomes more complex in another. Nonetheless, the simplification achieved by reducing the number of the possible laryngeal elements to one in languages with two sets of obstruents does not require a greater complexity in other areas. To begin with, let us consider some stipulations concerning the behavior of the elements |L| and |H|, which have been around for a while, giving the illusion of a solid basis which current typologies can be built on. However, as soon as we examine data across languages a little more, we can realize that these regularities are tendencies only, so eliminating |L| does not decrease the explanatory power of the analysis.

First off, it is commonly regarded as an axiom that the presence of |L| in a laryngeal system, which is to be assumed if the language has consistently prevoiced obstruents, implies voice assimilation (van Rooy & Wissing 2001). Without accepting the Laryngeal Relativism view, it is quite puzzling to account for the fact that lenis plosives are indeed strongly prevoiced in Southern American English, Swedish and Italian, and voicing does not spread in these languages. Even if we agree that the former two should be simply taken as H-languages (after all, it does not go against phonetic reality, as their fortis plosives are strongly aspirated), Italian still causes trouble as its voiceless plosives are only slightly aspirated, which is why it is reasonable to consider it an L-language without voice assimilation (see the data in Huszthy 2019a).[18] This suggests that even though in the vast majority of the languages, |L| is bound to spread, this does not *have to* be the case. As for the spreading of |H|, on the other hand, it has been characterized as rare or even nonexistent (see e.g. Lombardi 1999: 299). Infrequent as it might be, we can still find examples of its occurrence other than in the Swedish cases above: for instance, in Yorkshire English (e.g. in *live performance*, the final obstruent of *live* becomes a fortis, i.e. not only is it pronounced voiceless, but other phonetic cues (such as the length of the preceding vowel) also show that it is actually a fortis fricative, making the word homophonous with *life*) (Wetzels & Mascaró 2001)—for a detailed analysis of the phenomenon, see Balogné Bérces (2017).

Furthermore, we can observe tendencies regarding the direction of the spreading of laryngeal features as well. According to van Rooy & Wissing, "regressive voicing assimilation is not just a 'rule' that should be stipulated [but] an inherent consequence, even property, of the distinctive feature [voice]" (or the element |L|) (2001: 310), whereas spreading appears not to be as characteristic of |H|[19] (Lombardi 1999: 299). Nevertheless, as the Yorkshire English dialect illustrates, |H| can cause regressive assimilation; moreover, it is also capable of spreading forward—as can be seen in Swedish and the Dutch example in (16a) (Ouddeken 2019) as well as in Frisian words like the one in (16b) (Visser 2019a). Frisian and Afrikaans provide further examples of the rightward spreading of voicelessness, as an alternative to the leftward spreading of voicing, which can apply across word boundaries (targeting /d/-initial function words in Frisian and very frequently used function words or the onset in /s#b/ sequences in

[18] For an alternative laryngeal analysis of Italian, see Huszthy (2019a) or Huszthy (2019b).

[19] In Backley (2011) or Huber & Balogné Bérces (2010), the devoicing of a sonorant following an aspirated obstruent (e.g. in [pl̥]*ide*) is analyzed as the consequence of phonological spreading. However, I will not take this allophonic variant to be the result of a phonological process but rather a purely phonetic means of realizing the fortisness of the preceding obstruent (as do Balogné Bérces & Huszthy (2018)).

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
DOI: 10.34103/ARGUMENTUM/2020/12

Afrikaans) (Visser 2019b and Wissing 2019), in which cases the process is not necessarily morphologically conditioned (see (16c–d)).[20]

(16)	a.	Dutch	kla/p#d/e	→	kla[pt]e			‘clap-PAST’
	b.	Frisian (I)	ba/k#d/e	→	ba[kt]e			‘bake-PAST’
	c.	Frisian (II)	wa/t#d/an	→	wa[t t]an	→	wa[t]an	‘what then’
	d.	Afrikaans	o/p#d/ie	→	o[p t]ie[21]			‘on the’
			toet/s#b/egin	→	toet[s p]egin			‘test begins’

The above data suggest that although we can identify general tendencies in connection with the spreading of |H| and |L|, it is clearly not true that regularities regarding the obligatoriness of laryngeal assimilation or the direction of spreading follow from some “inherent property” of the elements. It appears that the existence of this wide range of laryngeal phenomena in languages with two-way contrasts supports the less restrictive view of Hale & Reiss on phonology, namely that “the best way to gain an understanding of the computational system of phonology is to assume that the substance of phonological entities is *never* relevant to how they are treated by the computational system” (2000: 162, emphasis in original)—for details, also see Reiss (2017). In this theory, labeled as “Substance Free Phonology (SFP),” no reference should be made to the physical characteristics of phonological units or to concepts arising from these properties such as markedness or well-formedness when specifying

[20] According to an anonymous reviewer, the laryngeal element does not exhibit rightward spreading in these cases; rather, the voicelessness of the second obstruents of the clusters in (16a–b) can be explained with reference to allomorphic variation, whereas the reason for their lack of voicing in (16c–d) is that they occur in a nonvoicing environment. Taking Swedish as an example of an aspirating language with bidirectional laryngeal assimilation, I am going to show that it is unjustifiable to claim that this phenomenon is simply the absence of passive voicing. To begin with, we cannot avoid analyzing regressive assimilation as phonological spreading in Swedish. In Polish, where the phonetic cue of the laryngeal property of an obstruent is primarily the presence vs. absence of voicing, regressive voice assimilation can be considered a coarticulatory, i.e. purely phonetic, process (e.g. the second obstruent in /dɤ/*u* → [tɤ]*u* ‘breath-GEN-SG’ can be thought of as blocking the voicing of the one preceding it) (see Cyran 2017). However, in Swedish, the possibility to realize e.g. the /g/ in *vä*/g#t/ ‘weigh-SUP’ as a preaspirated voiceless segment (*vä*[kt]~*vä*[ʰkt]) indicates that it must have actually obtained |H|. As for the progressive version of the process (which is rare but attested, e.g. Indic */lab^{h}+ta/ → Sanskrit /labd^{h}a/ ‘grasped (adj.)’ (Iverson & Salmons 1995)), it can also be regarded as phonological spreading in Swedish; unlike in English, which is also often used to exemplify progressive devoicing (for a discussion on the issue, see Balogné Bérces & Huszthy 2018): In words like Eng. *ma*[ʧ̬]*ox*, the fortis obstruent has a voice-inhibiting effect on the following lenis (which tends not to be strongly voiced word-initially anyway), but it does eventually not become fortis, i.e. [p^{h}], so the assimilation is phonetic in nature. In Swedish, on the other hand, even though the realization of the obstruent cluster in *kö*/p#d/*e* ‘buy-PAST’ as [$^{(h)}$pt] does not reflect unambiguously whether |H| has spread onto the /d/, or the preceding voiceless consonant has simply blocked passive voicing, the latter scenario seems untenable in a language where lenis obstruents do not require a strong voicing environment to be phonetically fully voiced. Also, we have no reason to apply in this case an alternative analysis like that of Szigetvári (2020), who states that fortis+fortis clusters are not allowed in English (see the 2nd paragraph of footnote 26 too)—words like *vä*[ʰkt] prove that there is no such constraint in Swedish. All in all, assuming a phonological regressive and a phonetic progressive laryngeal assimilation in this language would not be more advantageous than considering the phenomenon a uniformly phonological bidirectional process. Finally, the Swedish data also show that stems and suffixes alike can display allomorphic alternation, so the process is not sensitive to the morpheme type but to which morpheme contains the marked obstruent.

[21] It should be noted though that regressive voice assimilation is reported to be more probable here, resulting in the form *o*[b d]*ie* (Wissing 2019).

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
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computationally possible phonological processes allowed by UG. Reiss illustrates it with the following example:

> let's assume that there are human languages that show word-final obstruent devoicing and languages that do not, but no languages that show word-final obstruent *voicing*. A theory of phonology is *substance free* if it *cannot* capture such apparently true generalizations, and it is not substance free if it can (2017: 425, emphases in original).

In the SFP view, the nonexistence of phonological systems in which final obstruents are neutralized to voiced segments should not be accounted for in the phonology as it can be explained as the result of extragrammatical effects such as ease of articulation, i.e. on a phonetic basis. Likewise, it is not the responsibility of the phonological grammar to tell in the case of other patterns too whether they are attested or not and to predict tendencies observed cross-linguistically, which normally have physical or psychological reasons.

So, if we examine laryngeal processes in a substance-free framework, we should take the relationship between aspiration or voicing and its behavior in a linguistic system to be arbitrary. Consequently, both the spreading and the nonspreading of a licensed laryngeal element and, in the former case, both the backward and the forward spreading thereof should be considered phonologically possible. As far as the frequency of each process is concerned across languages, it can be assumed to be more or less justified on a physical or psychological basis, the exploration of which would fall beyond the scope of this paper; however, interestingly, these factors do not prohibit or dictate any of the mentioned processes but make some of them rarer than the others at most.[22] Therefore, the freedom offered by SFP seems not only advantageous but also necessary for a comprehensive account of laryngeal phenomena. Therefore, getting rid of |L| and applying |H| instead[23] will not reduce the explanatory power of the analysis since either way we need to stipulate for a given language whether laryngeal assimilation is possible and, if so, what its direction is.

As a result, we end up with a new typology of languages, which is summarized in Table 4. First, languages can be grouped according to whether |H| can be licensed in any position or only before sonorants. The other aspect of categorization is related to the direction of the spreading of the laryngeal element. In this way, we can distinguish the following language types: (1) |H| is licensed in any position and does not spread (e.g. English[24, 25]); (2) |H| is licensed in any position and spreads (leftward[26]) (e.g. Yorkshire English); (3) |H| is licensed in

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[22] What appears to be computationally possible but will be ruled out outside the phonology is a licensing-related process: presonorant delaryngealization in words like Ger. /k^{H}/*asse* 'checkout' or /k^{H}/*lasse* 'class.'

[23] Cyran (2016) also suggests that laryngeal categories may be substance-free, which makes it possible that both voicing and aspirating languages contrast their obstruent series using one and the same category ([blue] in his example) instead of [voice] and [spread glottis] (or |L| and |H|).

[24] The fact that, for example, the /v/ in *leave home* is likely to be realized as [f] is not an instance of the spreading of |H|. It if were, *leave* would become homophonous with *leaf*, which it does not (the lenisness of /v/ will be maintained through other phonetic cues than voicedness, e.g. the longer duration of the preceding vowel). The phonetic voicelessness of the /v/ in *leave home* is due to the lack of a voicing environment.

[25] See the 2nd paragraph of footnote 26.

[26] Laryngeal assimilation, and consonant harmony in general (as opposed to vowel harmony), "shows a relatively strong bias towards right-to-left directionality, which has been explained in terms of speech planning, as the speaker harmonizes in anticipation of an upcoming segment" (Finley 2017: 4). Therefore, I expect that progressive laryngeal assimilation in a language implies its regressive counterpart.

I do not treat English as a language with progressive assimilation only as the phonotactic constraint requiring the past tense/past participle morpheme *-ed* and the plural/possessive/3rd person singular present

Péter Őri: Same Element, Different Processes
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Debreceni Egyetemi Kiadó
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any position and can spread in both directions (e.g. Swedish[27]); (4) |H| is licensed only in presonorant position and does not spread (e.g. German); (5) |H| is licensed only in presonorant position and spreads (leftward) (e.g. Russian or Hungarian[28]). Finally, bidirectional spreading is logically impossible if the licensing of |H| is not independent of its position: if a segment is delaryngealized before an obstruent, it cannot spread its laryngeal element rightward.

Licensing of |H|	Spreading of |H|	Example
independent of position	none	English
	unidirectional (regressive)	Yorkshire English
	bidirectional	Swedish
before sonorants	none	German
	unidirectional (regressive)	Russian, Hungarian
	bidirectional: not possible	—

Table 4. The alternative typology of languages with two obstruent series

6 Conclusion

In this paper, my goal was to show through the cases of Cracow Polish and Warsaw Polish, Southern American English and Swedish as well as Hungarian that the element |H| is sufficient to represent laryngeal contrast in languages with two obstruent series regardless of whether they are currently categorized as aspirating or true voicing languages. Consequently, we can get rid of |L| as a laryngeal prime, possibly simplifying the systems of elements and making phonological representations more uniform.

At the same time, this reduction seems to come free, without any actual trade-off in other aspects of the analysis. As to what follows phonologically from applying one laryngeal element instead of the other in a particular language, the answer is nothing really. |H| does not necessarily spread, and if it does, its direction is not obvious. We can also find languages in which it is reasonable to assume |L|, but, as opposed to the general tendencies observed cross-linguistically, its presence in the system does not imply voice assimilation. Therefore, the stipulations that are made regarding the spreading of |H| in the analysis proposed in this paper have to be made anyway even if we work with two laryngeal elements.

Furthermore, the present analysis requires that we accept Laryngeal Relativism, the view stating that the relationship between the phonological representation of a laryngeal contrast

tense morpheme *-s* to agree in their laryngeal specifications with that of the final obstruent of the stem is limited to these cases only, where it seems to be rather the faithfulness of the stem competing against the faithfulness of the suffix than the rightward spreading of a laryngeal feature qua phonological process. Or, as has been pointed out recently, there is actually no phonological evidence that the obstruents in words like *wished* are both fortis, i.e. it could be analyzed as /wɪʃd/, where the morpheme *-ed* is a lenis obstruent in a nonvoicing environment. For details, see Szigetvári (2020).

[27] Italian can be regarded as belonging to category (1), just like English, as laryngeal assimilation is not characteristic of the language. However, it is worth noting that when it does occur, it is rather voicelessness that appears to spread, both backward and forward (for data, see Huszthy 2019a: 76–79), so it shows a tendency to behave like a type (3) language—Huszthy (2019b), in fact, claims that Italian and Swedish belong to the same category, though based on a different analysis than the one proposed in this paper.

[28] What sets apart the two languages is that the Utterance-Final Exceptionality in (14b) applies in Hungarian, while in Russian it does not (so Russian has laryngeal neutralization at the end of utterances too).

Péter Őri: Same Element, Different Processes
Argumentum 16 (2020), 187-208
Debreceni Egyetemi Kiadó
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and its physical realization should be regarded as highly arbitrary. However, that it is not given a name in some analyses does not mean that there is no arbitrariness in the phonetic interpretation of the laryngeal elements and the lack thereof even in these approaches—let us consider, for instance, how in H-languages obstruents can undergo passive voicing differently (see footnote 9), or how |H| can represent various degrees of aspiration in, say, English and Icelandic (see Figure 3). That is, the principle of Laryngeal Relativism is actually inevitable to some extent in any analysis.

Finally, a result of simplifying the laryngeal analysis of aspirating and voicing languages by taking them all to be H-systems is an alternative typology summarized in Table 4.

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Péter Őri: Same Element, Different Processes
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Debreceni Egyetemi Kiadó
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