

# [-BACK] ASSIMILATION IN BALTO-SLAVIC AND THE NATURE OF PHONOTACTIC CONSTRAINTS

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## 1. Introduction

Many assimilation processes, such as place and voice assimilation in consonant clusters, can be straightforwardly analyzed within Optimality Theory (Prince & Smolensky 1993) using sets of fairly general context-free and contextual faithfulness or markedness constraints (e.g. Lombardi 2001, Hayes 1999 for [voice], among others). Yet some C-to-C assimilation processes tend to exhibit rather complex dependencies between target and trigger consonants. Palatalization assimilation in consonant clusters, or “[-back] assimilation” ( $CC^j \rightarrow C^jC^j$ ), is one of such processes. It is quite common in languages that contrast plain ([+back]) and palatalized consonants ([-back]) of different places of articulation.

Examples of [-back] assimilation in Russian coronal fricative-stop clusters are given in (1). The forms in (1a) illustrate the application of the process in derived environments: the plain coronal fricative becomes palatalized if followed by a palatalized coronal (which is either underlyingly palatalized, or palatalized by the following vowel; cf. Rubach 2000). The forms in (1b) illustrate the application of the process in non-derived environments, word-initially, word-medially, and word-finally. Crucially, in both (1a) and (1b), consonants show agreement with respect to [-back]: if  $C_2$  is [-back], then  $C_1$  is [-back] too (cf., Timberlake 1993: 829–30).<sup>1</sup>

- |     |    |   |   |                 |
|-----|----|---|---|-----------------|
| (1) | a. | raz + [d <sup>j</sup> ]el →                                 | ra[z <sup>j</sup> d <sup>j</sup> ]el, *ra[zd <sup>j</sup> ]el   | ‘division’      |
|     |    | mjas + [n <sup>j</sup> ]ik →                                | mja[s <sup>j</sup> n <sup>j</sup> ]ik, *mja[sn <sup>j</sup> ]ik | ‘butcher’       |
|     |    | most + e →  | mo[s <sup>t</sup> ]e, *mo[st <sup>j</sup> ]e                    | ‘bridge’, prep. |
|     | b. | [z <sup>j</sup> d <sup>j</sup> ]es’, *[zd <sup>j</sup> ]es’ |   | ‘here’          |
|     |    | gvo[s <sup>t</sup> ]’, *gvo[st <sup>j</sup> ]’              |   | ‘nail’          |
|     |    | ko[s <sup>t</sup> ]ēr, *ko[st <sup>j</sup> ]ēr              |   | ‘bonfire’       |

In this paper I show that the process of [-back] assimilation can be much more complex than the examples in (1). I present data from several Balto-Slavic languages: dialects of Bulgarian (South Slavic), Lithuanian (Baltic), Belorussian, and Russian (both East Slavic). The data show a range of [-back] assimilation patterns, some of which exhibit strong sensitivity to the place of articulation of  $C_1$ , as well as certain dependencies between the place of articulation of  $C_1$  and  $C_2$ . I further argue that an empirically adequate analysis of the attested patterns requires a set of fairly specific contextual faithfulness

<sup>1</sup> Note that assimilation of palatalized consonants to following plain consonants, “[+back] assimilation” ( $C^jC \rightarrow CC$ ), often exhibits different properties in Slavic languages, and is commonly analyzed as a neutralization process (Chekman 1970, Kochetov 2002).

constraints that would refer to place features of both target and trigger consonants.

## 2. Data

### 2.1 Bulgarian

Dialects of Bulgarian (South Slavic) show a range of [-back] assimilation patterns. The Bulgarian dialect of Nova Nadezhda (Khaskovsko), described in Khristov (1956) and Chekman (1970), has 28 consonants paired with respect to the plain/palatalized contrast. These include labials (/p b ɸ w m/ vs. /pʲ bʲ ɸʲ wʲ mʲ/), coronals (/t d s z n l r/ vs. /tʲ dʲ sʲ zʲ nʲ lʲ rʲ/), and dorsals (/k g/ vs. /kʲ gʲ/). The authors note that all plain consonants assimilate in secondary articulation to following palatalized consonants, regardless of their place of articulation. With a few lexical exceptions, sequences of plain + palatalized consonants are not attested.<sup>2</sup> Some examples from Khristov (1956: 187; transcription is mine: AK) are shown in (2).

(2)	a.	po[tʰnʲ]ik	*[tnʲ]	‘vest’
		ju[zʰmʲ]etʰ	*[zmʲ]	‘work’
		wrə[tʰkʲ]i	*[tkʲ]	‘annoying’
	b.	xle[pʰkʲ]i	*[pkʲ]	‘(kind of) bread’
		re[wʰnʲ]i	*[wnʲ]	‘jealous’
	c.	tʰə[kʰmʲ]e	*[kmʲ]	‘kick’
		ste[gʰnʲ]i	*[gnʲ]	‘tight’

Another dialect of Bulgarian, spoken in Krinichnoe (Cheshma-Varuita; Chekman 1970: 17), is similar to the Nova Nadezhda dialect in terms of the consonant inventory. The pattern of [-back] assimilation, however, is quite different. Only plain coronals are susceptible to assimilation, and only when they are followed by palatalized coronals. Plain coronals do not assimilate to following palatalized labials or dorsals; plain labials and dorsals do not assimilate to any palatalized consonants.

Standard Bulgarian has 30 consonants paired with respect to the plain/palatalized contrast. These include in labials (/p b f v m/ vs. /pʲ bʲ fʲ vʲ mʲ/), coronals (/t d ts s z n l r/ vs. /tʲ dʲ tsʲ sʲ zʲ nʲ lʲ rʲ/), and dorsals (/k g/ vs. /kʲ gʲ/). (based on Scatton 1993: 191). The dialect presents a pattern completely opposite of the Nova Nadezhda pattern. None of the plain consonants assimilate to following palatalized consonants, with palatalized consonants being prohibited in syllable coda position in general (Scatton 1993).

In sum, the three dialects exhibit strikingly different patterns of [-back] assimilation. All plain consonants are targets of assimilation and all palatalized consonants are triggers of the process in the first dialect (Nova Nadezhda). Only plain consonants are targets of assimilation and only palatalized coronals are

<sup>2</sup> Lexical exceptions mainly involve labials and dorsals as C<sub>1</sub>, as well as liquids /rʲ/ and /lʲ/ as C<sub>2</sub> (Khristov 1956: 187). Note that unlike Standard Bulgarian, this dialect allows palatalized consonants in coda: both word-finally and before plain consonants (CʲC).

triggers of the process in the second dialect (Krinichnoe). And none of the consonants are targets or triggers of assimilation in the third dialect (Standard).

## 2.2 Lithuanian

Standard Lithuanian (Baltic) has 44 consonants paired with respect to secondary articulation (based on Mathiassen 1996: 21–22). These include labials (/p b f v m/ vs. /pʲ bʲ fʲ vʲ mʲ/), coronals (/t d ts dz s z n l r/ vs. /tʲ dʲ tsʲ dzʲ sʲ zʲ nʲ lʲ rʲ/), and dorsals (/k g x ɣ/ vs. /kʲ gʲ xʲ ɣʲ/).<sup>3</sup> According to Mathiassen (1996: 25), all plain consonants assimilate to following palatalized consonants (3a): “[i]f the last consonant in a cluster is palatalized then the immediately preceding consonant is also palatalized.” However, Ambrazas (1997) notes that plain dorsals /k g/ present an exception; they fail to assimilate, while being “transparent” to the process. As shown in (3b), /k/ in the cluster [lʲksʲnʲ] is plain, while the consonants following and preceding it are palatalized. Ambrazas (1997) also mentions that some non-standard dialects of Lithuanian exhibit a more restricted pattern of assimilation: both plain dorsals and plain labials fail to assimilate to following palatalized consonants.

(3)	a.	pi[lʲnʲ]i	*[lʲnʲ]	‘full’
		[sʲpʲrʲ]ęsti	*[sprʲ]	‘to decide’
		di[rʲpʲtʲ]i	*[rptʲ]	‘to work’
	b.	a[lʲksʲnʲ]is	*[lʲkʲsʲnʲ]	‘alder’

In sum, the targets of [-back] assimilation in Standard Lithuanian are all plain consonants, with the apparent exception of dorsals. The triggers are all palatalized consonants. Non-standard Lithuanian dialects limit targets of assimilation to coronals only, having no restrictions on triggers.

## 2.3 Belorussian

Standard Belorussian (East Slavic) has 30 consonants paired with respect to [±back] (based on Mayo 1993: 891). These include labials (/p b f v m/ vs. /pʲ bʲ fʲ vʲ mʲ/), coronals (/t dz s z n l/ vs. /tsʲ dzʲ sʲ zʲ nʲ lʲ/), and dorsals (/k g x ɣ/ vs. /kʲ gʲ xʲ ɣʲ/).<sup>4</sup> Plain coronals assimilate to following palatalized coronals and labials, but not to palatalized dorsals (4a). Plain labials and dorsals do not assimilate to following palatalized consonants (4b) (Baimut et al. 1957: 47–49). Thus, the targets of [-back] assimilation in Belorussian are plain coronals only. The triggers are palatalized labials and coronals.

<sup>3</sup> Some of the contrasts listed here are marginal (see Mathiassen 1996: 22). (The same applies to the contrasts listed for Belorussian and Russian below.) The language does not allow palatalized + plain sequences; only some palatalized consonants are allowed word-finally (Mathiassen 1996).

<sup>4</sup> In Belorussian, palatalized coronals (but not palatalized labials or dorsals) are allowed in coda: word-finally and before (hetero-organic) plain consonants (Mayo 1993).

(4)	a.	ve[sʲtʲsʲ]i	*[zʲtʲsʲ]	‘to carry’
		[sʲmʲ]ajatstsja	*[smʲ]	‘to laugh’
		ve[skʲ]i	*[sʲkʲ]	‘heavy’
	b.	tsja[mnʲ]etsʲ	*[mʲnʲ]	‘to get dark’
		a[gnʲ]om	*[gʲnʲ]	‘fire’, instr. sg.
		le[xkʲ]i	*[xʲkʲ]	‘light’

## 2.4 Russian

Russian (East Slavic) has 32 consonants paired with respect to [±back] (based on Timberlake 1993: 829). These include labials (/p b f v m/ vs. /pʲ bʲ fʲ vʲ mʲ/), coronals (/t d s z ʂ zʲ n l r/ vs. /tʲ dʲ sʲ zʲ ʂʲ: nʲ lʲ rʲ/), and dorsals (/k g x ɣ/ vs. /kʲ gʲ xʲ ɣʲ/).<sup>5</sup> The process of [-back] assimilation is noted to be fairly complex, showing sensitivity to place and manner of both consonants involved, syllable-structure, and morpheme-boundaries (Avanesov 1972: 145–166; Timberlake 1993: 829–830). For the purposes of this study, I will limit the data to assimilation in ambisyllabic clusters with obstruents or nasals stem-internally (mostly root + suffix).

With respect to [-back] assimilation, there appear to be up to three varieties of Standard Russian. The so-called ‘Old Muscovite’ pronunciation, the old pronunciation norm (Avanesov 1972: 145), is least restrictive and most consistent. In this dialect, plain labials assimilate to palatalized labials and dorsals, but not to palatalized coronals (5a). Plain coronals assimilate to palatalized labials and coronals, but not to palatalized dorsals (4b). Plain dorsals assimilate to palatalized dorsals, but not to palatalized labials or coronals (5c).

(5)	a.	la[mʲpʲ]e	*[mpʲ]	‘lamp’, dat. sg.
		ju[pʲkʲ]i	*[pkʲ]	‘skirt’, pl.
		ko[ptʲ]itʲ	*[pʲtʲ]	‘to smoke, to cure in smoke’
	b.	molit[tʲvʲ]ennyj	*[tvʲ]	‘prayer’ adj.
		po[sʲtʲ]itʲ	*[stʲ]	‘to fast’
		sla[tʲkʲ]ij	*[tʲkʲ]	‘sweet’
	c.	ty[kʲvʲ]e	*[kʲvʲ]	‘pumpkin’
		ša[xʲtʲ]e	*[xʲtʲ]	‘mine, pit’ dat. sg.
		mja[xʲkʲ]ij	*[xkʲ]	‘soft’, masc.

The second variety of Standard Russian (the prescribed pronunciation norm: Avanesov 1972: 146, 166; cf. Timberlake 1993: 829–30) shows the same pattern of assimilation, except for the lack of assimilation of plain labials to palatalized velars and labials (unless the two underlying consonants are of the same manner of articulation, e.g. mmʲ → mʲmʲ). For example, unlike in (5a), the forms *ju[pʲkʲ]i* ‘skirt’, pl. and *la[mʲpʲ]e* ‘lamp’, dat. sg. in this variety show no [-back] assimilation.

In yet another variety of Standard Russian (an alternative pronunciation norm: Avanesov 1972: 148; Krysin 1974), the scope of the process is curtailed even further: plain coronals are assimilated by palatalized coronals only, and not

<sup>5</sup> In Russian, both palatalized labials and coronals (but not palatalized dorsals) are allowed word-finally; only palatalized coronals are allowed before plain (hetero-organic) consonants (Avanesov 1972).

by palatalized labials. For example, unlike in (5b), the form *moli*[tv<sup>j</sup>]*ennyj* ‘prayer’ adj., does not show assimilation of [t] to [v<sup>j</sup>]. As Timberlake (1993: 829–830) notes, “the once regular tendency to palatalize a consonant preceding a palatalized consonant is losing ground.”

In sum, the targets of [-back] assimilation in the first variety of Standard Russian are plain labials (if followed by palatalized labials and dorsals), plain coronals (if followed by palatalized labials and coronals), and plain dorsals (if followed by palatalized dorsals). The triggers are palatalized labials (if preceded by plain labials and coronals), palatalized coronals (if preceded by plain coronals), and palatalized dorsals (if preceded by plain labials and coronals). The other varieties of Standard Russian add additional restrictions on targets and triggers: plain labials are targeted neither by palatalized dorsals, nor by palatalized labials (unless under more specific conditions; the 2<sup>nd</sup> variety); plain coronals are not targeted by palatalized labials (the 3<sup>rd</sup> variety).

## 2.5 Summary

The patterns of [-back] assimilation in Balto-Slavic languages with respect to triggers and targets are summarized in (6). Here, symbols P, T, K stand for plain labials, coronals, and dorsals respectively; P<sup>j</sup>, T<sup>j</sup>, K<sup>j</sup> stand for palatalized labials, coronals, and dorsals respectively. As we can see, the languages/dialects show a range of [-back] assimilation patterns, from the assimilation involving all places of articulation (6a) to the lack of any assimilation (6c). Most cases, however, involve intermediate patterns, and these are of particular interest.

(6)

Language	[+back] targets	[-back] triggers	Source
a. Bulgarian, Nova Nadezhda	P, T, K	P <sup>j</sup> , T <sup>j</sup> , K <sup>j</sup>	Khristov 1956, Chekman 1970
b. Bulgarian, Krinichnoe	T	T <sup>j</sup>	Chekman 1970
c. Bulgarian, Standard	none	none	Scatton 1993
d. Lithuanian, Standard	P, T, (K)	P <sup>j</sup> , T <sup>j</sup> , K <sup>j</sup>	Mathiassen 1996, Ambrazas 1997
e. Lithuanian, non-standard dialects	T	P <sup>j</sup> , T <sup>j</sup> , K <sup>j</sup>	Ambrazas 1997
f. Belorussian	T	P <sup>j</sup> , T <sup>j</sup>	Baimut et al. 1957
g. Russian, Standard 1	P	P <sup>j</sup> , K <sup>j</sup>	Avanesov 1972
	T	P <sup>j</sup> , T <sup>j</sup>	
	K	K <sup>j</sup>	
h. Russian, Standard 2	P	(P <sup>j</sup> )	Avanesov 1972, Timberlake 1993
	T	P <sup>j</sup> , T <sup>j</sup>	
	K	K <sup>j</sup>	
i. Russian, Standard 3	P	(P <sup>j</sup> )	Avanesov 1972, Krysin 1974
	T	T <sup>j</sup>	
	K	K <sup>j</sup>	

Although any place of articulation can be a target of [-back] assimilation, plain coronals are better targets than labials or dorsals (e.g., b, e, f, h). The relation between the latter two is less consistent: labials are better targets of assimilation than dorsals in (d and g), while the reverse is the case in (h and i). Any place of articulation can be a trigger of assimilation, however, homorganic palatalized consonants are better triggers than hetero-organic palatalized consonants (b, f-i). In addition, Russian shows preferences for triggers in hetero-organic clusters: palatalized labials but not dorsals assimilate plain coronals, while palatalized dorsals but not coronals assimilate plain labials.

### 3. Analysis

The patterns of [-back] assimilation in Balto-Slavic exhibit some familiar properties of major place assimilation, namely the regressive direction of assimilation and relative susceptibility of coronals as targets (Jun 1995, Steriade 2001, de Lacy 2002). However, unlike in the case of place assimilation, many [-back] assimilation patterns exhibit rather complex dependencies between the place of articulation of target and trigger consonants. For example, labials assimilate to dorsals but not to coronals, while coronals assimilate to palatalized labials but not to dorsals (6g). How can the range of [-back] assimilation patterns be captured within Optimality Theory (Prince & Smolensky 1993)? And more specifically, what kinds of constraints are needed to generate the observed target-trigger dependencies?

Following previous accounts of assimilation, we can assume the following set of constraints: the context-free markedness constraint M:Agree(bk) requiring assimilation in clusters with respect to [±back] (7a), the context-free faithfulness constraint F:bk preserving the feature regardless of the context (7b), the contextual faithfulness constraint F:bk/\_V responsible for the regressive direction of assimilation (7c),<sup>6</sup> and the context-free place-referring faithfulness constraints F:bk-cor, F:bk-lab, and F:bk-dor (6d) (cf., Hayes 2004 for [±voice]; Lombardi 2001 for [place]). Further, in order to capture the susceptibility of plain coronals to [-back] assimilation, we can assume a ‘harmonic’ hierarchy of the place-referring constraints (7e), so that F:bk-cor is crucially ranked below F:bk-lab and F:bk-dor (cf. Prince & Smolensky 1993, Jun 1995 for [place]).

- (7)
- |    |                                |  |
|----|--------------------------------|--|
| a. | M:Agree(bk):                   | Consonants in clusters agree in [±back]; |
| b. | F:bk:                          | Preserve [±back];                        |
| c. | F:bk/_V:                       | Preserve [±back] before vowels;          |
| d. | F:bk-cor:                      | Preserve [±back] of a coronal;           |
|    | F:bk-lab:                      | Preserve [±back] of a labial;            |
|    | F:bk-dor:                      | Preserve [±back] of a dorsal;            |
| e. | F:bk-lab, F:bk-dor » F:bk-cor. |  |

<sup>6</sup> Note that the constraint F:bk/\_V (cf. Steriade 2001 for [place]) is more appropriate than F:bk/Onset (cf. Jun 1995 for [place]) to deal with [-back] assimilation in onset or coda clusters (e.g. Lithuanian [s<sup>h</sup>p<sup>h</sup>r<sup>h</sup>]ęsti ‘to decide’ and Russian gvo[s<sup>h</sup>t<sup>h</sup>] ‘nail’).

Different rankings of M:Agree(bk) with respect to the hierarchy, together with the relatively high ranking of F:bk/\_V and the relatively low ranking of F:bk, will be able to generate some of the attested [-back] assimilation patterns (8), namely those corresponding to (6a, c, d, e). The grammars are ordered from least restrictive to most restrictive; the markedness constraint is shown in bold.

(8)

Bulgarian, Nova Nadezhda	Lithuanian, Standard	Lithuanian, dialects	Bulgarian, Standard
<b>M:Agree(bk)</b>	F:bk/_V	F:bk/_V	F:bk/_V
»	F:bk-dor	F:bk-dor	F:bk-dor
F:bk/_V	»	F:bk-lab	F:bk-lab
»	<b>M:Agree(bk)</b>	»	»
F:bk-dor	»	<b>M:Agree(bk)</b>	F:bk-cor
F:bk-lab	F:bk-lab	»	»
»	»	F:bk-cor	<b>M:Agree(bk)</b>
F:bk-cor	F:bk-cor	F:bk	F:bk
F:bk	F:bk		

The problem with this account, however, is that it cannot generate more complex patterns with target-trigger dependencies, as found in the Krinichoe dialect of Bulgarian, Belorussian and Russian. One possible solution to this problem is to additionally specify the faithfulness constraints to [ $\pm$ back] for the place of articulation of following palatalized consonants (cf. Steriade 2001 on [place]). Examples of such ‘specific’ contextual constraints are shown in (9). Thus, the constraint F:[ $\pm$ back]-cor/\_K<sup>j</sup> would preserve the relevant [ $\pm$ back] value of a coronal before a palatalized dorsal consonant (K<sup>j</sup> = [dorsal, -back]), and the constraint F:[+back]-dor/\_T<sup>j</sup> would preserve the relevant [ $\pm$ back] value of a dorsal before a palatalized coronal consonant (T<sup>j</sup> = [coronal, -back]).

Further, this account would involve re-stating the original harmonic place target hierarchy with respect to [ $\pm$ back] (7e) as two separate hierarchies for homorganic and hetero-organic clusters (9b). These harmonic rankings would capture the general susceptibility of plain coronals to [-back] assimilation, while allowing for flexible rankings of constraints for hetero-organic and homorganic clusters. In addition, we may assume that constraints referring to a target place in hetero-organic contexts are ranked above the constraints to the same place in the homorganic context (9c). Such harmonic rankings would allow us to capture the propensity of palatalized consonants to trigger assimilation in homorganic clusters, regardless of the place of articulation.

- (9) a. F:bk-cor/\_K<sup>j</sup>: Preserve [ $\pm$ back] of a coronal before a palatalized dorsal;  
 F:bk-dor/\_T<sup>j</sup>: Preserve [ $\pm$ back] of a dorsal before a palatalized coronal, etc.;
- b. F:bk-dor/\_K<sup>j</sup>, F:bk-lab/\_P<sup>j</sup> » F:bk-cor/\_T<sup>j</sup>  
 F:bk-dor/\_C<sup>j</sup><sub>ht</sub>, F:bk-lab/\_C<sup>j</sup><sub>ht</sub> » F:bk-cor/\_C<sub>ht</sub> (ht = hetero-organic)
- c. F:bk-cor/\_K<sup>j</sup>/\_P<sup>j</sup> » F:bk-cor/\_T<sup>j</sup>, etc.

The new set of constraints, as well as the re-stated harmonic hierarchies, would allow us to generate all the attested patterns. To ensure computational feasibility of the account, all rankings were generated using *OTSoft* (Hayes et al. 2003). The grammars without and with target-trigger dependencies are shown separately in (10a) and (10b), ordered from least restrictive to most restrictive. Harmonic rankings from (9c) are not shown for simplicity reasons.

(10)

a.

Bulgarian, Nova Nadezhda	Lithuanian, Standard	Lithuanian, dialects	Bulgarian, Standard	Bulgarian, Krinichnoe
<b>M:Agr(bk)</b>	F:bk/_V	F:bk/_V	F:bk/_V	F:bk/_V
»	F:bk-dor/_P <sup>j</sup>	F:bk-dor/_P <sup>j</sup>	F:bk-dor/_P <sup>j</sup>	F:bk-dor/_P <sup>j</sup>
F:bk/_V	F:bk-dor/_T <sup>j</sup>	F:bk-dor/_T <sup>j</sup>	F:bk-dor/_T <sup>j</sup>	F:bk-dor/_T <sup>j</sup>
»	F:bk-dor/_K <sup>j</sup>	F:bk-lab/_T <sup>j</sup>	F:bk-lab/_T <sup>j</sup>	F:bk-lab/_T <sup>j</sup>
F:bk-dor/_P <sup>j</sup>	»	F:bk-lab/_K <sup>j</sup>	F:bk-cor/_K <sup>j</sup>	F:bk-cor/_K <sup>j</sup>
F:bk-dor/_T <sup>j</sup>	<b>M:Agr(bk)</b>	F:bk-dor/_K <sup>j</sup>	F:bk-lab/_K <sup>j</sup>	F:bk-lab/_K <sup>j</sup>
F:bk-lab/_T <sup>j</sup>	»	F:bk-lab/_P <sup>j</sup>	F:bk-cor/_P <sup>j</sup>	F:bk-cor/_P <sup>j</sup>
F:bk-cor/_K <sup>j</sup>	F:bk-lab/_T <sup>j</sup>	»	F:bk-dor/_K <sup>j</sup>	F:bk-dor/_K <sup>j</sup>
F:bk-lab/_K <sup>j</sup>	F:bk-cor/_K <sup>j</sup>	<b>M:Agr(bk)</b>	F:bk-lab/_P <sup>j</sup>	F:bk-lab/_P <sup>j</sup>
F:bk-cor/_P <sup>j</sup>	F:bk-lab/_K <sup>j</sup>	»	F:bk-cor/_T <sup>j</sup>	»
F:bk-dor/_K <sup>j</sup>	F:bk-cor/_P <sup>j</sup>	F:bk-cor/_K <sup>j</sup>	»	<b>M:Agr(bk)</b>
F:bk-lab/_P <sup>j</sup>	F:bk-lab/_P <sup>j</sup>	F:bk-cor/_P <sup>j</sup>	<b>M:Agr(bk)</b>	»
F:bk-cor/_T <sup>j</sup>	F:bk-cor/_T <sup>j</sup>	F:bk-cor/_T <sup>j</sup>	»	F:bk-cor/_T <sup>j</sup>
F:bk	F:bk	F:bk	F:bk	F:bk

b.

Russian, Standard 1	Russian, Standard 2	Russian, Standard 3	Belorussian, Standard	Bulgarian, Krinichnoe
F:bk/_V	F:bk/_V	F:bk/_V	F:bk/_V	F:bk/_V
F:bk-dor/_P <sup>j</sup>	F:bk-dor/_P <sup>j</sup>	F:bk-dor/_P <sup>j</sup>	F:bk-dor/_P <sup>j</sup>	F:bk-dor/_P <sup>j</sup>
F:bk-dor/_T <sup>j</sup>	F:bk-dor/_T <sup>j</sup>	F:bk-dor/_T <sup>j</sup>	F:bk-dor/_T <sup>j</sup>	F:bk-dor/_T <sup>j</sup>
F:bk-lab/_T <sup>j</sup>	F:bk-lab/_T <sup>j</sup>	F:bk-lab/_T <sup>j</sup>	F:bk-lab/_T <sup>j</sup>	F:bk-lab/_T <sup>j</sup>
F:bk-cor/_K <sup>j</sup>	F:bk-cor/_K <sup>j</sup>	F:bk-cor/_K <sup>j</sup>	F:bk-lab/_K <sup>j</sup>	F:bk-cor/_K <sup>j</sup>
»	F:bk-lab/_K <sup>j</sup>	F:bk-lab/_K <sup>j</sup>	F:bk-dor/_K <sup>j</sup>	F:bk-lab/_K <sup>j</sup>
<b>M:Agr(bk)</b>	F:bk-lab/_P <sup>j</sup>	F:bk-cor/_P <sup>j</sup>	F:bk-lab/_P <sup>j</sup>	F:bk-cor/_P <sup>j</sup>
»	»	F:bk-lab/_P <sup>j</sup>	F:bk-cor/_K <sup>j</sup>	F:bk-dor/_K <sup>j</sup>
F:bk-lab/_K <sup>j</sup>	<b>M:Agr(bk)</b>	»	»	F:bk-lab/_P <sup>j</sup>
F:bk-cor/_P <sup>j</sup>	»	<b>M:Agr(bk)</b>	<b>M:Agr(bk)</b>	»
F:bk-dor/_K <sup>j</sup>	F:bk-cor/_P <sup>j</sup>	»	»	<b>M:Agr(bk)</b>
F:bk-lab/_P <sup>j</sup>	F:bk-dor/_K <sup>j</sup>	F:bk-dor/_K <sup>j</sup>	F:bk-cor/_P <sup>j</sup>	»
F:bk-cor/_T <sup>j</sup>	F:bk-cor/_T <sup>j</sup>	F:bk-cor/_T <sup>j</sup>	F:bk-cor/_T <sup>j</sup>	F:bk-cor/_T <sup>j</sup>
F:bk	F:bk	F:bk	F:bk	F:bk

The proposed analysis is successful at generating the patterns of [-back] assimilation attested in Balto-Slavic. It does, however, raise a number of issues.



First, the analysis obviously leads to a substantial increase in the number of constraints. Note, however, that it is not necessary to assume that specific contextual constraints of the type in (9a) are part of Universal Grammar; more plausibly, these constraints can be induced or constructed on a language-particular basis (cf. Hayes 1999). Thus, language learners who encounter complex phonotactic patterns may “expand” context-free constraints by specifying them for relevant contexts. The same would hold for the hierarchies in (9b and c). Specific contextual faithfulness constraints and constraint hierarchies would be needed to acquire and to re-produce the phonotactic knowledge of languages like Russian and the Krinichnoe dialect of Bulgarian. Simpler patterns, such as in the Nova Nadezhda dialect of Bulgarian or of Lithuanian, can be acquired and re-produced using the basic set faithfulness constraints provided by UG, and thus will not require additional machinery.

Second, the presented analysis appears to be powerful enough to generate not only the attested [-back] assimilation patterns, but also the ones not attested in the current sample. Further empirical investigation of [-back] assimilation patterns may fill the gaps in the factorial typology of the process. Alternatively, these gaps may be attributed to the continuous influence of extra-grammatical factors such as language learners’ articulatory, perceptual, or higher-level cognitive biases (cf. Ohala 1990, Hume & Johnson 2001, Blevins 2004; see Kochetov 2002 on this with respect to neutralization of the plain/palatalized contrast).

#### 4. Conclusion

To conclude, Balto-Slavic languages and dialects exhibit a range of possible [-back] assimilation patterns. Some of these patterns are amenable to the traditional Optimality Theoretic analysis, while others are not. In order to account for certain target/trigger dependencies of such problematic patterns, I propose a revised set of phonotactic faithfulness constraints. Different rankings of the markedness constraint requiring assimilation against the hierarchy of specific contextual constraints are able to generate all the attested patterns of [-back] assimilation. It is further suggested that specific contextual constraints can be seen as language-particular constructs: rather than being supplied by UG, the constraints can be induced by language learners acquiring complex phonotactic patterns.

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