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## A World without Voiced Sonorants: Reflections on Cyran 2014 (Part 1)

### Abstract

The article discusses the theory of laryngeal phonology exposed in Cyran (2014), Laryngeal Relativism. The basic assumption of this approach is that sonorants and vowels never bear phonological specifications for voicing: their voicing is only ever phonetic in nature. Therefore phonetic interpretation, i.e. spell-out of the output of phonology into phonetic categories, is central: this is where phonetic voicing leaks into neighbouring segments. In the first part of the article, the generative power of Laryngeal Relativism is evaluated, and its workings are compared with previous analyses. The impact of substance-free primes is also discussed.

### Keywords

Laryngeal Realism, Laryngeal Relativism, sonorant voicing, post-phonological spell-out, substance-free primes, Polish

### Streszczenie

Przedmiotem artykułu jest teoria fonologii laryngalnej zaprezentowana w pracy Cyra (2014), czyli relatywizm laryngalny. Podejście to opiera się na założeniu, iż spółgłoski sonorne oraz samogłoski nie mają specyfikacji fonologicznej ze względu na dźwięczność – w ich przypadku ma ona zawsze charakter jedynie fonetyczny. Głównym elementem jest zatem interpretacja fonetyczna wyniku komputacji fonologicznej – to właśnie wówczas fonetyczna dźwięczność przenika na sąsiadujące segmenty. W niniejszej, pierwszej części artykułu ocenie podlega potencjał generatywny teorii zakładającej relatywizm laryngalny, a zasada jej działania porównana zostaje z wcześniejszymi analizami. Podjęta zostaje również kwestia wpływu jednostek fonologicznych pozbawionych substancji.

### Słowa kluczowe

realizm laryngalny, relatywizm laryngalny, dźwięczność spółgłosek sonornych, fonetyczna interpretacja wyniku komputacji fonologicznej, jednostki fonologiczne pozbawione substancji, język polski

## 1. Introduction

The book which inspired the current article is about the phonetic-phonology interface and Polish voicing, especially in external sandhi. The author has made the wise decision to expose relevant data, previous analyses, his take on the interface and the way Polish voicing works in the two relevant varieties (Warsaw Polish and Cracow–Poznań Polish, which I refer to below as WP and CPP, respectively) in a theory-neutral fashion. This takes up four chapters out of five. The presentation is such that readers with any theoretical inclination or background will be able to see the points that are made, and to understand why the author believes his approach to the interface (phonetic interpretation) and to (Polish) voicing (Laryngeal Relativism) fares better than previous accounts. It is only in the fifth chapter that the Polish voicing facts are looked at through the lens of Government Phonology in general and Cyran's (2010) Licensing scales in particular.

The deliberations below concentrate on the two central claims made in the book, regarding phonetic interpretation and Cyran's theory of laryngeal phonology, Laryngeal Relativism (which is designed to supersede Laryngeal Realism). This covers chapters one to three only: as was mentioned, chapter five is theory-specific, and chapter four is about progressive voice assimilation in Polish, which plays no role in external sandhi voicing and the demonstration regarding Laryngeal Relativism.

It will be evident as we go along that I believe that the analysis of Polish external sandhi voicing in terms of Laryngeal Relativism is elegant and that there are reasons to believe it is correct – but that it will need to be sustained phonetically (Cyran predicts that stops in Warsaw and Cracow–Poznań are phonetically identical, see part 2, section 8) and cross-linguistically regarding the central claim that vowels and sonorants are never phonologically specified for voicing, under no circumstances and in no language. The entire demonstration, both regarding the analysis of Polish and Laryngeal Relativism as such, indeed hinges on this cornerstone assumption. There are good arguments in its favour, which unfortunately the author does not mention. He does not even try to engage into any discussion, or to argue: the assumption is taken for granted since, Cyran says, Element Theory prohibits voicing specification for sonorants and vowels, and he assumes Element Theory.

Hiding behind Element Theory does not do a favour to his enterprise, for two reasons. For one thing it is not true that Element Theory prohibits the presence of voicing primes in vowels and sonorants: this does not follow from any property of the theory. Therefore, predictably enough, there are Element-based approaches (namely in Laryngeal Realism) where sonorants and vowels do bear voice primes (see part 2, section 6.3). But calling on Element

Theory is also a bad idea for another reason: it makes the cornerstone of Laryngeal Relativism theory-specific – exactly what the author wisely avoided otherwise. That is, Cyran will lose those readers who do not buy Element Theory – which is surely quite a bulk: they have no reason to follow the author into Laryngeal Relativism, which stands and falls with sonorants and vowels being phonologically unspecified for voicing. In sum, the author does a good job at developing a theory of laryngeal phonology, but less well at selling it. Therefore, while the purpose of the current part of the article is to present the context of and the grounds for Laryngeal Relativism, as well as its comparison to earlier approaches to CPP, the second part (to appear in the next issue of this journal) is devised to emancipate the claim that sonorants and vowels bear no phonological voicing from any particular theory of segmental representation: the absence of laryngeal specification in vowels and sonorants should stand on pre-theoretical grounds.

## 2. Background

### 2.1. In between: phonetic interpretation

Let us begin by zooming in onto the heart of Cyran's concern in the book, which is twofold and faithfully reflected by the title (Between Phonology and Phonetics) and subtitle (Polish Voicing).

The word “between” in the former refers to what is called phonetic interpretation in the Government Phonology literature of the 1990s (Harris and Lindsey 1995: 46ff; Harris 1996; Gussmann 2007: 25ff). This device in the architecture of grammar is genuine to Government Phonology, but was left quite orphan in the further development of the theory. It was revived more recently, namely in Edmund Gussmann's book on Polish phonology (Gussmann 2007), and is central in Cyran's thinking both regarding the interface of phonology with phonetics as such and the way voicing works in Polish.

So what is phonetic interpretation? Phonetic interpretation is the idea that there are not two, but three devices that control the communication between phonology and phonetics. That is, phenomena concerning sound may not be only either phonological or phonetic in kind – they may also be interpretational. For example, the classical analysis of the fact that in Polish some *e*'s palatalize (Lsg *-e* as in *lot – loci-e* “flight Nsg – Lsg”) while others don't (I.sg *-em* as in *lot – lot-em* “id., Nsg – Isg”) is phonological. That is, the *-e* of the Isg morpheme is front on the surface, but not underlyingly according to Rubach (1984): the morpheme identifies as /-ɣm/ lexically, and then is turned into /-em/ by a (context-free) phonological rule at the appropriate derivational stage (i.e. after palatalization has applied).

Instead of having the job done by phonological computation, the phenomenon may also be viewed as purely interpretational: like Rubach, Gussmann (2007: 56ff) holds that there are two distinct items in Polish that appear as [ɛ] on the surface, palatalizing I-A and non-palatalizing \_-I-A (where heads are underscored and “\_” is an empty head). These are distinct in the lexicon and remain perfectly unaltered during phonological computation. Phonetic interpretation then converts the output of phonology into phonetic objects. The conversion works like in a multi-lingual dictionary (because phonological and phonetic items belong to two distinct sets of vocabulary, just like words of two distinct languages do): it is unpredictable (there is no reason why, say, English *table* has the Polish equivalent *stół* rather than *dom*) and thus conventional and arbitrary. Equivalences are language-specific and thus part of the systemic settings (in the structuralist sense) of each language. They are stored in long-term memory and must therefore be learned in the same way as inventories. The specific Polish convention is that the two phonological objects I-A and \_-I-A are spelt out as the same phonetic object [ɛ] – in other words, the phonological contrast is neutralized in pronunciation. Note that on this analysis, the neutralization of the lexical contrast (/e/ vs. /ɛ/ with Rubach, I-A vs. \_-I-A with Gussmann) is not operated by any phonological activity: phonology does not know (or care) how the items it manipulates end up being pronounced. Rather, the neutralization is *interpretational* in kind, i.e. occurs post-phonologically when phonological vocabulary is converted into phonetic items.

The central point made by Cyran is that there is no hope to understand sound structure if phonetic interpretation is not on the radar of the analyst, i.e. if the phenomena observed can only be ascribed to phonological or phonetic workings. This is true in general, Cyran argues in chapter 2, and especially when voicing is concerned: the critical property of the diagram on p. 29 that represents sound systems is the prohibition against relating phonological categories directly to phonetic ones – phonetic interpretation necessarily mediates between the two. The author puts it this way: “a sound system cannot be identified only with phonology, or only with phonetics. Sound patterns are always a result of system dependent phonetic interpretation of phonological representation” (p. 29).

This is what the word “between” means in the title of the book. Since the author is not delving into the matter any further, though, it may be worthwhile to provide some contextualization in the following section.

## 2.2. Phonetic interpretation is the modular spell-out of the lower interface

In Cognitive Science, modularity holds that the mind (and ultimately the brain) is made of a number of computational systems that are non-teleological,

symbolic and specialized in a specific task (Fodor 1983; Coltheart 1999; Gerans 2002; Carruthers 2006). Modules are also domain-specific, which means that they work with a specific symbolic vocabulary that is distinct from the vocabulary of other modules. For example, the input to visual and auditory computation is made of distinct items, which will be unintelligible by modules that they do not belong to. Based on their domain-specific input vocabulary, modules perform a computation whose output is structure. Hence syntactic computation (whose central tool is Merge in current minimalism) takes as its input features such as gender, number, person, tense etc., and outputs hierarchized syntactic structure, i.e. trees.

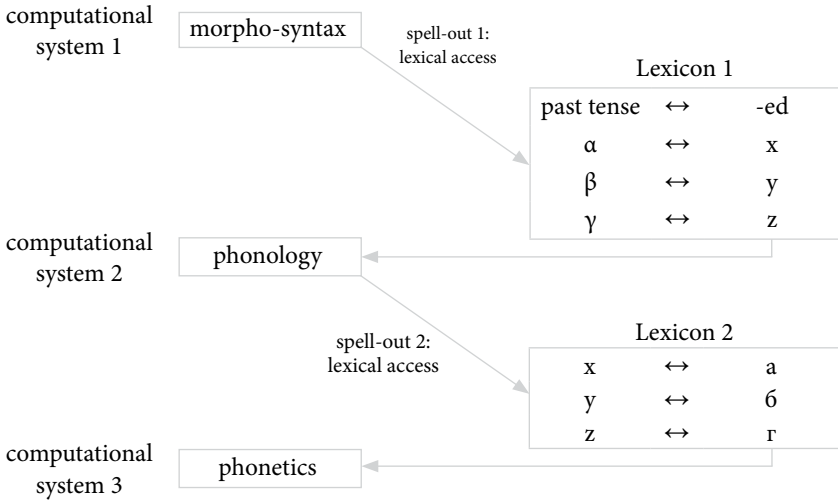
A necessary consequence of domain-specificity is translation (or transduction): since different modules speak mutually unintelligible idioms, intermodular communication must rely on translation of items from one vocabulary into another. The way morpho-syntax transmits information to PF is called lexical (or vocabulary) insertion: a spell-out mechanism converts (portions of) the hierarchical morpho-syntactic structure into phonological material. This implies lexical access: the phonological material inserted is stored in the lexicon (long-term memory), and the units stored are morphemes.

The assignment of a morpheme to a portion of the morpho-syntactic structure depends on its morpho-syntactic properties, but on account of its phonological characteristics is unpredictable and arbitrary: there is no reason why, say, *ed* realizes past tense in English (rather than *eg* or *a*). This is because we are dealing with a lexicon, and lexical properties are arbitrary.

All these characteristics also apply to the interface of phonology with phonetics: phonetic interpretation is the name that Government Phonology gave to the spell-out that occurs when phonological vocabulary is converted into phonetic items (see section 2.1). Scheer (2014a) explores the contours of this interface in the modular environment and compares it to the upper interface with morpho-syntax. Table (1) below (taken from Scheer 2014a) depicts the architecture discussed.

On several occasions (pp. vii, 21, 141), Cyran points out the arbitrary relationship between the phonological object and the phonetic item that it is translated into. This is what spell-out 2 under (1) embodies: a phonological prime  $y$  is mapped onto a phonetic category  $\delta$  ( $y \leftrightarrow \delta$ ) by convention. This setup is independent of another choice, which concerns the nature of the phonological primes. In all traditional theories of subsegmental representations (binary features as much as unary systems), there is a universal set of phonological primes that is given at birth whereby each prime is (also universally) related to some phonetic substance. Hence [-back] has an inherent and innate specification for the anterior position of the tongue, and I is inherently and innately linked to the high front tongue body position. In this perspective, arbitrary spell-out may modify these specifications.

(1) fragment of grammar involving phonology



For example, a shift from [uu] to [ii] is documented in South-East British varieties of English (Henton 1993, Harrington et al. 2008): a word like *boot* is pronounced [biit]. There is reason, however, to believe that the [ii] in question is still phonologically /uu/ since in external sandhi gliding it produces a back, rather than a front glide. In (certain varieties of) English, *see* [j] *it* comes with a yod, while *do* [w] *it* produces a *w*. Uffmann (2010) reports that in the u-fronting variety, speakers continue to produce a [w] even if the preceding vowel is pronounced [ii]: *d*[ii w] *it* “do it.” In the perspective of (1), this means that the regular and the u-fronting varieties of English have identical phonologies: the vowel in question is /uu/. The only thing that was innovated in the u-fronting variety is spell-out: while *ii* in phonological output representations is faithfully mapped onto [ii] in regular English, it is spelt out as [uu] in the u-fronting variety.

The substance-free approach to phonological primes argued for e.g. by Hale and Reiss (2008), Blaho (2008) and Hamann (2009, 2011) goes one step further: there is no universal set of primes that is given at birth, and hence there is no phonetic value associated to any given prime that children are born with. Children have the innate capacity to operate (phonological) categorization and build melodic primes based on this ability, universal phonetic constraints and the L1 environment that they are exposed to. That is, melodic primes are the result of the acquisitional process, and so are the phonetic values that they are associated with. Hence primes are not given – they emerge.

Note that this does not mean that primes in the substance-free approach need to be void of any phonetic value. The adult state of affairs may be identical in substance-based and substance-free scenarios – the difference concerns

the initial state before acquisition starts. In particular, at least in some cases the association of a phonetic value to an initially substance-free prime is not only done through spell-out. In the u-fronting variety of English mentioned, the vowel necessarily has a phonological identity that includes the association to a phonetic value: /uu/ is back, high and rounded. Although the spell-out of /uu/ maps it onto [ii], its underlying backness and roundness is guaranteed by the fact that it produces *w*. In other words, arbitrary spell-out and the association of a phonetic value to phonological primes (be they initially substance-free) are two separate things: the former cannot fully replace the latter.

In his book, Cyran uses the primes L and H throughout. Upon the introduction and discussion of Laryngeal Relativism in chapters one to four the substance-free option is not mentioned. It is only in chapter 5 (pp. 198ff) that Cyran argues in favour of substance-free primes. On his interpretation, this means that the only way to associate a phonetic value to laryngeal (or all phonological) primes is through spell-out: initially substance-free primes remain substance-free even in adult systems after acquisition. On p. 200, Cyran therefore concludes that in two-way systems L and H in fact are not any different: there is only one laryngeal prime that identifies the laryngeally marked set of segments. Hence in a system where the voiced series is marked (voicing languages such as Romance, see section 3.1), [b] will be made of whatever set of non-laryngeal primes plus X, the laryngeal prime (while [p] will have the same makeup minus X). In a system where voiceless consonants are marked (aspiration languages such as Germanic, see section 3.1), the situation is the reverse: [p] will have one more prime than [b]. It is crucial for Cyran on p. 200 that in both systems the prime in question may be the same phonological object, X, which has no inherent phonetic value even in adults: its pronunciation is exclusively defined by spell-out.<sup>1</sup>

There is thus debate whether substance-free primes are substance-free only in the initial state or also in adult systems. Cyran favours the latter option (but then it is unclear how cases such as the u-fronting variety of English could be analyzed). This has consequences on laryngeal phonology because at least in two-way systems L and H collapse into a single prime, say X. In this perspective, an X-containing consonant can be pronounced in any possible way (arbitrary mapping): fully voiced, voiceless, aspirated. This contrasts

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<sup>1</sup> Cyran (2014: 200) also contends that mirror image systems like CPP and WP in his analysis (see below) would be impossible when traditional substance-based primes are used. I believe that this is not the case: his own demonstration in the preceding chapters is consistent while based on substance-carrying L and H, and this is also what is shown below. On the same page, Cyran says that diachronic change which affects only spell-out (i.e. which leaves the phonological system unchanged) would be impossible with substance-based primes. This statement also appears to be incorrect: in the u-fronting variety of English mentioned, the only innovation that took place concerns spell-out.

with substance-based primes, which restrict possible mappings to phonology: an L-containing consonant will not be able to be pronounced aspirated, and a consonant bearing H could not come out fully voiced.

The debate regarding substance-free primes lies beyond the scope of Cyran's book: its consequences for laryngeal systems are not worked out, and it is only introduced once Laryngeal Relativism is exposed on the grounds of substance-based L/H. The present article mirrors this setup: the substance-free debate is introduced in this section, but the remainder of the discussion uses substance-based L/H, knowing that the move towards substance-free X-type primes may modify the set of laryngeal systems generated (namely under (2)).

### 2.3. Outsourcing

Cyran's call for a spell-out mechanism that mediates between phonology and phonetics instantiates the general philosophy of Government Phonology regarding the set of phenomena that fall into the purview of phonology: *Small is Beautiful*.

In SPE, any (or almost any) surface alternation was ascribed to phonological computation, and the abstractness debate of the 1970s launched by Kiparsky (1968–73) was all about how much of these alternations are really phonological in kind, and what price in terms of abstraction (i.e. the distance between underlying and surface forms) phonologists should be ready to pay in order to keep processes in the phonology. The main challenger of the generative mainstream in the 1970s were the Natural Phonologies (Hooper 1976; Donegan and Stampe 1979), which tended to shift (or outsource) everything that has a morphological conditioning or is not 100% surface-true to a different computational system, morpho-phonology. Lexical Phonology (Kiparsky 1982) was an attempt to save the walls of SPE by shifting some alternations into the lexicon and by intertwining (rather than separating) morphology and phonology. When autosegmental representations arose in the late 1970s, it was hoped that they would be an antidote to the daunting problem of overgeneration (the development since SPE is described in greater detail in Scheer 2011b).

Within this general evolution, Government Phonology has always taken an extreme position on the far edge of the scale. *Small is Beautiful* means that synchronic phonological computation is minimized: maybe 90% of what SPE thought was managed by phonology is outsourced into other areas of grammar. Recipients of the outsourced alternations are 1) the lexicon, 2) phonetics, 3) allomorphy, 4) analogy, 5) diachrony, 6) morpho-phonology (in the structuralist sense, advocated by Gussmann 2007).

The instrument allowing the analyst to outsource into phonetics is precisely phonetic interpretation. The example from Polish palatalization in section



2.1 shows the functional equivalence between phonological computation (Rubach's analysis) and phonetic interpretation (Gussmann's approach): both transform non-palatalizing vowels into [ɛ], but in the latter approach phonology has no business in this move.

Cyran's book is a straightforward contribution to the Small is Beautiful philosophy: it extends this approach to the realm of laryngeal phonology, which had not been thought of in these terms before. We will see that the result, Laryngeal Relativism, makes phonology more, and sonorants/vowels less phonological. Phonology is more phonological because the kind of laryngeal system instantiated by a given language (aspiration or voice) cannot be discovered by any phonetic property (such as VOT): only phonological analysis will tell. Sonorants and vowels on the other hand are dephonologized under the overarching assumption made in the book on which all hinges and which I refer to as Unvoiced Sonorants (see part 2, section 6.1): sonorants and vowels do not bear any phonological specification for voicing, in no language and under no circumstances.

More recently, the Lexical Phonology mainstream compromise and Small is Beautiful cohabitate anew with voices that advocate a return to SPE-type Big is Beautiful, i.e. where overgeneration does not matter (or is even welcome as a sign of a sound natural computational system): about any alternation found on the surface is held to be due to synchronic phonological computation. Optimality Theory certainly represents this evolution back to SPE (Hulst and Ritter 2000), albeit without that being based on a principled argumentation. The work by Mark Hale and Charles Reiss (e.g. Hale and Reiss 2008) on the other hand explicitly addresses the question, concluding that phonological computation should be entirely unrestricted, except for a small set of formal properties. The Small is Beautiful vs. Big is Beautiful contrast is further discussed in Scheer (2014b).

### 3. Laryngeal Realism and Laryngeal Relativism

#### 3.1. Laryngeal Realism generates only two systems

Regarding voicing, or rather more broadly laryngeal phenomena, the theory that is presented in the book, Laryngeal Relativism, is possible only in a system that implements phonetic interpretation. Or rather, what is more, the existence of laryngeally relative systems is *predicted* by phonetic interpretation.

So what is Laryngeal Relativism? Laryngeal Relativism is a development of so-called Laryngeal Realism (Honeybone 2002, 2005; Iverson and Salmons 1995; Ringen and Kulikov 2012) holding that in contrast to current assumptions and practice in the latter, voicing and aspiration languages cannot be told

apart on phonetic grounds: only phonological behaviour is able to identify whether a given system is an H (aspiration) or an L (voice) system.<sup>2</sup>

Of course, non-phonetic arguments are also brought to bear in the Laryngeal Realism literature, but they are only ancillary: VOT is supposed to unambiguously identify aspiration and voicing languages. That is, languages with a two-way laryngeal system contrast a VOT-neutral category (around zero VOT) with either a VOT-lead category (negative VOT, i.e. voicing), or a VOT-lag category (positive VOT, i.e. aspiration). In both systems, only one of the two primes that are in principle available is active (both of them contribute in systems with three- or four-way laryngeal contrasts): voicing languages actively voice the negative VOT items by specifying them phonologically for voice (presence of L, transcribed as C<sup>L</sup>), while aspiration languages phonologically specify the positive VOT items (presence of H, transcribed as C<sup>H</sup>).

In both systems, the category that has no phonological specification for laryngeal behaviour is called neutral (around zero VOT), and is transcribed as C<sup>°</sup>. Hence typical voicing languages such as Slavic and Romance oppose C<sup>L</sup> : C<sup>°</sup>, while typical aspiration languages that occur in the Germanic family contrast C<sup>H</sup> : C<sup>°</sup>. While the pronunciation of the actively specified categories C<sup>L</sup> and C<sup>H</sup> is commanded by the phonology and hence does not vary, the voicing of the neutral consonants C<sup>°</sup>, escaping phonological control, is a matter of contextual and/or systemic properties. In English for example, an H language, Cyran reports (p. 26, but without providing references) that initial C<sup>°</sup>s are voiced to different extents in different dialects. This kind of voicing is called passive, since it is “only” phonetic, i.e. coming from phonetically voiced neighbours such as vowels and sonorants. While passive voicing may or may not occur (and to variable extents) in H-systems, Cyran notes p. 27 that it is strictly blocked in L-systems for universal systemic reasons: L-systems need to distinguish two categories and hence cannot tolerate that C<sup>°</sup>, acquiring passive voicing, is pronounced in the same way as C<sup>L</sup>. That is, sufficient discriminability (or minimal phonetic distance of the two categories) is universally enforced.

The situation described is shown under (2) below (note that Laryngeal Relativism provides for all systems shown, while Laryngeal Realism only entertains (2a, b).

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<sup>2</sup> Depending on the kind of melodic primes assumed (binary features or unary items), the literature talks about spread glottis vs. voicing languages (relating to the two features [spread glottis] and [voice]) or H- vs. L-languages (relating to the unary primes H and L). Note that in both cases the primes involved are necessarily privative, i.e. non-binary (being unary, H and L are privative anyway, but [spread glottis] and [voice] could in principle be binary – here they cannot). Cyran uses H/L but is explicit about the fact that nothing of what he says in the book hinges on that. In this article I either use the neutral descriptive terms aspiration vs. voicing language, or Cyran’s H/L terminology.

(2) two-way laryngeal systems and VOT

Laryngeal Realism							
closure	release			surface			
	lead	neutral	lag	C <sup>L</sup>	C <sup>°</sup>	C <sup>H</sup>	
a.		C <sup>°</sup>	C <sup>H</sup>		[D] / [T]	[T <sup>h</sup> ]	Germanic
b.	C <sup>L</sup>	C <sup>°</sup>		[D]	[T]		Slavic (incl. W Polish), Romance

Laryngeal Relativism							
closure	release			surface			
	lead	neutral	lag	C <sup>L</sup>	C <sup>°</sup>	C <sup>H</sup>	
c.	C <sup>°</sup>	C <sup>H</sup>			[D]	[T]	Dutch, CP Polish
d.		C <sup>L</sup>	C <sup>°</sup>	[D]	[T]		??
e.		C <sup>H</sup>	C <sup>°</sup>		[T]	[T <sup>h</sup> ]	??
f.	*	C <sup>°</sup>	C <sup>L</sup>				impossible

Laryngeal Realism generates only two systems, (2a) and (2b). Under (2a) H is phonologically active and produces aspiration [T<sup>h</sup>] on the surface while under (2b) L is phonologically specified and appears as voicing [D].<sup>3</sup> As was mentioned, the pronunciation of neutral consonants C<sup>°</sup> tolerates some slack in (2a) systems (passive voicing), but not in (2b) systems. Note that there is passive voicing, but no passive aspiration (which in principle could affect C<sup>°</sup> in (2b) systems). This is because a “plain,” i.e. archetypical obstruent is thought of as voiceless, rather than voiced: without phonology intervening, (universal) phonetics produce voiceless obstruents (but on the contrary voiced sonorants, on which more in the second part of this article). Also, for neutral obstruents to be passively aspirated, there would need to be a local source of (phonetic) aspiration, which is lacking.

### 3.2. H-systems where C<sup>H</sup> is pronounced without aspiration

Since two-way laryngeal systems in Laryngeal Realism reduce to (2a) and (2b), it may be read off the table that L-containing obstruents always and in all languages appear as voiced on the surface, while H-containing items are always pronounced aspirated. In other words, there is a one-to-one relationship between the phonological identity of an L/H-containing obstruent and its phonetic realization: C<sup>L</sup>s in all languages are voiced and show a negative VOT, while C<sup>H</sup>s are aspirated because they have a positive VOT. This is why it is

<sup>3</sup> Here and henceforth, T is shorthand for voiceless obstruents, D for voiced obstruents, R for sonorants and V for vowels.

enough, under Laryngeal Realism, to look at the VOT of obstruents in order to discover the type of system, (2a) or (2b), in which they occur. Therefore there is no meaningful way to talk about phonetic interpretation since the phonetic value of obstruents with phonologically specified laryngeal properties is 100% predictable.

This is precisely what Cyran calls into question: as we have seen earlier, he argues that an analytic setup without language-specific phonetic interpretation is a dead end. Therefore it cannot be true that the phonological identity of an obstruent may be read off its phonetic properties: there must be some language-specific slack in the phonetic interpretation of  $C^L$  and  $C^H$ . Recall from section 2.2 that this is what is meant by the absence of a stable phonetic correlate of phonological primes: arbitrariness is a consequence of spell-out, i.e. of phonetic interpretation.

With this prediction in mind, the author comes up with two languages, Dutch and the Cracow–Poznań variety of Polish, which look like L-systems (2b) because voiceless obstruents are non-aspirated but in fact, Cyran argues, identify as H-systems. Not as the H-system under (2)a, though, because precisely  $C^H$  is not pronounced aspirated but plain and thus has a neutral VOT. In turn, what appears as a voiced obstruent on the surface is a phonologically unspecified  $C^\circ$ , rather than a  $C^L$ . Dutch and CPP thus instantiate (2c), which means that there are two distinct H-systems around, (2a) and (2c), which differ only in the phonetic interpretation of  $C^H$ : aspirated (positive VOT) in the former, plain (neutral VOT) in the latter. This difference in phonetic interpretation has also a consequence for neutral  $C^\circ$  which, recall, in (2a) systems may or may not develop passive voicing. In (2c) systems it *must* be passively voiced. This is what Cyran calls *enhanced passive voicing* (p. 42), which is enforced by the aforementioned systemic requirement for phonological distinctions to also be phonetically discriminable (minimal phonetic distance): were  $C^\circ$  not passively voiced in a (2c) system, it would sound exactly like  $C^H$ , i.e. a plain voiceless obstruent would represent both phonological items. Such an absolute neutralization of laryngeal contrast cannot be tolerated.

What the existence of (2c) means is that the surface is out of business, as the author argues (p. 33): the phonological identity of a system cannot be determined by any phonetic properties (VOT, spectrograms etc.). Systems that have identical surface items may well be phonologically opposite. The prime witness that the book brings to bear for the sake of illustration are the two main varieties of Polish, referred to as Warsaw Polish (WP) and Cracow–Poznań Polish (CPP). These have identical surface patterns (both oppose plain voiceless to voiced stops), but Cyran argues that their different behaviour in external sandhi can only be made sense of if WP is an L-, but CPP an H-system.

In the Laryngeal Realism literature, the mere presence of voice assimilation in a language is typically taken to witness a voicing system: the only way for voiceless obstruents to become voiced is to acquire a voicing prime. This alternative way to read off the phonological identity of a system from the surface (this time from processing) is also a mirage under Laryngeal Relativism, as shown in section 4.5 (and in part 2, section 6.2).

Comparing options (2b) and (2c), the formal reason for the tolerance of identical pronunciations of phonologically distinct systems appears: Laryngeal Realism ties neutral consonants  $C^\circ$  to neutral VOT. A more or less simultaneous burst release and voice onset cannot represent phonological control over voicing since H and L represent the VOT extremes. This restriction is abandoned by Cyran's alternative, Laryngeal Relativism, which is a well-chosen name for the programme it represents: the association of phonologically active laryngeal primes L/H to VOT values is relative (i.e. decided on language-specific grounds), not fixed – and the instrument of this relativity is phonetic interpretation. Therefore both  $C^H$  and  $C^L$  may represent neutral VOT, as under (2c–f).

### 3.3. The surface is uninformative

In sum, Laryngeal Relativism governs the phonologization of laryngeal patterns: static phonetic properties of the items studied are toothless, only phonological behaviour can reveal the phonological identity of the players. Note that this is the application to laryngeal patterns of the basic methodological principle established in Government Phonology: “the only source of phonological knowledge is phonological behaviour. Thus, phonetics [...] plays no role in the postulation of phonological objects nor the interaction of such objects” (Kaye 2005: 283). The same strategy is also advocated by Dresher (2009): the systemic (i.e. contrastive) properties of phonetically identical inventories can only be discovered by studying phonological processes.

Phonological behaviour, then, is also the instrument that allows L1 learners to tell phonetically identical patterns apart: WP and CPP show different behaviour in external sandhi (on which more shortly), and this is what tells children that WP could only be an L-system, while CCP must be an H-system. On p. 41, Cyran discusses the acquisition issue, mentioning yet another factor that may orient learners, but which is in fact also related to processing: type frequency of voiced and voiceless items. As we will see below, the word-final context in WP produces more voiceless consonants in external sandhi than the same context does in CPP. Children may thus deduce markedness from frequency, Cyran argues, and discover whether voiced or voiceless obstruents are carriers of laryngeal specification: in WP voiceless items are unmarked and hence their voiced counterparts must be marked. By contrast in CPP voiced obstruents are

unmarked, which means that their voiceless cousins are marked. Note that the correlation between the fact of being marked and H/L-bearing relies on the assumption made by unary systems of melodic representation (Cyran assumes Element Theory, see Backley 2011) that whatever is phonologically specified is marked: unspecific, unmarked characteristics exist only by default (e.g. only nasal sounds bear a phonological specification for nasality, non-nasal items are characterized by the absence of an instruction to be nasal).

### 3.4. Systems generated by Laryngeal Relativism that are not mentioned

Let us now return to table (2): options (2d–f) were not discussed thus far. They are logically possible when the central formal point made by Laryngeal Relativism is accepted: the fact that L/H-bearing obstruents can also be realized with neutral VOT. Cyran does not mention the fact that his theory generates these three additional patterns. The system under (2f) should be impossible, one can presume, since it would require a surface distinction between voiced and super-voiced: if neutral VOT maps to voiced [D], the unmarked  $C^\circ$  with negative VOT could hardly be voiceless or aspirated. That is, negative VOT and voicelessness/aspiration are nothing that the phonetic system could produce simultaneously.

The situation is different for (2d) and (2e): there is no phonetic reason why these systems could not exist. (2d) is the symmetric system with respect to (2c) (which is supposed to represent CPP):  $C^L$  is mapped onto neutral VOT, while  $C^\circ$  is placed in the positive VOT area. Following Cyran's reasoning regarding sufficient surface discriminability,  $C^\circ$  in L-systems is not allowed to develop passive voicing – but it could well be either pronounced as plain voiceless [T], or as aspirated [T<sup>h</sup>]. Finally, (2e) would require enhanced aspiration (symmetric to Cyran's enhanced passive voicing required for (2a) systems). That is,  $C^H$  spells out as neutral VOT, and its  $C^\circ$  partner is in the positive VOT area. In order for them to be phonetically distinct,  $C^\circ$  would have to be aspirated – and nothing withstands this phonetic interpretation of an item with positive VOT. In other words, (2a) and (2e) are exact flip-flop systems where the distribution of  $C^\circ$  and  $C^H$  over the same VOT areas is opposite.

It thus seems that the theory introduced, Laryngeal Relativism, is even more relative than what the author reckoned: his theory generates systems that are predicted to exist and should be detectable when analyzing the empirical record. The picture is thus a little more complicated at the end of the day: instead of two phonologically distinct systems that are phonetically identical ((2b) and (2c)), a third system, (2d), is also homophonous: all three patterns (may) oppose [T] and [D]. Also, the classical aspiration system under (2a) now has a counterpart that may sound identical, (2e).

## 4. External sandhi in Polish

### 4.1. Germanic without aspiration: Dutch (Yiddish, Afrikaans)

What is the evidence that leads Cyran to claim that systems where the laryngeal contrast appears as [T] vs. [D] on the surface may not only by L- (as under (2b)), but also H-systems (as under (2c))? Dutch is one case in point: Honeybone (2002) points out that Dutch is a suspicious Germanic language in that it lacks aspiration and thus sides with Romance and Slavic, opposing [T] and [D]. Honeybone concludes that Dutch has evolved from an original H- to an L-system, maybe due to language contact with Romance. Cyran on the other hand interprets the evolution of Dutch as a purely interpretational one: Dutch is a regular Germanic H-system whose phonology was not modified, but where C<sup>H</sup> used to be pronounced as [T<sup>h</sup>] and now appears as [T].

In a footnote on p. 40 and on top of p. 34, the author also mentions Yiddish and Afrikaans as candidate Germanic languages of the Dutch kind, but the reader is not given any references, description of the situation in these languages, or actual data.

### 4.2. WP and CPP: what they share

The other witness of an H-system spelling out as [T] vs. [D] is CPP. Here the book offers a detailed introduction to the facts and previous analyses (chapter 3). Polish falls into two major varieties, referred to as WP and CPP. Their (two-way) laryngeal systems have the same surface manifestation, [T] vs. [D], and they show identical behaviour to all extents and purposes within the limits of the word. Namely, both varieties implement final obstruent devoicing (FOD) and regressive voice assimilation (RVA). Nothing much needs to be said about these at the descriptive level: obstruents can only be voiceless in word-final position, and a sequence of obstruents can only have one voice value, which is provided by the rightmost item.

A peculiarity of (all varieties of) Polish regarding both phenomena is so-called sonorant transparency: in positions where sonorants would be syllabic in other languages (e.g. in neighbouring Czech) but are not in Polish, they behave as if they were not there regarding voicing. These sonorants are called trapped (see Scheer 2008, 2009c) and occur in T\_\_T (*Jędrka* [jɛntɕka] “Andrew Gsg,” T here referring to both voiced and voiceless obstruents) as well as in C\_\_# (*bóbr* [bupɕ] or [bubr] “beaver”).<sup>4</sup> The [t] in *Jędrka* [jɛntɕka] is an

<sup>4</sup> Also in #\_\_C (*rtęć* “quicksilver”), but this context does not play any role in voicing.

underlying /d/, as witnessed by the Nsg form *Jędrek* [jɛndrɛk] where a vowel-zero alternation disrupts the TRT sequence. In the same way, the Gsg *bo-bra* [bɔbra] shows that the last obstruent is underlyingly voiced (/b/). The remarkable fact is, then, that the two obstruents in TRT sequences always agree in voicing, and the voice value is the one of the rightmost item, just as if the R were not there. Note that the sonorant itself is devoiced in this context in case the last obstruent is voiceless. Unlike in TR# where [TR<sub>ɔ</sub>]# and [DR]# are reported to be in free variation, there is no variation observed for T<sub>1</sub> in T<sub>1</sub>RT<sub>2</sub>: T<sub>1</sub> always agrees in voicing with T<sub>2</sub>.

Sonorant transparency is a definitorial property of trapped consonants (e.g. in Georgian and Czech, as discussed in Ritter 2006 and Scheer 2008, respectively). It plays no further role in the description and analysis of Polish voicing in terms of Laryngeal Relativism (except in the theory-specific chapter 5 of Cyran's book).

### 4.3. WP and CPP: external sandhi

While WP and CPP exhibit identical patterns within the limits of the word, they show different behaviour in external sandhi. A short description of the pattern observable on the surface is the following: in both varieties, laryngeal phonology treats the word boundary as if it were not there. That is, word-final obstruents are under the spell of the first segment of the following word. WP and CPP follow different paths, though, regarding which word-initial segments exactly influence word-final obstruents: only obstruents in WP, against all segments in CPP (thus obstruents, sonorants and vowels).

This means that the behaviour of WP in external sandhi is exactly the one that prevails within the word: the only thing that happens is RVA (of obstruents) across word boundaries. In CPP, though, word-final obstruents also end up voiced when the first segment of the following word is a sonorant or a vowel: descriptively, thus, sonorants and vowels are the source of voice assimilation. If the surface facts are ascribed to phonology, this means that they possess a voicing prime, which they spread onto preceding obstruents.

Table (3) below illustrates the WP and CPP patterns, whereby grey-shaded cells indicate those cases where sonorants and vowels cause the voicing of preceding obstruents (data are copied from p. 56). Note that the CPP pattern, which begs the question and is at the origin of Laryngeal Relativism, is also reported to occur in other languages: Catalan (Wheeler 1986, Bermúdez-Otero 2006), West Flemish (De Schutter and Taelde-man 1986), Breton (Krämer 2000) and Durham English (Gussenhoven and Jacobs 2011: 196).



## (3) external sandhi in WP and CPP

			WP	CPP
a. ...T/D # T...	jak trudno	“how hard”	k-t	k-t
	wkład stały	“permanent contribution”	t-s	t-s
...T/D # D...	jak dobrze	“how well”	g-d	g-d
	wkład własny	“own contribution”	d-v	d-v
b. ...T/D # R...	jak możesz	“how can you”	k-m	g-m
	wkład mój	“my contribution”	t-m	d-m
c. ...T/D # V...	jak oni	“how they”	k-ɔ	g-ɔ
	wkład odrębny	“separate contribution”	t-ɔ	d-ɔ

Nothing needs to be said about (3a): both varieties behave as expected given what we know from the word-internal situation and acknowledging that laryngeal phonology ignores word boundaries. Nothing needs to be said about WP under (3b, c) either: the pattern is identical to the one found word-internally. In CPP, though, the grey-shaded cells under (3b, c) beg the question since word-internally (both in monomorphemic strings and across morpheme boundaries), obstruents are not assimilated by following sonorants and vowels (or, using a more neutral formulation, do not necessarily agree in voicing).<sup>5</sup>

Before delving into the analysis of these data, a word is in order about the syntactic conditions of this external sandhi phenomenon: the understanding that the reader deduces from the presentation in the book (pp. 17, 56) is that there are no. That is, the external sandhi pattern under (3) (in both varieties) applies regardless of the kind of syntactic relationship that is entertained by two adjacent words in a string. Presumably, this is only true within the limits of a sentence (i.e. not across a sentence boundary), but this kind of information is not provided since the author does not consider the eventuality of a syntactic influence. This in fact is nothing quite extraordinary in the literature on external sandhi: there are a number of phenomena that are described as being completely insensitive to syntactic conditions. T-flapping in English is a prominent case in point (e.g. Nespors and Vogel 1986: 46f, 224ff), other cases include spirantization in Tuscan (*gorgia toscana*, Marotta 2008) and Corsican (Scheer 2009a), as well as Belarusian *v*-allomorphy and *i*-prothesis (Scheer 2009b). A factor that is worth mentioning for all of these cases is that the descriptions seem all to be due to phonologists – a fact that may arouse some suspicion.

<sup>5</sup> The situation of the CPP non-grey-shaded cells under (3b, c) could be debated: if final devoicing is assumed, the final obstruents will “first” be devoiced and “then” fall under the spell of the following R/V. If there is no final devoicing in external sandhi, though, i.e. going by the observation that the word boundary is simply ignored, the items at hand are not instances of assimilation but merely show their lexical voice value. Cyran provides arguments in favour of the former scenario.

#### 4.4. Previous analyses of external sandhi (WP, CPP)

Cyran argues right from the outset of the book that Laryngeal Relativism allows for a substantial analytical advantage when compared to previous accounts of CPP voicing: “[c]hapter 3 provides a new analysis of CPV [Cracow–Poznań Voicing], in which no new rule or rule ordering is necessary” (p. vii). Facing the situation described, the obvious intuition and goal, indeed, is that the behaviour in external sandhi should be able to be understood as an extension of the generalizations found word-internally. The two grey-shaded cells under (3), then, are the obstacle. The call for a unitary analysis is issued since the first generative account of CPP voicing by Bethin (1984), and this is the yardstick that Cyran uses all through in order to evaluate existing analyses: he successively reviews Bethin (1984, 1992), Gussmann (1992) and Rubach (1996) in great detail.<sup>6</sup> All treatments translate the surface observation into phonological terms: since in CPP sonorants and vowels are able to assimilate preceding obstruents, they are specified for voicing (either lexically or in the course of the derivation) and spread this phonological prime to obstruents (just as voiced obstruents do). In each case (except Bethin 1984), Cyran shows that the analysis does not live up to the unifying ambition.

Bethin (1984) does achieve uniformity of word-internal and external sandhi voicing for both dialects, though. Her assimilation rule for WP specifies that only obstruents are triggers, while in the CPP equivalent all voiced segments (i.e. D,R,V) are. Word-internal assimilation of obstruents by sonorants and vowels is blocked by the syllable-driven specification of targets: only non-onsets undergo assimilation. Word-final consonants are such non-onsets (appendices in Bethin’s system), but all pre-sonorant (*trudno* “hard,” *wiosna* “spring”) and pre-vocalic (*pić* “to drink”) obstruents belong to onsets. On p. 61, Cyran has to admit that this analysis complies with the unifying ambition: the same set of rules derives all instances of assimilation within a given variety (and the difference among varieties is due to different voicing rules). But he argues that Bethin’s account lacks “explanatory value.”

Bethin (1992) is different: Cyran points out on p. 63 that in CPP, the order of the default filling for voice values of lexically unspecified obstruents and sonorants that is needed word-internally (obstruents filled with [–voice] before sonorants filled with [+voice]) must be reversed in external sandhi (sonorant before obstruent filling). Hence word-internal and external sandhi voicing are driven by distinct mechanisms.

An interesting feature of Bethin (1992: 184) is that she appeals to a cyclic analysis in order to account for CPP external sandhi: sonorants and vowels

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<sup>6</sup> Gussmann (2007) does not talk about CPP voicing, except in a note on page 301 where a re-examination of the data is called for.

spread their voicing to preceding obstruents, but only at the phrase level, i.e. excluding word-internal contexts. This is of course exactly the surface description of the CPP pattern, and one may be surprised that this was not the general take on the issue in times when Lexical Phonology was the standard framework. That is, there are two distinct computational systems (cycles, mini phonologies), one applying to word-internal strings (lexical phonology), the other modifying larger units after syntax has created strings of words (phrasal, or postlexical phonology). There are two distinct rules, then, one where only obstruents are triggers of voice assimilation and which is active in both the lexical and the postlexical system, another where only sonorants are triggers and which is found only in postlexical computation. CPP features the latter in postlexical phonology, while WP lacks this rule altogether. This is indeed a very simple way of doing justice to the data, and no further syllable-based definition of targets, default filling of features or any other machinery is needed.

The literature, though, except Bethin (1992), did not go this way, maybe because the cyclic analysis of course gives up on the ambition to have a uniform analysis for word-internal and external sandhi contexts.

There may be another reason, though: in theories that refuse the idea of chunk-specific mini-phonologies and allow for only one computational system that manipulates all sizes of strings (such as SPE, Government Phonology or Distributed Morphology, see Scheer 2011a: §§811, 828), a cyclic analysis is impossible because in fact it would be anti-cyclic. That is, phonology would have to apply to the outer (cross-word) cycle, but could not apply to the inner cycle (within the word). This is inexpressible since interpretation is inside-out, i.e. from smaller to larger pieces moving up the morpho-syntactic tree. The reverse situation, i.e. where phonology applies in the inner cycle but is blocked in the outer domain, is perfectly regular and well attested (while the anti-cyclic monster is not on record). For example, English stress assignment is bound by the word, but inert when larger chunks are computed: the stress assignment algorithm does not operate over strings that contain a word boundary.<sup>7</sup> Defenders of distinct mini-phonologies, to start with Jerzy Rubach who is a prominent figure of Lexical Phonology in pre-OT and OT times, could thus have made a point in proposing a cyclic interpretation of the Polish facts – but they didn't. Instead, as Cyran observes (p. 68), all analyses (except Bethin 1992) try to avoid making reference to the word boundary (hence to cycles), thereby getting trouble out of the way of their competitors.

But let us return to the review of the two remaining analyses with respect to the uniformity criterion. Gussmann's (1992) account is not uniform: he proposes a specific CPP sandhi voicing rule that is absent from word-internal phonology.

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<sup>7</sup> Stress clash (*thirtéen* vs. *thirteen mén*) does move stress when cross-word phonology is computed, but this process is distinct from the regular stress assigning algorithm, which only operates within words.

Finally, Rubach (1996) brings home the unifying ambition, as Cyran has to admit. He says (p. 66) that Rubach's analysis "is the most comprehensive and workable account to date." Rubach first defines the targets of assimilation: all and only those obstruents that are delaryngealized (i.e. deprived of their laryngeal specification, [ $\pm$ voice] with Rubach) undergo voice assimilation. Obstruents are delaryngealized in two contexts, before other obstruents and word-finally. Then there is an obstruent-to-obstruent assimilation rule whereby  $T_2$  in  $T_1T_2$  spreads its voice value onto the delaryngealized  $T_1$ . This applies in both varieties and word-internally as much as in external sandhi. CPP features an additional rule that WP lacks, called Cracow Spread. This rule spreads the voice value of any segment, i.e. obstruents, sonorants and vowels alike (which are all specified for [ $\pm$ voice]), onto the preceding consonant. It will do the job for CPP external sandhi, but elegantly is innocuous word-internally since there are no appropriate targets: obstruents are not delaryngealized before sonorants or vowels. This mechanism works along Bethin's (1984) masterplan, except that Rubach's analysis does not resort to syllable structure in order to define targets (the title of his article is "Nonsyllabic analysis of voice assimilation in Polish").

#### 4.5. Cyran's analysis

Looking at the record established, it appears that Cyran's statement on p. vii is correct: previous analyses either have distinct workings for the word-internal and the external sandhi context and are thus non-uniform, or they resort to a specific CPP plug-in, i.e. Bethin's (1984) and Rubach's (1996) rule, dubbed Cracow Spread by the latter author, which is absent from WP. The appeal to a specific CPP rule is presumably what Cyran calls non-explanatory on p. 61 (talking about Bethin) and p. 68 (referring to Rubach). He then demonstrates what an explanatory analysis looks like in his mind, i.e. one where the external sandhi facts fall out simply from the systemic settings of the two varieties, without any additional machinery.

This is the main analytic argument made in the book. Let us thus see how the author gets a handle on the WP and CPP patterns just by finding out what makes them different, systemically speaking. One argument for WP being an L-, but CPP an H-system that the author brings to bear was already mentioned in section 3.3: the frequency of voiced and voiceless items word-finally, which is supposed to provide the L1 learner with information regarding markedness. Voiced obstruents being more frequent word-finally in CPP, voicing is considered unmarked, which means that the marked value is voicelessness – thus H. The same goes for WP, with the opposite empirical record and the opposite conclusion.

Before going into further detail, a useful guiding light is that Cyran's analysis follows the masterplan established by Bethin (1984), as well as Rubach's (1996) non-syllabic refinement thereof. The difference is that the transmission

of voicing from sonorants and vowels to obstruents in CPP external sandhi is not phonological (Rubach's Cracow Spread), but phonetic in kind (i.e. due to phonetic interpretation).

The central instrument for all authors is the identification of targets: all and only those obstruents that are either pre-obstruent or word-final. Bethin's delaryngealization makes them distinct from all other obstruents: they are made laryngeally unspecified. All analyses achieve this move by phonological computation, whose rule-based version is  $T^{Lar} \rightarrow C / \_ \{T, \#\}$  (where  $T^{Lar}$  refers to obstruents that bear a laryngeal specification in the phonology). With Bethin and Rubach, this means that these  $T^{Lar}$  are deprived of [voice]. In Cyran's analysis they lose L/H, depending on the variety: L is lost in WP (which is an L-system), while H is lost in CPP (an H-system). In both systems, pre-obstruent and word-final obstruents are thus made neutral  $C^\circ$ . In all analyses, then, only the voicing value of these naked obstruents can be modified contextually (phonologically with Bethin and Rubach, both phonologically and phonetically with Cyran as we will see, depending on the context).

When the phonological prime that is delinked is [voice], this way of singling out targets ingeniously does another job automatically: in CPP where sonorants and vowels have the ability to voice preceding obstruents, this voicing does not occur word-internally since pre-sonorant and pre-vocalic obstruents have never been delaryngealized and hence are no targets. That is, the s in *wio[s]na* "spring" remains voiceless in both varieties despite the nasal being ready to spread [+voice], because s is still specified for being [-voice].

In Cyran's analysis, the same effect is produced by the universal prohibition of passive voicing in L-systems that guarantees the expression of contrast on the surface (see section 3.1). Hence in the L-system of WP which contrasts  $C^L$  with  $C^\circ$ , the latter appears as voiceless [T] on the surface. The voiceless s of *wios<sup>o</sup>na* is thus neutral, but cannot take on the voicing of the following sonorant through phonetic transmission because passive voicing is blocked (see (6a6) below). In the H-system of CPP on the other hand where  $C^H$  and  $C^\circ$  are contrasted (the former being interpreted as [T] without aspiration, while enhanced passive voicing forcing the latter to appear as [D]), the s is H-bearing, *wios<sup>H</sup>na*, and therefore is not a target of phonetic transmission of voicing in the first place (see (6a5) below).

The reverse situation where an obstruent that is voiced on the surface precedes an R/V produces the same result. In WP, the b of *zaba* "frog" bears L and therefore is immune against phonetic contamination of voicing (see (6a5) below). The same consonant in CPP is a neutral  $C^\circ$  for which phonetic interpretation enforces enhanced passive voicing in order to keep it surface-distinct from its laryngeal counterpart in a system where  $C^H$  is pronounced without aspiration (see (6a6) below).

The systemic settings regarding phonetic interpretation for the two varieties are recapitulated under (4).

## (4) phonetic interpretation in WP and CPP

	C <sup>o</sup>	C <sup>L</sup>	C <sup>H</sup>	action guaranteeing surface contrast
WP	[T]	[D]	---	passive voicing of C <sup>o</sup> blocked
CPP	[D]	---	[T]	enhanced passive voicing of C <sup>o</sup> enforced

The cases under (6a1) and (6a2) illustrate the other phonological process (complementing delaryngealization) that is involved in the laryngeal phonology of Polish according to Cyran's analysis: spreading of its laryngeal properties from a laryngeally specified obstruent to a preceding non-specified congener. That is, any sequence C<sup>o</sup>C<sup>L</sup> and C<sup>o</sup>C<sup>H</sup>, whether the result of delaryngealization (as in *dech – tchu* “breath Nsg, Gsg”) or of the juxtaposition of two individual obstruents in external sandhi that happen to create this kind of cluster (under (6c1) and (6c2)), is transformed into C<sup>L</sup>C<sup>L</sup> and C<sup>H</sup>C<sup>H</sup>, respectively. The interpretation of these clusters, then, is trivial: C<sup>L</sup>C<sup>L</sup> produces [DD] in WP (*gdy* “when”), while C<sup>H</sup>C<sup>H</sup> comes out as [TT] in CPP (*kto* “who”). Note that the patterns (6a3) and (6a4) are neutralized because of delaryngealization. The resulting C<sup>o</sup>C<sup>o</sup> is then interpreted as [TT] in WP (*kto, dech – tchu*), and as [DD] in CPP (*gdy*) according to the regular phonetic interpretation conventions shown under (4).

It thus appears that despite the reverse phonological identities of WP and CPP, the conventions governing phonetic interpretation produce identical surface patterns within the word. In order to achieve the same uniform result word-finally, Cyran needs to introduce an additional convention regarding phonetic interpretation, though, which is shown under (5) below.

## (5) phonetic interpretation:

directionality of voicing contamination

- a. passive voicing needs a local source: voicing can only be acquired by transmission from an adjacent voiced obstruent, sonorant or vowel.
- b. this transmission is only regressive, i.e. right-to-left.

Hence in CPP *gdy*, the sequence of two neutral C<sup>o</sup>C<sup>o</sup> is not interpreted as voiced just by itself: it needs a vowel to its right that provides the source of phonetic voicing, which is then transmitted first to the adjacent C<sup>o</sup>, then from this C<sup>o</sup> to its lefthand congener: C<sup>o</sup> ← C<sup>o</sup> ← V.

This is the reason why final devoicing occurs in CPP: like in all other contexts, delaryngealized (under (6b2)) as much as lexical (under (6b3)) C<sup>o</sup> is subjected to enhanced passive voicing (see (4)), but word-finally (or phrase-finally in order to avoid the external sandhi context) there is no source to its right that could provide phonetic voicing (5a). There is a local source for phonetic voicing, though, the preceding vowel, which however cannot be taken into account due to the restriction of directionality (5b).

The WP pattern on the other hand does not need any specific proviso: C<sup>L</sup> is delaryngealized word-finally (under (6b1)) and then behaves just as lexical C<sup>o</sup>

(under (6b3)), which is pronounced [T] according to the regular conventions under (4) (passive voicing is blocked).

The table under (6) provides an overview of all cases relevant for Cyran’s analysis. The action of the systemic properties under (4) is mentioned in the last column (\*PV means that Passive Voicing is prohibited, while EPV notes that Enhanced Passive Voicing is enforced).

(6) Cyran’s analysis of Polish voicing: summary

underlying	phonological computation		after phonetic interpretation (surface)		comment	
	delaryngealization	spreading	WP	CPP	WP	CPP
a. word-internal						
1. C <sup>L</sup> C <sup>L</sup>	C <sup>o</sup> C <sup>L</sup>	C <sup>L</sup> C <sup>L</sup>	DD	---		
2. C <sup>H</sup> C <sup>H</sup>	C <sup>o</sup> C <sup>H</sup>	C <sup>H</sup> C <sup>H</sup>	---	TT		
3. C <sup>H/L</sup> C <sup>o</sup>	C <sup>o</sup> C <sup>o</sup>	no change	TT	DD		
4. C <sup>o</sup> C <sup>o</sup>	no change	no change	TT	DD	*PV	EPV
5. C <sup>H/L</sup> R/V	no change	no change	DR/V	TR/V		
6. C <sup>o</sup> R/V	no change	no change	TR/V	DR/V	*PV	EPV
b. phrase-final						
1. C <sup>L</sup> #	C <sup>o</sup> #	no change	T#	---		
2. C <sup>H</sup> #	C <sup>o</sup> #	no change	---	T#		no EPV
3. C <sup>o</sup> #	no change	no change	T#	T#	*PV	no EPV
c. in external sandhi						
1. C <sup>o</sup> # C <sup>L</sup>	no change	C <sup>L</sup> # C <sup>L</sup>	DD	---		
2. C <sup>o</sup> # C <sup>H</sup>	no change	C <sup>H</sup> # C <sup>H</sup>	---	TT		
3. C <sup>o</sup> # C <sup>o</sup>	no change	no change	TT	DD	*PV	EPV
4. C <sup>o</sup> # R/V	no change	no change	TR/V	DR/V	*PV	EPV
5. C <sup>H/L</sup> # C <sup>o</sup>	C <sup>o</sup> # C <sup>o</sup>	no change	TT	DD	*PV	EPV
6. C <sup>H/L</sup> # R/V	C <sup>o</sup> # R/V	no change	TR/V	DR/V	*PV	EPV

Finally, let us look at the situation in external sandhi. The patterns under (6c1,2) have already been discussed. Under (6c3) (lexically) and (6c5) (after delaryngealization), C<sup>o</sup>C<sup>o</sup> is sent to interpretation, and the situation is identical to its word-internal equivalent under (6a3,4) since the word boundary is invisible for voicing in Polish. C<sup>o</sup>C<sup>o</sup> is thus interpreted according to the regular spell-out conventions under (4): [TT] is produced in WP (no passive voicing allowed), while [DD] appears in CPP (enhanced passive voicing enforced).

Pattern (6c4) is the one that makes CPP so special and has caused the entire discussion in the first place: this is where sonorants and vowels turn preceding voiceless into voiced obstruents. On Cyran's count, there is no phonological activity involved at all:  $C^\circ\#R/V$  is simply sent to phonetic interpretation. In WP, since passive voicing of  $C^\circ$  is prohibited, the result is  $[T\#R/V]$ . In CPP, enhanced passive voicing is enforced like everywhere else, and this time (as opposed to the phrase-final situation), there is a source of phonetic voicing to the right of the  $C^\circ$ , which is therefore contaminated and appears as  $[D]$  on the surface. The remaining pattern (6c6) is a variant the one described: here  $C^\circ\#R/V$  is also sent to interpretation, except that  $C^\circ$  is not lexical but achieved through final devoicing of laryngealized consonants.

## 4.6. Functional equivalences

Let us now compare the tools that account for the WP and CPP external sandhi voicing in Rubach's (1996) and Cyran's analyses. The former author distinguishes both dialects by the presence (CPP) vs. absence (WP) of a specific phonological rule, Cracow Spread, which spreads voicing from sonorants and vowels onto preceding segments. The equivalent in Cyran's analysis are the universal systemic settings under (4): passive voicing is prohibited in WP because it is an L-language. This prohibition has the same function and effect as the absence of Rubach's rule in WP: the transmission of voicing (phonological for Rubach, phonetic for Cyran) from sonorants/vowels to preceding voiceless obstruents ( $C^\circ$ ) is blocked.

Turning to CPP, the job done by the presence of Rubach's rule and the enforcement of enhanced passive voicing on Cyran's side are functionally equivalent: they produce the transmission of voicing from sonorants/vowels to preceding obstruents.

Cyran's additional specifications regarding the directionality of phonetic voicing transmission under (5) also have a counterpart in Rubach's analysis: Cracow Spread specifies that voicing transmission is only regressive, and this is also what the two provisos under (5) do. In both analyses, the absence of any segment to the right of phrase-final (word-final) obstruents is the reason why these obstruents do not voice in CPP.

## 5. Outlook

The second part of the article (to be published in a forthcoming issue of the journal) first discusses the status of spontaneous (sonorants) and non-spontaneous (obstruents) voicing in the literature and cross-linguistically. The remainder of the article then endeavours to show that the premise of Cyran's Laryngeal



Relativism, i.e. the absence of laryngeal specification in vowels and sonorants, makes correct predictions, although a number of clarifications and amendments are called for, namely regarding the alleged universal prohibition of passive voicing in L-systems and the regressive character of passive voicing.

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