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Slavic Vowel-Zero Alternations and Government Phonology: Two Approaches, One Solution*

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1. Introduction

The classical generative analysis of modern Slavic vowel-zero alternations (Lightner 1965, Gussmann 1980, Rubach 1984, 1986, Kenstowicz and Rubach 1987, Spencer 1986) crucially relies on so-called abstract vowels, the yers. Yers and the mechanism that controls their vocalization, Lower[1], have been introduced in order to reduce the disjunction "in closed syllables and in open syllables if the following vowel alternates with zero" to a non-disjunctive phonological reality. I refer to this disjunction as the yer context.

In this article, I show that the distribution and function of the abstract vowels in question is *exactly* identical with that of empty nuclei in Government Phonology (Kaye et al. 1990, Kaye 1990).

A prominent feature of Government Phonology (hereinafter GP) is the extensive use of empty nuclei. My goal is to show that certain generative phonologists used the same concept long before GP came into being, and for entirely independent reasons, yet without giving any theoretical status to the abstract vowels in question. GP in turn ignored the Slavic evidence and its analysis when proposing empty nuclei. If this turns out to be true, the idea that syllable structure bears a non-negligible number of empty nuclei will be correspondingly strengthened.

Also, the classical generative analysis relates the abstract vowels in question by a regressive relation whereby yers directly influ-

* This text has been greatly improved by comments from Frank Gladney.

1 The mechanism represented by Lower is further explained in section 3.2. Its name comes from the assumption that yers are high vowels which are lowered when appearing on the surface.

ence their preceding peer (this is the essence of Lower). This influence of one vowel on its neighbor may be called lateral (as opposed to paradigmatic). Here again GP proposed the same device (Proper Government, henceforth PG) some years later without taking Slavic and Lower into account. Analysts of Slavic in turn did not make the lateral character of Lower explicit, and thus, some years later when GP brought the formal concept of lateral relations into the discussion, failed to equate Lower and PG.

Two central devices of GP – empty nuclei and lateral relations – were thus invented outside of GP and for entirely independent reasons. Their reality is therefore plausible: it is quite unlikely that the same highly specific mistake was made twice.

The present article represents the first piece of a demonstration that aims at integrating Slavic vowel-zero alternations, always regarded as a specifically Slavic matter, into a general theory of vowel-zero alternations. Most modern Slavic languages happen to illustrate the Lower pattern: "given a chain of alternating vowels, vocalize all but the last". The other system found in natural language is the Havlík pattern: "given a chain of alternating vowels, vocalize every other, counting from the right edge".[2] It occurs in languages such as German, French, Moroccan Arabic, Old Polish, and Old Czech (Scheer 2001, 2004).

The ultimate goal of my demonstration is to show that the yer context controls a variety of segmental alternations (e.g., Polish

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[2] The Lower rule and Havlík's Law organize the vocalization of alternation sites in two different ways. I call the result a pattern because it extends beyond Slavic and thus is independent from particular language families. If as I believe it is true that the parametric space of vowel-zero alternations boils down to these two options, theory must be able to come up with a principle that governs all vowel-zero alternations and a parameter which expresses the Havlík-Lower variation (or an equivalent set of constraints). A unifying perspective of this kind has not been pursued in the past. I show in Scheer (2004:§426) that in a framework operating with PG, a parameter on a lexical property of yers can do the job: in Havlík-languages yers are good governors (and hence behave like any other vowel), while they are unable to govern in Lower-languages.

o~ó: *krowa ~ krów, krówka, krówek* ‘cow’ Nsg, Gpl, dimin. Nsg, dimin. Gpl; Cezch vowel length: *žába ~ žab, žabka, žabek* ‘frog’ Nsg, Gpl, dimin. Nsg, dimin. Gpl; French: *morc[ə]ler ~ morc[ɛ]l, morc[ɛ]l[ə]ment* ‘cut into pieces’ infinitive, 3sg, related noun), of which vowel-zero alternations are but one representative. Therefore, the phonological mechanism that produces the Lower pattern cannot be the Lower rule, because even in its autosegmental version it cannot be extended beyond vowel-zero alternations.

Space restrictions do not allow to develop the full project here. Complete evidence and demonstration is available in Scheer (2001, 2004). The only goal of the present article is to show that two contemporary groups of researchers have promoted the same idea (abstract vowels/ empty nuclei and Lower/ PG), but did not equate their concepts with the devices developed next door.

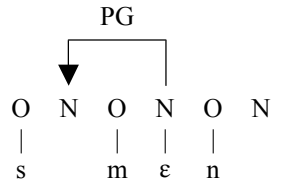
2. The distribution and function of empty nuclei in GP

Empty nuclei were sporadically used in the literature before Kaye et al. (1990) and Kaye (1990); see for instance Anderson (1982) and Spencer (1986). But only GP has given them a theoretical status with stable cross-linguistic properties. According to Kaye et al. (1990) and Kaye (1990), empty nuclei occur in two locations indicated under (1).

(1) a. after the last consonant of all consonant-final words (Kaye 1990).
b. where vowels alternate with zero (Kaye et al. 1990:219ff.).

For example, French *la semaine* ‘the week’ may be pronounced [lasmɛn] or [lasəmɛn], thus illustrating both types of empty nuclei.

(2)



French *la semaine* [lasmɛn]

Table (2) also shows the reason why, according to GP, the alternating vowel may be absent from the surface: it is under the influence of Proper Government, a lateral force which originates in the following vowel and is always regressive (right-to-left).

Parallel to the syntactic theory of the eighties, a phonological Empty Category Principle regulates the occurrence of empty nuclei. Its initial version (Kaye et al. 1990:219, Kaye 1990:313) restricts empty nuclei to the two locations that are identified under (1): an empty nucleus may remain phonetically unexpressed iff it is 1) word-final or 2) affected by PG.

Let us now look at the motivation for empty nuclei. In Government Phonology, no syllabification algorithm creates constituent structure; it is present in the lexicon. Moreover, the syntactic principle Structure Preservation applies: a segment originating in a certain constituent remains in that constituent no matter what phonological process it undergoes. This creates an absolute ban on resyllabification. Hence, C_2 of a $\sqrt{C_1V_1C_2vC_3}$ root where lower case v alternates with zero does not become the coda of V_1 when v is absent from the surface. Rather, C_2 continues to belong to the same onset as before only that its nucleus now happens to be phonetically unrealized.

It is important to bear in mind that GP arrived at this result without reference to the Slavic evidence, just as the classical generative analysis of Slavic vowel-zero alternations owes nothing to GP, which did not exist when Lightner wrote.

3. Slavic vowel-zero alternations and their analysis

3.1. Vocalization of alternation sites in open syllables

The idea that the clusters which host an alternation site are separated by abstract vowels goes back to Lightner (1965). Through the seventies and into the late eighties it was practised in both linear *SPE*-type approaches and autosegmental generative frameworks.

The basic pattern of vowel-zero alternations that, with some

variation, occurs in all Slavic languages appears in (3).[3]

(3)

	C__C-V	C__C-ø	C__C-CV	gloss
Czech	lok**ø**t-e	lok**e**t	lok**e**t-ní	'elbow' Gsg, Nsg, adj.
Polish	woj**ø**n-a	woj**e**n	woj**e**n-ny	'war' Nsg, Gpl, adj.

As these data show, the alternation can be captured in terms of open vs. closed syllables: a vowel appears in closed syllables (*lok**e**t, lok**e**t-ní*), while zero occurs in open syllables (*lok**ø**t-e*). The vocalization of alternation sites thus seems to be a direct consequence of syllable structure. If a coda needs to be accommodated within a syllable, its nucleus must be vocalized. The presence or absence of a vowel that follows the alternation site stands in no causal relation with the effect observed. Word-final consonants are not followed by a vowel but trigger vocalization the same as word-internal consonants that are followed by another heterosyllabic consonant and a vowel.

However, this syllable-based view is built on incomplete data. Consider the full evidence under (4).[4]

(4)

	open syllable		closed syllable	
	zero	vowel	vowel	vowel
	C__C-V	C__C-yer Cø	C__C-ø	C__C-CV
Czech	dom-øk-u	dom-eč-ek	dom-ek	dom-eč-øk-u
Slovak	kríd-øl-o	kríd-el-iec	kríd-el	kríd-el-øc-e
Polish	buł-øk-a	buł-ecz-ek	buł-ek	buł-ecz-øk-a
Serb.-Cr.	vrab-øc-a	vrab-ac-a	vrab-ac	

[3] Examples are drawn from some particular languages. The general Slavic picture is discussed for example in Bethin (1998:205ff.) and Panzer (1991:303ff.).

[4] The symbols 'cz' and 'č' are the spellings for [t͡ʃ] in Polish and Czech, respectively; they represent a palatalized /k/. Glosses: Czech 'house' dim. Gsg, double dim. Nsg, dim. Nsg, double dim. Gsg; Slovak 'wing' dim. Nsg, double dim. Gpl, dim. Gpl, double dim. Nsg; Polish 'bread roll' dim. Nsg, double dim. Gpl, dim. Gpl, double dim. Nsg; Serbo-Croatian 'sparrow' Gsg, Gpl, Nsg.

As may be seen, another recurrent pattern in Slavic languages is the vocalization of the alternation site in an open syllable (the grey-shaded column).[5] The paradigms shown are fully regular in the languages in question, and the relevant distributional regularity is as under (5) below.

(5) alternation sites are vocalized in open syllables iff the following vowel alternates with zero.

Indeed, in all cases where an alternation site is vocalized in an open syllable (Pol *buł**e**czek*), the vowel of the following syllable itself alternates with zero (Pol *buł**e**czøka*). In other words, the existence of a vowel in *-**e**cz-* is a consequence of the fact that the vowel in *-ek* alternates with zero. Alternation sites are never vocalized in open syllables if the following vowel is stable.

The challenge raised by this distribution, then, is its disjunctivity: vocalization occurs in closed syllables and in open syllables if the following vowel is a yer. The question thus arises in which way closed syllables and yers constitute a natural class.

3.2. Lower

If there is any chance to capture the distribution of vocalized and unvocalized alternation sites in terms of a non-disjunctive statement, the formulation must not include any reference to closed vs. open syllables: the closed-syllable analysis is contrary to fact. Hence, the only alternative is to explore the possibility of generalizing the yer context. A vowel appears in an alternation site if and only if it is followed by a yer: yer → V / __C_0 yer. Accordingly, all

[5] The alternating identity of the final vowel in Serbo-Croatian Gpl *vrab-ac-a* cannot be established synchronically since morphology does not allow adding another suffix. However, Gpl *vrab-ac-a* contrasts with Gsg *vrab-øc-a*, and more generally with all other nominal forms. Eleven out of twelve vowel-initial case markers condition the allomorph zero *-øc-*. Only Gpl induces its vocalized version. It is certainly no accident that the diachronic identity of Gpl *-a*, and of this case marker alone, is a yer.

members of a chain of yers but the last will appear on the surface.

This is the essence of Lightner's (1965) proposal, which is known as Lower because it was initially designed for an environment where two underlyingly high [- tense] vowels, the yers, are lowered to some mid or low vowel (according to the particular Slavic language at hand).[6]

3.3. Implications of Lower: the distribution of abstract vowels

The chief incidence of Lower on underlying structure is evident from simple cases such as /pьs/ ("ь" represents a yer), which reaches the surface as [pɛs] 'dog Nsg'. If it is true that yers are vocalized when followed by another yer, the word-final consonant must be followed by a yer: only /pьsь/ can be turned into [pɛs] via Lower. Therefore, all consonant-final words were assumed to end in yers underlyingly: the yers in question were attributed the morphological value of a case marker (i.e., Nsg for /pьs-ь/, but also Gpl, cf. (4) Pol *bułeczek* /buł-ъk-ьk-ъ/ 'bread roll' Gpl).

In other words, Lower enforces the existence of underlying (word-final) yers that never appear on the surface.

According to this analysis, thus, yers are distributed as follows: they exist 1) in locations where a vowel alternates with zero and 2) after word-final consonants. The former may appear on the surface under certain conditions, while the latter never enjoy a phonetic existence. Therefore, the former may be called alternating, the lat-

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[6] Another important property of yers is their unpredictable distribution across the lexicons. Also, the phonetic value of yers may be shared with regular vowels that do not alternate with zero; compare for example Czech *pes ~ psa* 'dog' (Nsg ~ Gsg) with *les ~ lesa* 'forest' (Nsg ~ Gsg). Therefore yers must be present in the lexical representation, and insertion strategies that epenthesize a vowel in some syllabic environment do not work. Treatments employing insertion have been proposed by, among others, Laskowski (1975) and Worth (1978). They are convincingly refuted by Gussmann (1980:26ff.), Rubach (1984:28f., 1993:134ff.), and Szpyra (1992:280ff.). Lower has known linear (Gussmann 1980, Rubach 1984) and non-linear incarnations. Rubach (1986) and Kenstowicz and Rubach (1987) discuss the advantages of the autosegmental version at length.

ter final yers.

The attentive reader will have noticed that this distribution of abstract vowels exactly coincides with the distribution of empty nuclei in standard Government Phonology (see (1). Moreover, the distinction and properties of two categories of yers/ empty nuclei is shared: just as final yers, final empty nuclei never appear on the surface; just as alternating yers, internal empty nuclei are identified by the presence of a vowel-zero alternation. The following section shows that this distinction has also a diachronic reality: internal yers may originate in a vowel or in nothing, while final yers always have a vocalic ancestor.

3.4. Havlík revisited: not yers, but empty nuclei are vocalized

An alternating vowel in a modern Slavic language can have two Common Slavic (CS) sources: either a yer or nothing.[7] In other words, some modern alternating vowels were born through epenthesis. The yer origin does not call for any specific illustration. But let us review some typical cases of so-called non-etymological yers. The group of words concerned is identified according to the traditional classification of stems that relies on the thematic vowel in Indo-European.

1) feminine -i stems in Nsg > CS case marker -ь. Cause of ep-

[7] A good deal of the philological literature holds that alternating vowels in modern Slavic languages always originate in yers. This view is rooted in an antipathy against non-etymological objects that is widespread among philologists. See Scheer (1996:92ff.) for discussion. Even though diachronic grammars such as Gebauer (1894-98 I:154ff.), Trávníček (1935:230), Trávníček (1948-49 I:41ff.), Havránek and Jedlička (1988:31) clearly state the fact that alternating vowels may originate either in a yer or in epenthesis, the same authors sometimes properly invent yers or resort to analogical explanations in order to be able to avoid objects that lack any etymological source. For Gpl forms, instead of admitting epenthesis, Gebauer (1894-98 I:160), Gebauer (1894-98 II,139ff.), Trávníček (1935:230), Lamprecht (1987:138) and Komárek (1962:150) for example invoke analogy with yer-bearing items. Isačenko (1970), acknowledging epenthesis, pursues the same kind of analogical mirages in Eastern Slavic.

enthesis: loss of a yer in the *following* syllable. Modern Czech (MCz) *pís**e**ň ~ pís**ø**n-ě*, *bás**e**ň ~ bás**ø**n-ě* ‘song, poem’ Nsg, Gsg < CS Nsg *pě-sn-**ь***, *ba-sn-**ь***.

2) neuter o-stems and feminine a-stems, both in Gpl > CS case marker -ъ. Cause: loss of a yer in the *following* syllable. MCz *čís**ø**l-o ~ čís**e**l* n., *sest**ø**r-a ~ sest**e**r* f. ‘number, sister’ Nsg, Gsg < CS Gpl *čit-sl-**ъ***, *sestr-**ъ***.

3) some masculine o-stems in Nsg > CS case marker -ъ. Cause: loss of a yer in the *following* syllable. MCz *moz**e**k ~ moz**ø**k-u* ‘brain’ Nsg, Gsg < CS Nsg *mozg-**ъ***.

4) prepositions and prefixes:[8] MCz *vz**e**-pnout se ~ vz**ø**-pínat se* ‘straighten up’ pf, ipf, *roz**e**-psat ~ roz**ø**-pisovat* ‘begin to write’ pf, ipf, *bez**e**-dný ~ bez**ø**-bradý* ‘without bottom, beard’, *od**e**-mknout ~ od**ø**-mykat* ‘open (key)’ pf, ipf < CS **vъz-*, **orz-*, **bez-*, **od-*.

As a matter of fact, epenthesis occurred when a yer fell out in the following syllable. All cases quoted follow this pattern (including the prepositions and prefixes where, however, some analogical activity needs to be acknowledged, see Scheer 1996). This behavior of course hints at Havlík's Law: in the period of its activity (i.e., the evolution form CS to the particular Slavic languages), vowels appear out of nothing iff a yer in the following syllable was lost. Both in case of yer chains and when an epenthetic vowel emerges, the vocalization is identical, e.g. [ɛ] in Czech and Polish.

This means that the loss of a yer causes the vocalization of ei-

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[8] The effects of the antipathy against non-etymological objects appear most strikingly in the treatment of prefixes and prepositions. In answer to the question "which prepositions/ prefixes were terminated by a yer?", almost anything and its reverse can be found in the literature. The item *roz(e)* is identified as *orzъ in etymological dictionaries (Machek 1957:424, Holub and Lyer 1978:391), although no yer can be established on the basis of either comparatism or Old Church Slavonic texts. The same holds true for *otъ > od(e) (Lamprecht et al. 1986:332ff.). Machek (1957:579) invents yers when a vowel-zero alternation without etymological yer-source has to be brought back to yer regularity. For example, he derives Old Czech vz**e**zvati from CS *vъz-**ъ**-zъvati, identifying the yer between the prefix and the stem as "added" ("přidáváno ъ, dávající e").

ther a yer, or of nothing in the preceding syllable. If the same causes produce the same effects, the "nothing" and the yer must share some property. What could that be? Can nothing be a yer? No. This is what some philologists have tried to do: inventing yers (see notes 7 and 8). Can a yer be nothing? Yes, of course. We know that yers were "fading away". That is, they were first centralized, and then fell out. Hence, the objects that were vocalized are not yers, as is commonly believed. Rather, the items that undergo vocalization are "nothing", or zeros. Zeros of vocalic nature, to be precise. In an autosegmental framework, a "vocalic zero" can be nothing else than an empty nucleus.[9]

Hence, it appears that there must have been empty nuclei "hidden" in the CS clusters of *pě**sn**ь*, *ses**tr**ъ* and the like, as well as after consonant-final prefixes/ prepositions *bez-*, *od-* etc. This is something that a more recent development of Government Phonology, so-called CVCV, predicts. Here, syllable structure boils down to a strict sequence of non-branching onsets and non-branching nuclei (Lowenstamm 1996, Scheer 1999, 2004). Even though space restrictions do not allow further discussion of this option, it may be seen that on its assumption, no special provision needs to be made in order to insert vowels: they simply fill in empty nuclei that have always existed. These empty nuclei were either empty since ever ("epenthesis"), or they contained a yer and were emptied as the yers faded away ("yer vocalization"). Empty nuclei of both origins then were vocalized iff the vowel in the following syllable fell out (because it was a yer). Hence, Havlík's Law does not only concern yer chains, it has actually larger scope: objects that are vocalized are former yers *and* former nothings.

This means that a slight modification of Havlík's Law (Havlík 1889) is in order, at least for the Czech situation. Its classical for-

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[9] Isačenko (1970) uses the diacritic # in order to refer to alternating vowels of both etymological and epenthetic origin. Empty Nuclei are a non-diacritic interpretation thereof which unifies the two origins while keeping alternating vowels distinct from their non-alternating counterparts.

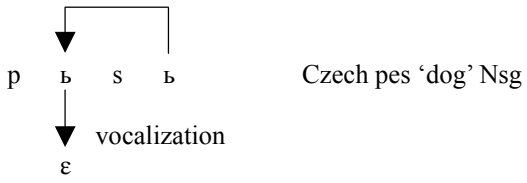
mulation says "given a sequence of consecutive yers in Common Slavic, every other yer is vocalized, counting from the right edge". This now needs to be recast as follows: "given a sequence of consecutive empty nuclei in Common Slavic, every other empty nucleus is vocalized, counting from the right edge".[10]

4. Slavic vowel-zero alternations are caused by a lateral relation

The first generalization made in section 3.1 holds syllable structure responsible for Slavic vowel-zero alternations: vowels occur in closed syllables, while nothing appears in open syllables.

By contrast, *Lower denies any causal relation between syllable structure and the vocalization of alternation sites*: the only information that is needed in order to compute the phonetic value of alternation sites is of lateral nature. Either the following vowel is a yer, or it is not. If it is, the alternation site is vocalized; if it is not, the site remains phonetically unexpressed. That is, vowel-zero alternations are not triggered by the presence or the absence of a consonant in a given syllable (coda analysis). Rather, it is controlled by an *intervocalic communication* which involves two yers whereby the rightmost yer determines the phonetic status of the preceding yer. This is depicted under (6) below.

(6) the causality of Slavic vowel-zero alternations: lateral and regressive



Czech pes ‘dog’ Nsg

[10] The reformulation of Havlík's Law describes the Czech state of affairs, i.e., the language on which the Law was originally based. In other Slavic languages, however, epenthesis has been less regular, and hence the reformulation does not apply. This is, for example, the case in Polish: Pol Nsg *siostra* ~ Gpl *sióstr* = Cz *sestra* ~ *sester*; Pol *baśń* = Cz *báseň* etc.

The arrow under (6) expresses the intervocalic causality that is the very essence of Lower, but has unfortunately remained unmentioned in the literature on yers. As far as I can see, the enormous body of writings on the matter does not make explicit that we are in presence of a communication between two neighboring vowels, and that this lateral relation is *regressive*: the rightmost vowel performs an action on its preceding peer. The formulation of Lower, whether linear or autosegmental, never involves an arrow such as in (6).

Also, the irrelevance of syllable structure is only indirectly associated with Lower: the "insertionists" mentioned in note 6 typically use syllable structure as the epenthesis-triggering environment. Lower, then, is opposed to this approach as a solution that relies on deletion rather than insertion. Therefore, the debate regarding syllabic vs. lateral conditioning becomes a secondary issue that usually goes unnoticed. I believe on the contrary that it is central to the understanding of vowel-zero alternations.

Saussure's (1915:23) "le point de vue crée l'objet" (the point of view creates the object) may thus be an accurate description of the situation at hand: those who have created Lower did not perceive its lateral and regressive identity because it had no function in their world-view. By contrast, it springs to the eye of somebody who looks at Lower through the lense of Government Phonology and a lateral world-view.

5. Conclusion: two traditions and two empirical fields, one solution

The synchronic analysis of Slavic vowel-zero alternations, developed prior to Government Phonology and for entirely independent reasons, relies on the existence of abstract vowels, the yers. One goal of this article was to show that these yers have exactly the same distribution as empty nuclei in standard Government Phonology. They occur 1) in locations where a vowel alternates with zero

and 2) after word-final consonants.

Since an "empty nucleus" is a rather sound match for an "abstract vowel" in an autosegmental framework, it may be hoped that empty nuclei will be considered less as an exotic object on the phonological scene.

Government Phonology gives a regular syllabic status to abstract vowels. This move lays the grounds for understanding the Slavic pattern not as a specific event of a particular language family, but rather as one possible implementation of a more general principle that governs vowel-zero alternations in many genetically unrelated languages. That is, empty nuclei, but not yers, can exist in languages whose ancestor is not Common Slavic. Space restrictions preclude the discussion of non-Slavic vowel-zero alternations that follow the Havlík pattern, and of other vocalic and consonantal alternations which are governed by the Lower pattern (some examples are briefly mentioned in section 1, further detail appears in Scheer 2001, 2004:§§497,521).

The second genuine property of Government Phonology, regressive lateral relations such as Government, is also consubstantial with Lower, even though this fact has not been spotlighted in the literature: it had no function in the classical generative analysis.

Two central devices of Government Phonology, empty nuclei and regressive intervocalic relations[11], have thus been used for over thirty years in order to analyze Slavic vowel-zero alterations. Government Phonology and its tools were developed in the complete absence of any Slavic evidence or influence. Although Slavic facts and the Lower analysis provide striking support, they are completely absent from the basic Government literature.

On the other hand, analysts of Slavic have been using abstract vowels and regressive intervocalic relations without being aware that these notions are practiced in Government Phonology under a different name and enjoy a stable cross-linguistic status.

Significantly, work in all fields at hand (Slavic vowel-zero al-

[11] Rowicka (1999) operates with progressive lateral relations.

ternations, the French facts that could not be discussed here, and Government Phonology) was perfectly contemporaneous: Gussmann (1980), Rubach (1984), Anderson (1982), Spencer (1986), Kaye et al. (1985,1990), Kaye (1990).

Can a result that has been achieved several times independently, on different empirical grounds by different people working on different languages with different theoretical assumptions and without awareness of each other be entirely wrong?

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