

Cracow sandhi voicing is neither phonological nor phonetic. It is both phonological and phonetic

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1. Introduction

This paper was inspired by a footnote in Gussmann (2007: 301), in which he relates to previous accounts of Cracow sandhi voicing in the derivational-generative literature as unsatisfactory, since “they all smack of gimmicky manipulations encouraged by the theoretical machinery of default filling, voice spreading from sonorants and the like”. This was said with reference to Bethin (1992); Gussmann (1992) and Rubach (1996). In the same footnote, Gussmann admits that at this stage he has “nothing of great pith to add”. His critical opinion derived directly from his theoretical beliefs that phonology is non-derivational, there is no rule ordering and no systematic level of phonetic representation as distinct from phonological representation, and that the phonological representation is privative. On both counts, this was the opposite position from the one he had taken himself in his previous paper on voicing in Polish, that is, Gussmann (1992). Given his theoretical standpoint in 2007, as well as his assumptions concerning the representation of voicing contrasts in Polish, he knew that Cracow sandhi voicing is impossible to express. The summer he passed away, I had informed him of the analysis I was developing – exactly the one to be presented below – but he never had the chance to learn about it. I hope he would not have found it too gimmicky.

Cracow sandhi voicing is the most intriguing aspect of sandhi phenomena in Polish. In the strict sense, it refers to a particular fact whereby a word-final obstruent, which is normally pronounced voiceless in that position in all varieties of Polish, is voiced in one group of Polish dialects if the following word begins with a sonorant sound (consonant or vowel). This phenomenon takes place regardless of whether the word-final obstruent is lexically voiced or voiceless.¹ Polish is divided into two dialect groups with respect to whether this voicing occurs or not: the north-eastern group, which is typically referred to as the Warsaw Polish dialect (WP), and the south-western group, that is the Cracow-

¹ Polish, as it happens, is not unique in this respect. Similar sandhi voicing has been reported for Breton (Ternes 1970), West Flemish (De Schutter and Taldeman 1986), Catalan (Wheeler 1986), and for some varieties of German and Italian (Krämer 2001).

Poznań dialect (CP).² For example, the phrase *nic o nas nie ma* ‘there is nothing about us’ is pronounced [ɲidz̥ ɔ naz ɲe ma] in CP, and [ɲits̥ ɔ nas ɲe ma] in WP.

The facts of both dialect groups are presented below on the basis of the words *brak* [brak] ‘lack’, which ends with a lexically voiceless obstruent (cf. *brak-u* [braku] ‘lack, gen.sg.’), and *obraz* [ɔbras] ‘picture’ (cf. *obraz-u* [ɔbrazu] ‘picture, gen.sg.’), in which the final obstruent undergoes Final Obstruent Devoicing (FOD), a phenomenon which is common to both dialects. The two types of final obstruents in (1) are placed in the context of the following word beginning with a vowel (V), a sonorant (S), a voiced obstruent (C^{+v}), and a voiceless obstruent (C^{-v}).

| (1) | WP | CP | |
|--|--------|--------|--------------------|
| a. brak <u>o</u> ceny ‘lack of mark’ | [k ɔ] | [g ɔ] | __ V |
| b. brak <u>jas</u> ności ‘lack of clarity’ | [k j] | [g j] | __ S |
| c. brak <u>w</u> ody ‘lack of water’ | [g v] | [g v] | __ C ^{+v} |
| d. brak <u>piec</u> zątki ‘lack of stamp’ | [k p] | [k p] | __ C ^{-v} |
| | | | |
| e. obraz <u>a</u> niola ‘picture of angel’ | [s a] | [z a] | __ V |
| f. obraz <u>m</u> istrza ‘picture of master’ | [s m] | [z m] | __ S |
| g. obraz <u>b</u> urzy ‘picture of storm’ | [z b] | [z b] | __ C ^{+v} |
| h. obraz <u>cz</u> łowieka ‘picture of man’ | [s tʃ] | [s tʃ] | __ C ^{-v} |

In WP, the final obstruent may be voiced only before a word beginning with another voiced obstruent (*brak wody*, *obraz burzy*), and remains voiceless in the remaining contexts, i.e., in front of words beginning with a sonorant sound, as well as in front of a voiceless obstruent. In CP, on the other hand, the final obstruent may remain voiceless only before a word beginning with a voiceless obstruent (*brak pieczętki*, *obraz człowieka*), and appears as voiced in all the remaining contexts, i.e., before a vowel, a sonorant consonant and a voiced obstruent. In both dialects the lexical distinction between voiced and voiceless obstruents is neutralized, albeit in two different ways: CP is generally ‘voicing’ in sandhi contexts, while WP is generally ‘devoicing’. The lexical voiced / voiceless distinction does not matter in either dialect.

First, I will discuss the representational and computational issues connected with the target, context and trigger of CP voicing (Section 2). This will be fol-

² CP sandhi voicing was noted very early by modern Polish linguists. Geographical as well as historical details concerning this phenomenon can be found, for example, in Baudoin de Courtenay (1894: 8–16) [1984: 297–308]; Benni (1902); Dejna (1973); Nitsch (1912, 1957); Urbańczyk (1972).

lowed by a brief survey of the main existing proposals concerning this phenomenon (Sections 3–6), and identification of the problems with the derivational-generative analyses of the phenomenon from the point of view of a non-derivational theoretical position of Gussmann (2007). The remaining sections contain a proposal of a new analysis.

2. Target, context and trigger

In this section I would like to lay out the relevant representational and computational issues connected with CP voicing. Contrary to what the heading of this section might suggest, it is not easy, and there is little point in breaking down the phenomenon into such three independent elements, if only because the context in which CP voicing occurs, and which can be schematically represented as in (2) below, necessarily involves all three of them: the obstruent in final position followed by a sonorant sound that begins another word.

(2)
... C # # S ..., V ...

A number of questions can be raised with respect to the target of CP voicing, that is, the word-final obstruent. First and foremost, one needs to consider the general question of how the two-way voicing contrast in a language like Polish should be represented. Briefly, there are two main schools of thought here. The first one assumes *binary* representations in which the voiced obstruents carry the [+voice] feature, while the voiceless ones are represented with [–voice]. This is opposed by a *privative* mode of representation, which assumes that in a two-way contrast system only one series needs to be lexically marked.

Connected with the question of the representation of voice is the status of the word-final obstruents which are targets of CP voicing as well as that of word-initial sonorants which are the triggers of this phenomenon. In one way or another, all analysts agree that the word-final context is neutralizing in Polish and that the obstruents in that position cannot possess a laryngeal category, or laryngeal node. One independent piece of evidence here is the across-the-board phenomenon of Final Obstruent Devoicing (FOD). It should be noted that this argument is compatible with both privative and binary approaches to the representation of voicing contrasts. The important thing is that, at some stage of the derivation, only a neutral obstruent, i.e., /C⁰/ is allowed in the context (__#). It does not really matter whether our analysis arrives at this situation through a

delaryngealization rule, e.g., $C^{Lar} \rightarrow C^0 / _ \#$, or through positive conditions or constraints on the distribution or licensing of Lar .³

It is interesting to note that the lexical laryngeal distinction is also suspended in both CP and WP with respect to sandhi assimilations. Recall that in CP sandhi the final obstruent is generally voiced, while in WP it is generally voiceless, and the effects ignore the lexical distinction of voice. Putting it another way, in WP the context in front of words beginning with voiced obstruents acts separately from all the other contexts, while in CP it is words beginning with a voiceless obstruent vs. all the other contexts.

(3) *Word-final obstruent in sandhi contexts*

| | Warsaw | Cracow-Poznań | |
|-----------|-------------|---------------|--------|
| | $_ C^{+v}$ | $_ C^{+v}$ | |
| voiceless | $_ S$ | $_ S$ | voiced |
| | $_ V$ | $_ V$ | |
| | $_ C^{-v}$ | $_ C^{-v}$ | |

Sonorant consonants and vowels are said to be spontaneously voiced (e.g., Chomsky and Halle 1968; Halle and Stevens 1971), which raises the question whether they should carry a phonological property responsible for voicing. It is not merely the question of their phonetic interpretation as voiced. More importantly, this concerns the fact that they appear to trigger CP sandhi voicing.⁴ As we already know, only in word-final context are obstruents affected by sonorants and vowels in CP. Thus, for example, word-internal sequences ... CS ..., or ... CV ... do not show this effect, as testified by forms like *sosna* [sɔsna] 'pine tree', which would otherwise be pronounced *[zɔzna]. This distinction should suffice to answer the question of how the context in (2) differs from word-medial situation. Word-medially, obstruents do not neutralize before sonorants and vowels.⁵ For clarity, I schematize the contexts in which laryngeal contrasts are kept (4a), and in which they are neutralized (4b, c). The schemes refer to both dialects of Polish equally.

³ Further details will be laid out when we discuss the individual proposals below.

⁴ It is generally assumed that CP sandhi voicing is a result of [+voice] spreading from sonorants (cf. also the proposal in Rice 1993).

⁵ The story is slightly more complicated as will become apparent when we discuss the individual proposals.

- (4)
- | | | |
|-----------------|-------------|-----------------|
| a. | b. | c. |
| ... C (S) V ... | ... C (S) # | ... C (S) C ... |
| | =+ | =+ |
| Lar | Lar | Lar |

C = obstruent, (S) = optional sonorant, Lar = laryngeal feature, V = vowel

The schemes in (4) are meant to be neutral with respect to syllable theory and whether the representation of voice is binary or privative. ‘Lar’ merely stands for the possibility to maintain a laryngeal contrast. The respective contrasts are neutralized word-finally (4b), and before other obstruents (4c), regardless of whether a following sonorant is present or not.⁶ The voicing contrast is maintained on word-medial obstruents which occur before vowels, with or without an intervening sonorant (4a). For the binary representation of voice, it means that both /C^{-v}/ and /C^{+v}/ remain unscathed in that context, and logically, they are not targets of voice spreading. On the other hand, for privative approaches, (4a) has to be understood as saying that both the marked /C^{Lar}/ and the unmarked (neutral /C^o/) are found in that context lexically. This fact creates a problem for privative accounts, which will be returned to below.

To sum up, the point of general consensus in all analyses of CP voicing is that the target obstruent, which is found in the neutralizing context, is an object devoid of laryngeal specification.⁷ Thus, some kind of delaryngealization process must be assumed in any analysis of this phenomenon.⁸

Finally, as for the trigger of CP voicing, there are two questions that need to be addressed: i) what is the representation of sonorants in terms of laryngeal categories, and ii) what is the nature of the voicing assimilation in front of sonorants. If sonorants do carry a [+voice] property, then CP sandhi voicing can be understood as a phonological, computational phenomenon. However, if sonorants are spontaneously voiced and have nothing to spread, then CP voicing cannot be phonological in nature. Below, I briefly summarize the proposals of Bethin (1984, 1992); Gussmann (1992); Rubach (1996) and Gussmann (2007) paying attention only to the relevant aspects, that is, the representation of the voicing contrast, the status of the final obstruent as target of CP voicing, the

⁶ The pre-obstruent context in (4c) is the context where word-internal voice assimilations occur.

⁷ Recently, Strycharczuk (2010) has shown preliminary experimental data suggesting that FOD might in fact be an optional process in CP.

⁸ Details of how this is achieved, i.e., by rule of delinking, conditions on licensing, or otherwise are really not important for our purposes. The reader is referred to, e.g., Rubach (1996) for a discussion of the various proposals.

representation of sonorants and the formulation of the CP sandhi voicing rule, as well as its relation to word-internal voice assimilations in Polish.

3. Bethin (1984, 1992)

Bethin (1984) is a first non-linear analysis of CP voicing. It relies on syllable structure to define the context in which an obstruent is a target to voicing assimilations in both dialects of Polish. She does not need to refer to word boundaries in her analysis which is an advantage, given that such objects are extraneous to phonology (cf. Scheer 2011). Her initial objective also seems to be intuitively correct:

... in both Cracow-Poznań Polish and Warsaw Polish dialects word external assimilation can be seen as a simple extension or generalization of word internal processes. CP, much like WP, has only one rule of voicing assimilation. The two dialects differ, however, in the nature of the voicing assimilation rule (Bethin 1984: 20).⁹

Given the fact that CP voicing is restricted to word-final context it is not an easy analytical task to account for this phenomenon as an extension of word-internal voicing assimilation rules in Polish and not a separate rule for Cracow-Poznań Polish. Recall that word-internally sonorants do not affect preceding obstruents, e.g., *sosna* [sɔsna] ‘pine tree’.

Bethin’s analysis generally rests on two ingredients. The first one is representational and says that in both dialects of Polish the obstruent that is the target of voicing assimilation is in the syllable appendix. She makes a distinction between the syllable coda, which can only be occupied by sonorants in Polish, and appendix which is occupied by obstruents that cannot be syllabified in the onset position. This situation occurs word-finally and medially before other obstruents – the two contexts in which the laryngeal contrasts are suspended in Polish (cf. (4b) and (4c) above). Thus, representationally, CP and WP are identical.

Bethin (1984) is not concerned with the actual representation of the voicing contrast in Polish. Though, given the format of the voicing assimilation rules – the use of the ‘ α ’ variable for voice that she proposes – it may be surmised that she adhered to a binary representation.

The second aspect of her analysis, this time one that distinguishes between WP and CP, is the formulation of the voicing assimilation rules. The WP Voicing Assimilation rule is more general in the description of the target and more

⁹ The idea that external sandhi be handled by the same computational system as word-internal processes is also advocated in Scheer (2011: 683–695).

specific in the definition of the trigger (5a), while the CP Appendix Voicing Assimilation rule (5b), is more specific about the target, and more general about the trigger (Bethin 1984: 28).¹⁰

(5)

a. WP Voicing Assimilation

$$[-\text{sonorant}] \rightarrow [\alpha \text{ voice}] / ___ \left[\begin{array}{l} \alpha \text{ voice} \\ -\text{sonorant} \end{array} \right]$$

b. CP Appendix Voicing Assimilation

$$\begin{array}{c} \text{App} \\ | \\ \text{C} \\ [-\text{sonorant}] \end{array} \rightarrow [\alpha \text{ voice}] / ___ [\alpha \text{ voice}]$$

Rule (5a) restricts the triggers to obstruents and accounts for the assimilation facts in WP, both word-internally, e.g., *koza – kóz-ka* [kɔza – kuska] ‘goat / dim.’ and in external sandhi, e.g., *świat baśni* [ɕʲad baɕɲi] ‘a world of fairy tales’. It correctly predicts that neither medially nor finally should assimilation be triggered by sonorants in that dialect. Medially, the obstruent is syllabified in the onset and not in the appendix, e.g., [baɕɲi] ‘fairy tale, gen.sg.’, and word-finally, sonorants do not trigger sandhi voicing in this dialect.

Rule (5b) allows sonorants to be triggers but they will only ever get the chance to spread voice onto the preceding obstruent in external sandhi context. This is due to the same reason as above: medially, obstruents may end up in appendix only before other obstruents, not before sonorants. In this sense, the unification of the internal and sandhi assimilations is only apparent.

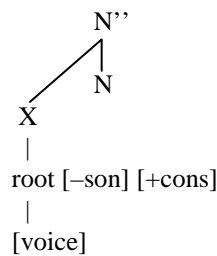
There are a couple of advantages of Bethin’s (1984) analysis. For example, it avoids the use of boundary markers in phonological rules by replacing them with the definition of the context for CP voicing with a representational aspect – syllabification. Secondly, the intuition that internal and external assimilations should be given a uniform account, although not fully realized, certainly goes in the right direction if we want to fully understand the CP voicing. It should be

¹⁰ It seems that the WP Voice Assimilation rule would work equally well if it was also defined as part of an appendix, in which case the difference between WP and CP could be boiled down to the extension of possible triggers of assimilation to include sonorant consonants and vowels.

added that given the precise definition of the context in which an obstruent is a target (appendix), Bethin's (1984) analysis could equally well work under the privative representation of voice, in that the target obstruent is not just neutral (or neutralized) with respect to voicing specification, it must also belong to the appendix. Thus, Bethin could still express the difference between *sosna* 'pine tree', in which the phonetic sequence [sn] is an onset, and *sos na stole* 'sauce on the table', where the *s* in the sequence [sn] is in the appendix. This is not what she could readily do in her 1992 proposal, to which we now turn.

Bethin (1992) further develops the 1984 analysis. The main unifying aspect is the role of syllable structure. Bethin gives up on the notion of syllable appendix in favour of a positive statement as to the relation between syllable membership and expression as well as spreading of voice (1992: 167). Syllabically speaking, the target is now defined indirectly as "not an onset". In onset position, the laryngeal specification is secure, as shown in (6) below.

(6)



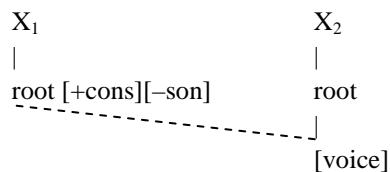
Only those obstruents which are associated to syllable onset preserve their association to the laryngeal tier, otherwise they lose it. Thus onsets show voice contrast, and are triggers of assimilation. The condition in (6) is not met in two contexts: i) word-finally and ii) in pre-obstruent position because these obstruents are not onsets (cf. (4b, c)).

Bethin (1992) is also the first attempt to account for Polish voicing with a privative feature system. Only the voiced obstruents are assumed to possess a lexical property [voice]. The voiceless obstruents are unspecified for voice underlyingly. Sonorants are redundantly specified for voice. This goes against the privative philosophy, but is necessary, as is now clear, to account for CP voicing.

At this point a few things need to be clarified. Firstly, under the privative view, voice assimilation in front of obstruents becomes a cover term for two disparate phenomena leading to the same phonotactic effect: voice agreement. The first phenomenon is [voice] spreading from a marked obstruent, e.g., *liczyć* – *liczba* [lʲiɕʲɪɕ – lʲid͡ʒba] 'to count / number', and the second is neutralization of [voice] in front of a neutral obstruent, e.g., *koza* – *kózka* [kɔza – kuska] 'goat / dim.'. Secondly, the problem with this analysis is that it is not exactly clear now

what defines the obstruents which are targets of assimilation. Is it merely the fact that they do not possess a laryngeal specification, or must they also appear in a particular syllabic position? If the former is the case, then the class of targets of voice spreading is unexpectedly increased under the privative view to include not only delaryngealized objects, but also the lexically neutral ones. This would wrongly predict that neutral obstruents followed by sonorants and vowels should be affected by the voicing spreading rule in CP, in which sonorants are voice assimilation triggers, and all neutral obstruents are assimilation targets. In other words it is not clear how lexically unspecified obstruents are different from delaryngealized ones. The statement: "In order for voicing assimilation to take place, obstruents must lose their specification for voicing" is rather vague. Obstruents, of course, lose their specification only when they are in a particular syllabic position "not in the onset". To all intents and purposes, it would appear that the neutral (voiceless) obstruents are also legitimate targets, because they never had the specification in the first place, unless we claim that the default filling of such objects with [-voice] occurs in onsets before the assimilation rules apply. Another way to get round the problem of neutral obstruents is to assume, like in Bethin (1984), that the target must be defined more precisely in the rule of CP voicing in which the target was specified as occurring in appendix. Thus, both melodic representation and syllabic position are crucial. Unfortunately, Bethin (1992: 184) chose a more general rule format for CP voicing, one which does not bypass the problem described above.

(7)

Cracow-Poznań Voice Spread

The only modification necessary is to note that in the CP dialect voicing may spread to obstruents from following sonorants at the phrase level (Bethin 1992: 184).

The statement is descriptively correct, but the notion "at phrase level" is not written in the rule itself. The rule is supposed to be general, thus accounting for word-internal and sandhi assimilation. Further, Bethin adds:

Word internally, due to the regular syllabification rules, obstruents before sonorants will always be in the syllable onset. They will not lose their association to voice.

It is clear that this refers to obstruents with [voice] and that Bethin simply forgets to say what happens with lexically unspecified obstruents. This does not mean that the analysis cannot be salvaged. All that is required is a less general formulation of the CP Voice Spread rule, one in which syllabic affiliation of the target obstruents would be made more specific.

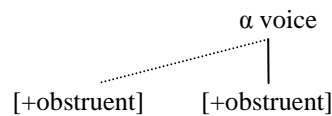
4. Gussmann (1992)

Unlike Bethin (1992), Gussmann (1992) uses a binary feature system, that is, [+voice] and [–voice]. Sonorants are assumed to be underspecified and to become [+voice] in derivation, but it is not mentioned when and by what mechanism – presumably some default – they receive that property. Nevertheless, the feature is present in all demonstrations in the paper, except for the contexts where sonorants are contextually devoiced.

Both in sonorants and in obstruents, voicing must be licensed, and the licensing takes place in obstruents only if they are syllabified as onsets, while the sonorants license voice in onset or coda position.¹¹ The account of Final Devoicing includes two steps: i) the word-final obstruent, which is not syllabified in the onset, loses its voicing category, and ii) such obstruents are filled with [–voice] by default, unless [+voice] is spread from the following context.

Word-internal Voice Assimilation as in *liczba* [lʲid͡ʒba] < /liʃba/ ‘number’, takes the form of a rule of Obstruent-to-Obstruent spreading (Gussmann 1992: 44), which is shown below with some modification.

(8)



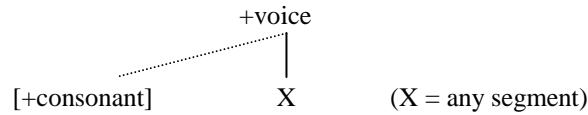
Word-external Voice Assimilation rule in Warsaw Polish is more general with respect to the target, in that this type of assimilation is due to the rule of Obstruent-to-Consonant spreading, where ‘consonant’ stands for both obstruents and sonorants. This extension is due to the fact that, for example, in *wiatr zachodni* [vʲadr zachodɲi] ‘western wind’, the spreading of voicing affects both the obstruent and the sonorant, which is otherwise voiceless in *wiatr* [vʲatr̩] ‘wind’.

The fact that the rule of word-external Voice Assimilation is an extension (generalization) of the one operating word-internally forces Gussmann to admit

¹¹ Sonorants may lose the laryngeal specification if they are not syllabified. This concerns such forms as *Jędrka* [jentr̩ka] ‘Andy, gen.sg.’, *wiatr* [vʲatr̩] ‘wind’.

that the two types of assimilation must be viewed as different.¹² This is even more visible in his formalization of CP sandhi voicing in which the target remains general ('consonant'), and additionally, the trigger is now extended to all types of segments, that is, obstruents, sonorants and vowels. Again, a slightly modified scheme is given below.

(9)



In essence, this extension of the types of triggers of CP sandhi voicing is no different from what can be found in Bethin (1984, 1992), or indeed Rubach (1996), to which we now turn. It must be said, however, that any analysis which uses such extension in the rules of assimilation to account for CP voicing in fact admits defeat. While descriptively correct, such analyses have no explanatory value. We still do not know why in this particular dialect sonorants should voice obstruents, and why only across word boundaries.

5. Rubach (1996)

The analysis of Polish voicing presented in Rubach (1996), while going against the linguistic trends at the time of publication, and even more so now, is the most comprehensive and workable account to date.¹³ The author admits himself that his two main assumptions, namely, that [voice] is binary rather than privative, and that voice assimilations are not syllable-based are highly controversial (p. 76).¹⁴ The binary view of features, and especially rule ordering, which lie at the heart of Rubach's analysis, are indeed controversial. The early and mid nineties abound in arguments in favour of privativity (e.g., Avery 1996; Bethin 1992; Brockhaus 1995; Harris 1994; Iverson and Salmons 1995; Lombardi 1991, 1995), while rule ordering has by and large been given up in mainstream phonological theory.

¹² Recall that using the same premises Bethin (1984, 1992) argued that the two types of assimilation are identical.

¹³ Suffice it to say that it took another decade or more for Polish voicing to be given sufficient attention (Gussmann 2007; Michalski 2009; Cyran in press).

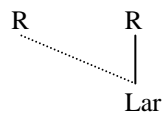
¹⁴ In fact, the latter assumption is hardly controversial in the light of the fact that the early 90ties witnessed the death of the syllable as a meaningful linguistic concept (Kaye, Lowenstamm and Vergnaud 1990; Dziubalska-Kořaczyk 1995)

As for the representation of [voice] on sonorants, Rubach (1996) is no different from Bethin (1992) or Gussmann (1992) in assuming that the voicing specification of sonorants is related to prosodification, and that at some point, sonorants become [+voice] *as per* Sonorant Default, except for the contexts, e.g., *Jędrka* and *wiatr*, in which it is devoiced due to an ordered relationship between Spread and Sonorant Default. Also, similarly to the previous analyses, Final Devoicing of obstruents is a two-step phenomenon. The first one is delaryngealization at the right edge of the prosodic word, and the second step consists in the application of Voice Default, a fill-in rule which supplies [–voice] to segments which are unspecified for [voice] (p. 77). Both types of obstruents are delaryngealized in word-final position. In other words, they can carry neither [+voice] nor [–voice]. Thus, the delaryngealization produces ‘a third object’, which has no laryngeal node. I will symbolize it as /C^o/ for the purpose of this discussion. This neutralized obstruent is (must be) subject to further derivation: either spreading of [+voice] or [–voice] from other local objects that possess these properties, or to default filling. Thus, we are dealing here with an intermediate stage, so typical of analyses using rule ordering.

Word-internal voicing assimilation, involves, generally speaking, delaryngealization in front of another obstruent, and spreading of the laryngeal node from the trigger to the left (p. 78). Limiting the discussion of the assimilation across word boundaries to the relevant [+voice] spreading now, it must be said that, to a great extent, it works in a similar way. The target consonant (word-final obstruent) is already deprived of the laryngeal node due to its position in the word. In Warsaw Polish, where only voiced obstruents may assimilate the preceding word-final obstruents, e.g., *sad wiśniowy* [sad v^hiɕɲɔvɨ] ‘cherry orchard’, the presence of the assimilation is attributed to the regular Obstruent-to-Obstruent Spread rule, which is identical to that operating word-internally.

Cracow sandhi voicing, on the other hand, is given a separate rule called Cracow Spread (p. 82), which can be described as spreading of the laryngeal node from any root node (of an obstruent, sonorant or vowel) to an adjacent root node with no such specification.

(10)

Cracow Spread

One of the conditions on Cracow Spread is that the triggers are prosodified and hence, already filled with [+voice] – by Sonorant Default in the case of vowels

and sonorants. The filling must crucially occur before the operation of this rule. It is interesting to note the generality of the formulation of this rule. No word boundary is mentioned, and the rule can easily be extended to operate also word-medially in that particular dialect, which responds to the postulate formulated already in Bethin (1984), that internal and external assimilations be treated uniformly. Indeed, Rubach can claim that this is the case, except that, like in Bethin's proposal, Cracow Spread never gets the chance to operate word-internally because the configuration in (10) never occurs in that context. This is due to two assumptions: i) [voice] is binary in Polish, and ii) there is no delaryngealization of obstruents in front of sonorants.¹⁵ Thus, the rule in (10) is in effect limited to sandhi.

It will be recalled that a rule similar to (10) was proposed in Bethin (1992) as illustrated in (7), and indeed in Gussmann (1992), which is given in (9). It appears that this rule works best in a binary system, and is problematic for privativity. If sonorants in Cracow-Poznań Polish spread [+voice] onto preceding obstruents with no laryngeal specification, they should do that also word-medially. This flaw of the privative analyses, which I mentioned above as well, was scrupulously noted in Rubach (1996). To salvage privativity, one should return to the presence of the word boundary in the phonological rule of CP voicing, something Bethin wanted to eliminate, or mark the targets of CP voicing more precisely, for example, the way Bethin (1984) did. Later in this paper, I propose a third option.

6. Gussmann (2007)

In order to better understand the criticism of previous derivational-generative accounts of CP voicing, I would like to make the theoretical position from which such criticism is wheeled out more precise. In most respects my views agree with those of Gussmann (2007). They can be summed up in the following way:

There is no systematic level of phonetic representation (Harris and Lindsey 1993). Phonological representations in mainstream Government Phonology are assumed to be directly interpretable. In this sense, default feature filling is viewed as non-existent. There is no underspecification. Instead, there is non-specification. Sonorants and vowels are pronounced voiced for free. They do

¹⁵ Well, in fact, in *Jędrka* [jɛntrka] 'Andy, gen.sg.', the /d/ is delaryngealized in front of an adjacent /t/ (due to the following obstruent), but in Rubach's analysis the sonorant is claimed to be prosodified after Obstruent-to-Obstruent assimilation spreading, and so, it is also not the context for Cracow Spread – the potential trigger does not have [+voice] to spread. This analysis is possible only if a particular rule ordering is assumed.

not need to carry a phonological laryngeal property. At this point it becomes clear that the assumption about non-specification of sonorants immediately puts any GP analysis of such facts as CP voicing at a disadvantage, because at no stage do sonorants and vowels have any phonological property to spread. Recall that all previous analyses of CP voicing take such spreading for granted. Once we agree that sonorants cannot spread [+voice], we must also admit that none of the previous analyses has understood or explained CP voicing.

In one respect, there seems to be nothing wrong with default filling, but only if it is understood as another term for direct interpretation – an unmarked object is pronounced voiced if it is a sonorant or a vowel.¹⁶ However, in all previous analyses, default filling is but a step in a derivational chain: the sonorants which receive [+voice] by default are said to trigger CP voicing. In other words, the default values are used in further phonological computation. In this sense, default filling cannot be accepted in a non-derivational framework such as the one presented in Gussmann (2007).

There is no ordered derivation. Rule ordering itself appears to be a thing of the past in phonological theory.¹⁷ In the approaches adhering to this mechanism, for example, default filling of [+/-voice] must be assumed to be ordered differently for sonorants and differently for obstruents with respect to other rules and each other. Default filling on obstruents must occur *after* voice assimilation rules, or else, potential targets might simply become unavailable for [+/-voice] spreading. For example, if the neutralized final obstruent is filled with [-voice] by default before sandhi assimilation from the following obstruent, it would bleed such assimilation, and instead of [brad baçi] *brat Basi* ‘Barbra’s brother’ we would get *[brat baçi]. On the other hand, default filling on sonorants must be ordered *before* voice assimilation rules and voice default on obstruents, because in CP sandhi voicing, the [+voice] property on sonorants is required in the trigger when the target is still ‘available’ for spreading, e.g., *brak rdzy* [brag rdzi] ‘lack of rust’, and not *[brak rdzi]. In Warsaw Polish, the [+voice] is also required to appear on the word-initial sonorant quite early in the derivation, but in this dialect, this is to block regular sandhi voice assimilation from the following obstruent, e.g., [brak rdzi] *brak rdzy* ‘lack of rust’, and not *[brag rdzi].¹⁸

¹⁶ It will become apparent presently that the same cannot be said about obstruents receiving default voiceless pronunciation.

¹⁷ Although proposals such as Derivational OT (Rubach 1997) show that it is difficult to bypass ordered derivation.

¹⁸ Admittedly, it is quite difficult to understand how the same phonological property, i.e., [+voice], may spread only from obstruents, but it may be blocked by exactly the same property linked to a sonorant.

Gussmann (2007) follows the Laryngeal Realism view within the privative strand of melodic representation (Harris 1994; Honeybone 2002, 2005), to be introduced below, and assumes that voiced obstruents are marked by means of the element [L], while the voiceless unaspirated ones are neutral. Like in most other descriptions of Polish voicing, the process of Final Devoicing is a case of delaryngealization, or non-licensing of [L]. A delaryngealized obstruent is identical to the voiceless unaspirated congener and must receive such phonetic interpretation, unless [L] is spread from the following context. Recall that delaryngealization in Polish takes place in two contexts: i) word-finally, and ii) word-medially in front of another obstruent. In both instances, the following voiced obstruent can act as a trigger of L-spreading, i.e., the voicing assimilation. Sonorant consonants and vowels do not possess the element [L]. They cannot therefore act as triggers of voicing assimilation. This is because voiced obstruents must be voiced phonologically – by possession of [L]. Thus, voicing assimilation can only be phonological, due to the presence of [L] in the following context. A neat prediction follows: since sonorants and vowels do not possess [L] they should not act as triggers of voicing assimilation in a system with L-toned obstruents. This is exactly what happens in the WP dialect, both word-internally and across word boundaries.

As mentioned in the discussion of Bethin (1992), the real problem for this type of privative view of the representation of voice arises when we want to understand the CP dialect. The first question that needs to be addressed is whether sonorants in that dialect possess [L]. If they do, we should expect them to voice neutral obstruents also word-medially. Alternatively, one needs to consider a possibility that CP sandhi voicing could not be phonological. But then, what is it? And how to account for the fact that it occurs only at word boundary? It is for these reasons that Gussmann (2007) failed to include CP voicing in his otherwise thorough analysis of the Polish voicing complex.

From the theoretical perspective of Gussmann (2007), as well as mine, an ideal analysis of Cracow sandhi voicing should meet the following conditions and expectations, all of which appear to have been already expressed in one way or another in all the analyses discussed above:

- i) privativity of voice – only one member of the contrastive pair of obstruents carries a melodic category responsible for the voiced / voiceless opposition.
- ii) no [voice] on sonorants – sonorant consonants, like vowels, do not contrast in terms of [voice] and should not carry laryngeal specification, such specification should, therefore, not take part in any phonological processing to do with CP voicing.

- iii) no rule ordering – the absence of phonologically active categories which result from default filling already lowers the chance of process interactions.
- iv) CP voicing should not be viewed as an *ad hoc* rule. It should be part and parcel of all voice assimilations in that dialect.¹⁹

It seems that such an analysis is possible, but it requires certain assumptions about the representation of voice, and more importantly, a particular view on the interaction between phonology and phonetics.

7. Laryngeal Realism and Low tone in Polish

As mentioned above, Gussmann's (2007) analysis of Polish voicing is couched in the spirit of Laryngeal Realism. It is a tradition within Government Phonology (Honeybone 2002, 2005), which uses GP elements (Harris 1994, 2009). It claims that laryngeal specification in phonological representation is privative, and that in each phonological system there should be one series of obstruents which is phonologically unmarked in terms of laryngeal categories. Thus, it shares the basic assumptions with other privative frameworks such as, e.g., Avery (1996); Avery and Idsardi (2001); Bethin (1992); Lombardi (1991, 1995); and Iverson and Salmons (1995, 2003).

What makes the Laryngeal Realism view different from other privative models is the claim that the unmarked, non-specified objects need not receive full specification in the course of derivation. Rather, the neutral objects receive phonetic interpretation as such. Phonetic interpretation of this type, however, has not received sufficient attention and it is rarely explicated how the representations are interpreted. An attempt to amend this situation will be made below.

Like other privative models, Laryngeal Realism also assumes that there are two major groups of laryngeal systems with a two-way voicing contrast. Languages belonging to the first group are called 'aspiration' languages, and are represented by most Germanic languages. There are various ways of referring to the laryngeal contrast in this group depending on the choice of descriptive tools. Thus, they may be characterized as *fortis / lenis*, or 'spread glottis' vs. 'non-spread glottis'. The other group, represented by Romance and Slavic languages, is assumed to base the opposition 'voiceless' vs. 'voiced' on the feature [voice]

¹⁹ One could add a few other conditions, for example, that the analysis should not be syllable based (cf. Rubach 1996). Let us however concentrate on the most important points mentioned here.

rather than on [spread glottis]. Languages of this group are sometimes referred to as ‘voicing’ languages.

Another useful tool to distinguish the two groups is to define them in terms of the phonetic category of Voice Onset Time (VOT). In Germanic languages, the VOT lag, i.e., aspiration corresponds to the *fortis* segment, which in Laryngeal Realism is marked with the element [spread]²⁰ (Honeybone 2002, 2005) or [H] (Harris 1994, 2009), while the unmarked segment is voiceless unaspirated, or may be weakly or ‘passively’ voiced. In Romance and Slavic languages the marked segment contains [voice], or [L], which corresponds to full voicing (VOT lead) during the closure of stops, while the unmarked series are voiceless unaspirated.

In the following discussion, I am going to employ a modified notation of Honeybone (2002: 141–142) in which the symbols /C^o, C^H, C^L/ will be used to refer to obstruents in abstraction of the actual classes such as fricatives, stops, or particular place of articulation. These are respectively neutral, High-toned, and Low-toned. The last two correspond respectively to aspirated and fully voiced objects in Laryngeal Realism.

Since the unmarked obstruents are typically pronounced as having little or no substantial displacement of VOT (neither long lead nor long lag), it has become common practice to associate the actual presence of VOT lead or lag with the presence of a phonological category which is responsible for it, a sort of biuniqueness between phonetic facts and phonological representation. Similarly, the absence of such displacement is taken to correspond to a non-specified obstruent. It will be shown below that it is this assumption that makes Laryngeal Realism unable to account for the difference between the two dialects of Polish. It is, however, perfectly able to account for the Warsaw Polish dialect alone.

Applying the assumed notation to Warsaw Polish facts, we may briefly illustrate the voicing contrast as /C^o/ vs. /C^L/, e.g., /t^oam/ > [tam] *tam* ‘there’ vs. /d^Lam/ > [dam] *dam* ‘I will give’. The marked obstruent is realized phonetically as fully voiced, while the neutral one is pronounced voiceless. Word-final devoicing is a case of phonological process called delaryngealization (neutralization), whereby a lexical /C^L/ becomes /C^o/ and must therefore be pronounced as voiceless.²¹ This is exemplified below.

²⁰ The difference between [spread] and [spread glottis] is that the former is an element, while the latter is a distinctive feature, corresponding to two markedly different models of melodic representation.

²¹ For completeness one should add that the delaryngealization takes place before a word-final empty nucleus in GP. Thus it is not due to syllable structure but to particular licensing properties of this type of nucleus in relation to the preceding consonant (onset). For simplicity, I will avoid making reference to the empty nucleus.

- (11)
- $/z^L ab^L a/ > [zaba] \acute{z}aba$ ‘frog’
- $/z^L ab^L/ \rightarrow /z^L ab^0/ > [zap] \acute{z}ab$ ‘frog, gen.pl.’²²

Note that the voiced symbol $/b^0/$ in $/z^L ab^0/$ is a mere transcriptional trace of what object we are dealing with lexically. However, its phonetic interpretation will be identical to that of a lexical $/p^0/$ of, e.g., *łapa / łap* $[wap] < /wap^0/$ ‘paw, nom.sg./ gen.pl.’. Thus, phonetic interpretation takes into account only the superscripted value in the phonological representation, and the voiced or voiceless symbol is a mere presentational trace of the lexical identity of the object.

One thing needs to be said about the phonetic interpretation of the non-specified obstruents in an L-system. Their consistent voicelessness has a cross-linguistic phonetic explanation in the fact that contrasts based on the different values of negative VOT (degrees of voicing) are not used in languages (e.g., Lisker and Abramson 1964). Thus, the $/C^0/$ in a privative L-system, whether lexical or resulting from delaryngealization, must be interpreted as voiceless for both systemic and universal reasons, while voicing in obstruents must be due to the presence of $[L]$.

The voice assimilation in Polish appears to be symmetrical in the sense that both voicing and devoicing assimilations occur. A privative account must distinguish here between a phenomenon which is a result of spreading of the active laryngeal category, e.g., *prosić / prośba* $[prɔɕitɕ] / [prɔzba]$ ‘to ask / a request’, in which $/b^L/$ affects the neutral $/c^0/$ in $/p^0 rɔɕ^0 b^L a/$, and one in which we are dealing with mere delaryngealization as in *dech / tchu* $/d^L ex^0/ > [dex] / [txu] < /d^0 x^0 u/$ ‘breath, nom.sg. / gen.sg.’. The two phonological sources of what appears to be symmetrical assimilation are illustrated below.²³

- (12)
- | | |
|--|--|
| a. $/p^0 rɔɕ^0 itɕ^0/ \sim /p^0 rɔɕ^0 b^L a/$ | b. $/d^L ex^0/ \sim /d^0 x^0 u/$ |
| $\begin{array}{c} \text{c}^0 \quad \text{b}^L \text{a} \\ \swarrow \quad \downarrow \\ \text{L} \end{array}$ | $\begin{array}{c} \\ \text{L} \end{array} \quad =$ |
| $\begin{array}{c} [prɔɕitɕ] \quad [prɔzba] \end{array}$ | $\begin{array}{c} [dex] \quad [txu] \end{array}$ |

It is clear that in an L-system only the assimilation to voiced obstruents can be viewed as truly phonological. What is more, due to the obligatory interpretation of $/C^0/$ as voiceless, the only ‘voicing’ assimilation that can occur across word

²² The symbol ‘ \rightarrow ’ refers to a truly phonological process (delaryngealization), while ‘ $>$ ’ refers to phonetic interpretation.

²³ It is obvious that the term ‘assimilation’ becomes rather vague, as it stands for two disparate phonological phenomena – spreading and delaryngealization.

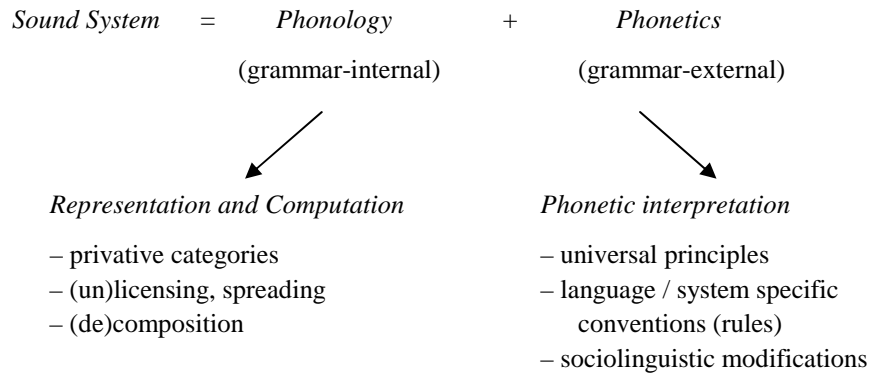
boundaries in such a system is in front of a voiced obstruent. This is exactly what happens in Warsaw Polish, as we saw in (1) and (3), e.g., *bra[k] [ɔ]ceny* 'lack of mark', *bra[k] [j]asności* 'lack of clarity', vs. *bra[g] [v]ody* 'lack of water'. It is also immediately obvious why CP voicing cannot be handled under this analysis: one would have to assume that sonorants in Cracow-Poznań Polish possess a phonological category [L], because obstruents in an L-system must have [L] to be interpreted as voiced. In order to solve the CP sandhi voicing problem we need to introduce a number of new concepts and assumptions. The solution will be based on two main ingredients: i) a particular view of phonetic interpretation in Government Phonology, and ii) a replacement of Laryngeal Realism with something which may be called Laryngeal Relativism (Cyran in press).

8. Phonetic interpretation in GP

In this section, I would like to characterize a particular view on how phonology and phonetics interact in sound systems.²⁴ For the sake of simplicity let us assume that the traditional phonetic dimensions to do with consonants, such as 'place', 'manner', and 'voicing' constitute domains of interaction between phonetics and phonology. The nature of this interaction consists in building arbitrary relations between categorical distinctions provided by phonology proper and their direct expression within a particular phonetic space. The phonetic nature of these spaces, however, is such that the interpretational phonetic choices are not entirely arbitrary. A system, then, including a laryngeal system, may be defined as the sum of phonological and phonetic aspects which together are responsible for the observed phonetic facts. It is, however, not synonymous with phonetic facts. It is a view, in which phonology and phonetics are kept strictly apart, yet they form two sides of the same coin and are mutually dependent, to the extent that it is quite impossible to talk about sound systems without making reference to both phonology and phonetics as well as to the way these domains interact within a particular system. Schematically, our understanding of a system is represented below.

²⁴ This section is based on Cyran (in press). This new research programme aims to include also other phonetic dimensions which can be utilized by sound systems such as place (including the palatalization complex), manner, and the vocalic system of Polish. The idea will be basically the same as below: phonetics provides an arrangement of probable contrasts for a particular number of substance free contrasts allowing for an arbitrary relation between the two aspects.

(13)



Translating the scheme into a specific laryngeal system now, the phonological aspects include the representation of the categorical distinction between the marked and non-specified consonants, the well-formedness conditions, which are responsible for the distribution of the utilized laryngeal category within the phonological word (licensing), and the phonological processes in which the active (present) category is manipulated by phonology. Phonology is the grammatical side of the system and involves abstract symbols and principles of their distribution as well as manipulation (representations and computation).

The phonetic aspects involve the necessary principles of interpretation, which are responsible for a particular phonetic realization of the phonological representations. The principles of phonetic interpretation are understood as grammar-external (e.g., Harris 2003). For our purposes, I will discuss just two such principles which appear to be universal and have a direct influence on language particular interpretational choices. One of them is related more to production, while the other, to perception, or better, to a tug of war between production and perception.

The first principle refers to general aerodynamic conditions which provide articulatory context for vocal fold vibration. Vocal folds vibrate spontaneously if a sufficient drop in air pressure and air flow between the trachea and pharynx are maintained (e.g., Chomsky and Halle 1968). Spontaneous voicing is therefore a natural phonetic property of sonorant consonants and vowels because they are unoccluded and are therefore characterized by the absence of the intra-oral air pressure build-up. There are a number of articulatory parameters which allow for the state in which vocal folds vibrate spontaneously also in obstruents. For example, Westbury and Keating (1986: 151) enumerate such aspects as relatively short duration of closure, contraction of the respiratory muscles, decrease of the average area of the glottis and / or tension of the vocal folds, decrease of the level of activity in muscles which underlie the walls of the suprag-

lottal cavity, active enlargement of the volume of that cavity, etc.²⁵ There is, however, no one direct gesture causing the vibration. Thus, given the sum of the above mentioned articulatory conditions, it should probably be assumed that in a sense all voicing is spontaneous, albeit in the case of obstruents it requires a number of indirect active gestures. Laryngeal Realism, for example, claims that this ‘active’ voicing in obstruents is due to the presence of a phonological category, e.g., [L], in which case there is one-to-one correspondence between active gestures and a phonological category that stands behind them.

The second universal principle of phonetic interpretation that will be used here is that of sufficient discriminability in production and perception. In a system with a two-way laryngeal contrast, this principle is directly responsible for the interaction of phonetics with phonology proper in that its task is to phonetically express the categorical distinctions provided by phonology within a particular phonetic space.²⁶ Phonetic interpretation is therefore not purely phonetic. It is systemic, and in that sense it is an interface phenomenon.

To illustrate the relevant phonetic space connected with laryngeal contrasts, I choose the VOT continuum (see, e.g., Lisker and Abramson 1964; Lieberman 1970; Keating 1984; Cho and Ladefoged 1999), which offers three major phonetic categories that are utilized by languages, i.e., i) long lead (negative VOT, which is found in fully voiced stops), ii) short lag (voiceless unaspirated stops), and iii) long lag (voiceless aspirated stops). The choice of the VOT continuum for the illustration of phonetic interpretation is also arbitrary. Equally well, we could use the articulatory parameters of the type proposed in Halle and Stevens (1971), or Avery and Idsardi (2001) to achieve the same descriptive goals.

Below, I present a graph which incorporates the three phonetic categories along the VOT continuum and symbolically represents the Laryngeal Realism view. The ‘voicing’ languages select the category [L], responsible for long VOT lead. The ‘aspiration’ languages use [H] in their obstruents, that is, C^H. The black circle symbolizes the fact that this particular point in the continuum corresponds with an actual laryngeal category in phonological representation, while the white circle denotes the interpretation of the non-specified congener within the VOT-defined phonetic space. The occlusion interval in the production of stops is the domain typically associated with the element [L] and the post-release space belongs to [H]. The dotted line between the realizations of the marked and the

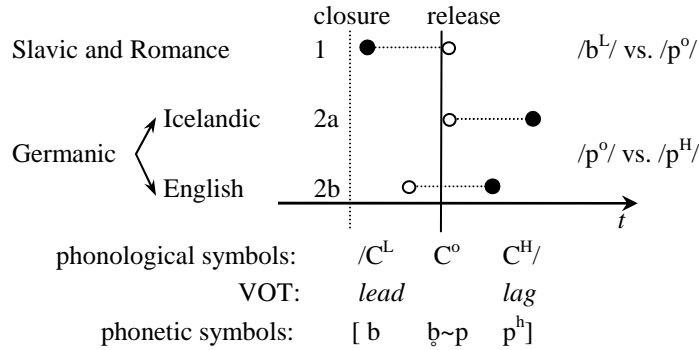
²⁵ The reader is also referred to, e.g., Halle and Stevens (1971) where it is shown how voicing can be achieved or prevented by a number of articulatory gestures.

²⁶ Phonetic theory has a long tradition of the concept of sufficient dispersion, or sufficient discriminability. For some phonetic proposals to do with utilization of phonetic space see, e.g., Liljencrants and Lindblom (1972); Schwartz, Boë and Abry (2007), and Stevens (1972).

unmarked is a symbolic representation of sufficient phonetic distance. This distance is symbolic in the sense that it refers to both articulatory and perceptual distance between the two contrastive series, as well as the phonological (distributional) robustness of a particular property expressed along the VOT continuum.

(14)

The Laryngeal Realism view



Slavic and Romance languages, under the Laryngeal Realism view, utilize the element [L] in their grammar, which is mapped onto voice in the signal, while the Germanic languages utilize the element [H], which is responsible for aspiration.

Germanic languages are shown to divide into those allowing for passive voicing of its unmarked objects, like English or German, and those that generally do not, like Icelandic. This is expressed in the graph by moving the two interpretations of the contrastive objects slightly to the left. Although it is a merely symbolic displacement, it is supported by the fact that aspiration in English is not as robust in terms of perception and phonological stability (distribution) as it is in Icelandic. This fact shows that there is some relativity in the phonetic interpretation of both the marked and the unmarked series.

In what follows, I would like to claim that the 'active' voicing in obstruents may indeed be due to the presence of a phonological category, but it may also be due to language specific principles of interpretation, whereby, non-specified obstruents may involve exactly the same articulatory gestures. This view will be called Laryngeal Relativism.

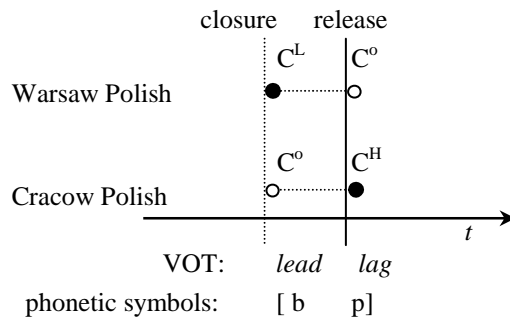
9. Laryngeal Relativism

I would like to claim that it is possible that seemingly identical phonetic facts can be due to two completely different sound systems, in which, to be precise,

the marked / unmarked relation is reversed.²⁷ Unlike in Laryngeal Realism, here phonetic interpretation involves a systemic decision with respect to placing both realizations of the contrastive pair along the VOT continuum in such a way that they remain articulatorily and auditorily distinguishable. Thus, the phonetic principles stay the same. It is the relation between phonological marking and particular phonetic interpretation that ceases to be direct. It is obvious that given the nature of the VOT continuum, the arbitrariness of the relation between a phonological category and a particular phonetic realization is dramatically curtailed. This, however, concerns more the placement of a two-way contrast as such rather than the status of the particular interpretations with respect to their phonological representation. In other words, I would like to claim that it is possible, that the phonological marking in an apparent ‘voicing’ language or dialect, which contrasts fully voiced obstruents with voiceless unaspirated ones, may be that of an ‘aspiration’ system. This is illustrated below with clear reference to the two dialect groups in Polish.

(15)

Two laryngeal systems of Polish



As can be seen, the two marking schemes in (15) produce identical phonetic facts with respect to the voice / voiceless contrast: fully voiced obstruents contrast with voiceless unaspirated ones. This, however, is achieved in two completely opposite systems. In WP, the fully voiced obstruents possess [L], e.g., *dom* [dɔm] < /d^Lɔm/ ‘house’, and /C^o/ must (always) be interpreted phonetically as voiceless, e.g., *tom* [tɔm] < /t^oɔm/ ‘volume’. In CP, on the other hand, the fully voiced obstruent is phonologically unmarked /C^o/, e.g., *dom* [dɔm] <

²⁷ The extreme position in this model may assume the possibility that phonological primes are devoid of phonetic substance. At the same time, quite paradoxically, the model combines this position with the opposite view that phonetics has explanatory value in phonology (phonology and phonetics are one).

/d^oɔm/ ‘house’, while the voiceless unaspirated one contains [H], e.g., *tom* [tɔm] < /t^Hɔm/ ‘volume’.²⁸

The H-system makes completely different predictions not only with respect to voicing in obstruents, but in fact to voicing in general. It is simply never due to a particular phonological category in that dialect. It is always interpretational. Recall, that phonetic interpretation is not exactly solely phonetic in nature. It is an interface phenomenon – a particular phonetic interpretation of one of the congeners of the voiced / voiceless opposition is always due to the placement of both congeners within the VOT continuum. The net result, however, is that fully voiced obstruents are phonologically identical to sonorant consonants and vowels – the voicing is spontaneous. The difference lies in the fact that spontaneous voicing of sonorants means voicing in almost all positions, while in the case of neutral obstruents a particular phonetic context must be present, namely, the following voiced environment. In fact, we are dealing with a scale here. Vowels in Polish are voiced in all environments. Sonorant consonants may get ‘devoiced’ in two environments which were mentioned earlier: i) after a voiceless or devoiced obstruent and before word boundary, e.g., *wiatr* [v¹atɹ] ‘wind’, *bóbr* [bupɹ] ‘beaver’, and ii) after an obstruent and before another voiceless one, e.g., *Jędrka* [jentɹka] ‘Andy, gen.sg.’.²⁹ It is only natural to expect that obstruents will also not be voiced in certain positions. These include: i) word-final, including a situation when a following sonorant consonant follows, e.g., *żaba* / *żab* [ʒaba – ʒap] ‘frog, nom.s.g./gen.sg.’, *bóbr* [bupɹ] ‘beaver’, and ii) pre-obstruent context, also including an intervening sonorant consonant, e.g., *żab-ka* [ʒapka] < /ʒ^oab^o-k^Ha/, *Jędrka* [jentɹka] ‘Andy, gen.sg.’.

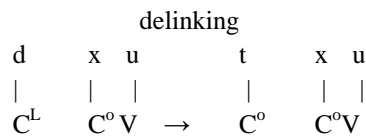
Returning to the predictions of an H-system, it forces us to assume or simply accept that FOD (Final Obstruent Devoicing) is not a case of delaryngealization in an H-system but a mere case of the absence of spontaneous voicing. All remaining aspects of voicing remain the same as in an L-system. For example, voice assimilation in obstruent clusters receives an identical analysis, albeit, involving mirrored representations, and therefore, mirrored interpretation. To give an example, I illustrate the derivation of the genitive singular form in the alternation *dech* / *tchu* [dɛx – txu] ‘breath, nom.sg./gen.sg.’.

²⁸ I do not assume that such relativity is a regular phenomenon, only that it is possible. Language contact has been blamed for reversing laryngeal systems in the literature. For example, Dutch, a Germanic language has been claimed to behave like a Romance one, that is, not an ‘aspiration’ but a ‘voicing’ system (e.g., Honeybone 2002). Surely, inter-dialectal contact is of even greater intensity, as it is the same language, and mutual influence is highly expected.

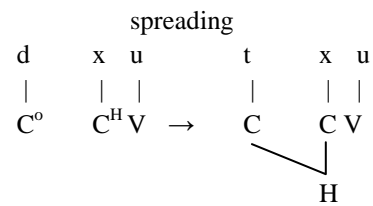
²⁹ Clearly, this ‘devoicing’ is just a contextual absence of spontaneous voicing in a hostile environment.

(16)

a. *Warsaw Polish*



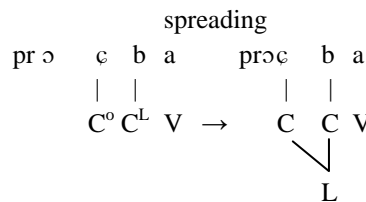
b. *Cracow-Poznań Polish*



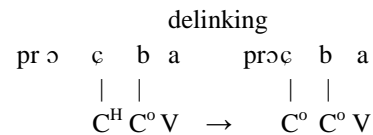
In WP, /C^L/ must be delaryngealized in front of an obstruent of the opposite representation. As a result, a sequence /C^oC^o/ is interpreted as voiceless. The effect of voiceless assimilation in CP takes the form of H-spreading. It is obvious, that voicing assimilation in CP must take the form of delaryngealization and then direct interpretation of a sequence of /C^oC^o/. For the sake of completeness, this type of assimilation is also illustrated on the basis of *prośba* [prɔʂba] < /prɔɕ-ba/ ‘a request’.

(17)

a. *Warsaw Polish*



b. *Cracow-Poznań Polish*



Note that *spreading* and *delinking* are the same phonological mechanisms as in (16) above, except that they are now present in the opposite systems due to the opposite representation.

With the assumptions listed in this section we are ready to look at the phenomenon of CP sandhi voicing again.

10. CP sandhi voicing revisited

Representationally, the Cracow-Poznań dialect is an H-system. As far as phonological computation is concerned I assume that the element [H] will be unlicensed and delinked word-finally and in front of another obstruent, just as the element [L] is delinked in WP. Computationally, then, the phonologies of CP and WP are identical, except that a different laryngeal element is lost. This delaryn-

gealization in an H-system has no phonetic consequences word-finally, as long as the simplified consonant is prepausal, because a delaryngealized (neutralized) /p^o/ in *łap* [wap] < /wap^o/ ← /wap^H/ ‘paw, gen.sg.’ will obviously receive the same phonetic interpretation as the lexically neutral /b^o/ of *żab* [zap] < /ʒ^oab^o/ ‘frog, gen.pl.’ in that dialect. It is pronounced as voiceless unaspirated due to the absence of the phonetic conditions for interpreting such an object as voiced. The consequence of the delaryngealization in the H-system will become obvious presently.

Since both WP and CP have word-final delaryngealization, the two dialects end their words with a neutral obstruent /C^o/. In pre-pausal context, this object receives a uniform interpretation as voiceless unaspirated. However, it is a different interpretational object in each of the two varieties of Polish and this shows immediately when another word follows. In WP, sandhi voicing assimilation is possible only in front of a voiced obstruent. The reason for this is quite clear. In that dialect, obstruents may be voiced only by virtue of possessing or having received the element [L]. Only objects that possess this property could spread it onto the preceding word-final neutral obstruent. The voicing assimilation across word boundary in WP must therefore be considered a truly phonological computational phenomenon. It is impossible when the following word begins with sonorant consonants or vowels because such objects do not possess a phonological property responsible for their voicing. Understandably, there is no voicing assimilation in front of a voiceless obstruent. Thus, if WP is an L-system as assumed in Gussmann (2007), all the facts fall out neatly. Voicing must be phonological in that dialect.

CP sandhi voicing is not due to a special rule, or contingent extension of other assimilation rules by generalizing the triggers to all voiced objects. In fact, under this analysis the postulate voiced in Bethin (1984, 1992) and Rubach (1996) that CP sandhi voicing should reflect the word-internal assimilation rules finally finds a real instantiation. No additional statement is necessary either about the rule itself or about the trigger. CP sandhi voicing is exactly what is going on word-internally: a neutral obstruent /C^o/ is interpreted as fully voiced if it finds itself in voiced environment. This environment is invariably phonetic in that dialect as there is no phonological voicing in it. Thus, the environment includes other spontaneously voiced obstruents (18a), sonorant consonants (18b) and vowels (18c), neither of which possesses a phonological category responsible for voicing. All that is necessary is phonetic adjacency.

(18)

- | | | |
|---|----------------------|-------|
| a. brak <u>w</u> ody ‘lack of water’ | /k ^o v/ > | [g v] |
| b. brak <u>jasności</u> ‘lack of clarity’ | /k ^o j/ > | [g j] |
| c. brak <u>o</u> ceny ‘lack of mark’ | /k ^o ɔ/ > | [g ɔ] |

Word-internally, full voicing of obstruents is due to exactly the same mechanism – phonetic interpretation of the unmarked /C^o/ in a voiced environment. This analysis also bypasses the problem encountered in Bethin (1992) and which was noted in Rubach (1996). Briefly, if we are dealing with a privative system in which the neutral or neutralized /C^o/ is the target of voice spreading from the following sonorants across word boundaries, the same type of object should be affected in exactly the same fashion word-internally, especially if we claim that there is generally one rule of assimilation. Note, that in Bethin (1992) the neutral obstruents are, like in Gussmann (2007), meant to be eventually realized as voiceless. If sonorants affect neutral obstruents, then such a system would inevitably yield the incorrect form *[zɔzna] instead of [sɔsna] for *sosna* ‘pine tree’, in which the fricatives are lexically unmarked and they find themselves in front of a vowel and a sonorant respectively.

In an H-system proposed here for the CP dialect, neutral obstruents are meant to be voiced in front of sonorants both internally and in sandhi. Forms like *sosna* [sɔsna] ‘pine tree’ are not problematic because, firstly, the fricatives are not neutral, they contain [H]. Secondly, pre-sonorant context is not neutralizing in Polish. The marked obstruents will never be delaryngealized in that context and therefore never voiced. This may happen only to word-final obstruents which are neutralized.

11. Conclusions

CP sandhi voicing can be given a privative account, in which sonorants do not possess a phonological category responsible for voicing. They are also not endowed with special powers. CP sandhi voicing is a regular pattern which is to be expected in an H-system, but not in an L-system. The analysis appears to respond quite positively to all the postulates enumerated earlier:

- the account is privative
- sonorants do not spread [voice] because they do not have it
- there is no rule ordering: phonological processes are not ordered, phonetic interpretation operates on the final phonological form
- CP sandhi voicing is part and parcel of all voice assimilation phenomena word-internally (full uniformity in both dialects)

This analysis is possible under two assumptions which are in fact related to each other. The first one is related to a particular view of interaction between phonology and phonetics in a sound system, which involves building arbitrary relations between the two domains. The second one is called Laryngeal Relativism,

which allows identical phonetic facts to stem from completely opposite representational systems. In this sense, CP sandhi voicing cannot be treated solely on phonological or solely on phonetic grounds. Phonetic interpretation requires both aspects to be taken into account, and thus, CP sandhi voicing is both phonological and phonetic in nature – it is systemic. This representation *cum* phonetic interpretation view allows us to say that there is no question of formulating a rule for sandhi voicing in CP. There is no such rule. The phenomenon is an exact copy of word-internal systemic interpretations.

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