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# Russian *Yers* and Prosodic Structure<sup>1</sup>

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## 1. Introduction

In this paper I investigate a previously neglected aspect of the phonology of Russian vowel- $\emptyset$  alternations involving verbal prefixes and prepositions.

There is evidence both for and against the notion that prepositions and verbal prefixes — which I will call P, for short — have identical phonological behavior. There are at least two processes that suggest that P forms a unified phonological category. Final devoicing and vowel reduction both treat the unit consisting of P and the following material as a single phonological word (for a detailed argumentation, see Matushansky 2001, Steriopolo 2007, Gribanova 2009, 2010). Crucially, P is unified for the purposes of these two processes, in that prefixes and prepositions are phonologically indistinguishable.

On the other hand, the vowel-zero alternation known as *yer* realization appears to distinguish the two categories (Gribanova 2009). This leads Gribanova to posit a stratal analysis where the two members of P attach at different levels in the phonology.

In sum, the diagnostics on the nature of P are paradoxical. The key to solving the paradox is that the empirical complexity of the *yer* facts has been underappreciated. Here I take a closer look at the data on *yer* realization with prepositions, using both the Russian National Corpus (RNC) and Google. Once the facts are sorted out, and once the intricate phonotactic, syntactic, and lexical factors that affect *yer* realization are brought to light, it is possible to resolve the two paradoxes by inferring the correct prosodic representation of the structures.

In the following section I outline the *yer* facts relevant to the phonology of prepositions, and propose a prosodic analysis. Section 3 summarizes the facts of the so-called rule of stress retraction, whose behavior parallels that of *yers* in relevant ways, and supports the analysis. In Section 4, I argue that the behavior of *yers* and of stress retraction in verbal prefixes, while superficially dissimilar to that in prepositions, in fact shows the same characteristics, and must be analyzed in the same way, vindicating the phonological unity of P.

## 2. Yer realization

### 2.1. Introduction

Gribanova (2009) argues that despite the apparent unity of P, the process of *yer* realization (YR) distinguishes prefixes from prepositions phonologically.

YR involves vowel- $\emptyset$  alternations that have their origin in the fall of the Common Slavic short vowels *ǔ* and *ǐ*, called *yers*. By a sound change known as Havlík's Law, a *yer* lowers to *o* or *e* if the following syllable contains a *yer*, iteratively right-to-left. All *yers* unaffected by lowering delete (e.g. Borkovsky and Kuznetsov 1965, V.Kiparsky 1979). Havlík's Law deposited vowel- $\emptyset$  alternations in the synchronic grammar of Russian, as illustrated in the following examples.

(1)		OLD RUSSIAN	RUSSIAN	
	a. Root alternations	rŭt-ŭ	rot	'mouth.NOM/ACC'
		rŭt-a	rt-a	'mouth.GEN'

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<sup>1</sup> I am grateful to Vera Gribanova, to my colleagues at Carleton, and to audiences at WCCFL and McGill.

b. Prepositions	vũ rŭt-ũ	v rot	‘into mouth.ACC’
	vũ rŭt-u	vo rtu	‘in mouth.LOC’
c. Prefixes	podũ-žŭg-l-ũ	pod-žog	‘kindled.MASC.PST’
	podũ-žŭg-l-a	podo-žg-l-a	‘kindled.FEM.PST’

Based on Havlík’s Law, it is expected that YR in P is conditional upon attaching to the zero alternant of a morpheme with a V-∅ alternation. This expectation is generally borne out for prefix-verb sequences, but not for preposition-noun ones. YR applies before some nouns (2)a but not others of similar structure (2)b.

(2)	a. son	‘sleep.NOM’	vo sne	‘in sleep.LOC’
	den <sup>j</sup>	‘day.NOM’	ko dn <sup>j</sup> u	‘to day.DAT’
	rot	‘mouth.NOM’	izo rta	‘from mouth.GEN’
	b. pen <sup>j</sup>	‘tree.stump.NOM’	s pn <sup>j</sup> a	‘from tree.stump.GEN’
	p <sup>j</sup> os	‘dog.NOM’	k psu	‘to dog.DAT’
	l <sup>j</sup> on	‘flax.NOM’	iz l <sup>j</sup> na	‘from flax.GEN’

While in some cases the behavior of YR is categorical, there is much inter- and intra-speaker variability (Steriopolo 2007, Gribanova 2009). Such unexpected failure of YR and variability are absent at the prefix-verb juncture, which leads Gribanova (2009) to conclude that prefixes and prepositions attach in different levels in the serially ordered analysis.

In what follows I will explore the underpinnings of the variability and exceptions to YR in prepositions, and will show that the distribution of variants with and without YR is systematic.

## 2.2. Phonotactic and lexical YR

One of the difficulties with synchronic YR in prepositions is that phonotactics complicate the picture. The sequences *ss*, *vv*, and *sv* are avoided word-initially when a consonant follows. If the preposition *s* or *v* is attached to a word beginning with a *sC* or *vC* cluster, YR applies to break up the cluster (Matushansky 2001, Steriopolo 2007). This happens even when there is no V-∅ alternation in the stem, as in the following examples.

(3)	*#ssC	*#vvC	*#svC
	so sredstvom ‘with means’	vo vrede ‘in harm’	so vredom ‘with harm’
	so starikom ‘with an old man’	vo vpadine ‘in hole’	so vpadinoj ‘with hole’

In addition, YR may occur before clusters whose profiles violate Sonority Sequencing, such as the ones consisting of a liquid and an obstruent. I refer the reader to Steriopolo (2007), where the phonotactically driven YR is spelled out in more detail.

However, not all instances of YR are phonotactically motivated; in (2)a, for example, *izo rta* and *ko dn<sup>j</sup>u* are not. These are genuine Havlík’s law cases of YR, not driven by cluster phonotactics. The pattern is truly lexical: *den<sup>j</sup>* and *pen<sup>j</sup>* have similar stop+nasal clusters, but are at the opposite extremes with respect to YR: the former conditions it frequently, the latter almost never. Another distinction between lexical and phonotactic YR is that lexical YR applies not only to the monoconsonantal prepositions *s*, *v* and *k*, but also to *iz* and *ot*, e.g. *izo rta* ‘from the mouth’, *oto sna* ‘from sleep’.

In this respect, verbs are not different from nouns: they show both phonotactic and lexical YR. The phonotactic factors in verbs are the same, and cause obligatory prefixal YR. However, verbs lack the variability characteristic of prepositional YR.

### 2.3. Restrictions on YR

#### 2.3.1. Lexical splits

The clearest set of facts that demonstrate the influence of the lexicon are lexical splits – homophones which behave differently with respect to YR. Gribanova pointed out the example of *množestvo* – when meaning ‘many’, the word conditions YR, but when meaning ‘mathematical set’, it does not.

Another example is the behavior of *vvod*, which can mean ‘bringing in troops’, or ‘enter(ing)’ in the computer context. Table (4) shows the highly significant difference in YR in *v(o) vvode voisk* ‘in bringing in troops’ compared to *v(o) vvode parol’a* ‘in entering the password’.

In both of these cases, the newer form – *množestvo* ‘mathematical set’, *vvod* ‘enter’ – are less likely to condition YR. This indicates loss of productivity of the process; newly coined items are less likely to undergo it than established items.

(4)

Google data	voisk	parol’a
v vvode	3580	2470
vo vvode	8910	1280

$$\chi^2 = 1706.15; p < 0.0001$$

#### 2.3.2. Non-complements

YR is favored in a narrow set of syntactic environments: it is more likely when the triggering noun is the complement of the target preposition. For example, the forms of the 1SG pronoun require YR on the preceding monoconsonantal preposition (5)a. However, when the same form of the pronoun is the complement of some other word, YR does not apply (5)b.

- (5) a. k\*(o) mne ‘to me’                      v\*(o) mne ‘in me’                      s\*(o) mnoj ‘with me’
- b. k\*(o) mne                      neizvestnomu                      človeku  
to                      I.DAT                      unknown.DAT                      person.DAT  
‘to a person unknown to me’
- c. s\*(o) mnoj                      interesujuščimsja                      človekom  
with me.INST                      taking.interest.INST                      person.INST  
‘with a person who takes interest in me’

#### 2.3.3. Non-transparent prepositional semantics

Not only the structure but also the meaning of sequences undergoing YR is restricted. Prepositions whose spatial or temporal semantics is transparent are more likely to undergo YR than those which are idiosyncratically selected by the verb. Consider the sequence *v(o) sne* ‘in sleep/dream’. If the preposition *v* has a locative meaning, the *yer* is nearly obligatory. When the same preposition is selected by a verb such as ‘need’ or ‘lose faith’, the *yer* is either problematic or impossible, as the following data illustrate.

- (6) a. videt’ v\*(o) sne                      ‘see in a dream’  
delat’ čto-l. v\*(o) sne                      ‘do something in a dream’
- b. nuždat’sja v(°o) sne                      ‘need sleep/dream’  
nuždat’sja v(\*o) t’me                      ‘need darkness’  
razuverit’sja v(°o) sne                      ‘lose faith in the dream’  
preusvat’ v(°o) sne                      ‘excel at sleeping’  
zaključat’sja v(°o) sne                      ‘to be the matter of sleep’

The following corpus evidence supports this claim. Generally, the sequence *v(o) sne* is realized without a *yer* about 0.3% of the time. But when it is the object of the verb *need*, that figure rises to 35% – a highly significant difference. In sum, non-transparent prepositions favor *yer*-less forms.

(7)	Google data	sne	vidit v(o)sne 'sees in dream'	nuždaetsja v(o) sne 'needs sleep'
	v	30,900 (0.3%)	2160 (0.28%)	12,100 (35%)
	vo	10,400,000	767,000	22,300

#### 2.3.4. Possession

The next factor influencing YR involves the possessor of the complement noun. Consider the following two examples. The choice of *yer*-ful form of the preposition *vo*, but not the *yer*-less *v*, necessitates the interpretation of its object as possessed by the syntactic binder of the noun.

- (8) a. Petja letaet vo sne  
P flies in dream  
'Peter flies in (his own) dream'
- b. Petja letaet v sne  
P flies in dream  
'Peter flies in (someone else's) dream'

The following RNC examples of *v sne* support this claim.

- (9) a. di'to plačet **v sne** Dmitrija  
child cries in dream Dmitry.GEN  
'a child is crying in Dmitry's dream'
- b. Vjačiku xotelos<sup>i</sup> kak možno dol'she ostavat'sja **v sne** Gul'nary  
Vjačik anted s-long-as-possible remain in dream ulnara.GEN  
'Vjačik wanted to stay in Gulnara's dream as long as possible'

A consequence of this effect is that *v rtu* 'in mouth', *iz rta* 'from mouth' and other similar phrases are strongly favored in the context of dead bodies, statues, and, the like. This effect is supported by corpus evidence. In the RNC, the sequence *v rtu* refers mostly to dead bodies, as the following examples show.

- (10) a. U m'ortvyx naxodili **v rtu** seno  
'They found hay in dead people's mouths'
- b. trup zaxripel, **iz rta** vypolzla černaja, kak smert'<sup>i</sup>, sl'una  
'The dead body wheezed, and saliva, black as death, crept from its mouth'
- c. **iz rta** Puruši voznikli žrecy (braxmany), iz ruk – voinskoe soslovie (kšatrii)  
'Priests (brahmins) were created from Purusha's mouth; warriors (kshatriyas) from his hands'

#### 2.3.5. Analysis

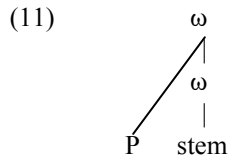
The upshot of the foregoing is that it is easier to characterize the set of environments where YR applies than those where it does not. Failure of YR is the general case, while its application is lexically restricted.<sup>2</sup>

<sup>2</sup> It is worth emphasizing that the claim of generality is not one of frequency. Failure of YR may, and often is, less frequent than its application. Rather, the set of contexts where YR applies form a more natural class than the set of contexts where YR does not apply.

Before proceeding with the analysis, a note is due on the variable nature of the data. None of the effects are absolute. However, the statistical tendencies displayed by the data are clearly grammatical in nature, and I follow many standard approaches to variability (e.g. Hayes 2000, Boersma and Hayes 2001, Anttila 2006) which analyze it using the same mechanisms as absolute grammaticality. In what follows, I will abstract away from the variability and treat the tendencies as if they are absolute, but it should be understood that the generalizations are subject to optionality.

On the assumption that YR is a rule of the phonology, the distinction between the cases where YR applies and those where it does not can be treated as due to a structural difference. Assuming that YR applies within the phonological word, there is a structural paradox. On the one hand, we have cases like *izo rta*, where YR applies, and which clearly constitute a single prosodic word. This can be seen, for example, in the behavior of vowel reduction. Unstressed /o/ surfaces as [a] when pretonic in the same phonological word, and as [ə] elsewhere. By this criterion, *izo rta*, realized as [izartá], clearly forms one word. On the other hand, there are cases like *iz rta*, where YR fails, but there is no other indication that this sequence does not form a single prosodic word. Final devoicing, which only applies prosodic-word finally, fails to apply in *i[z]rta*, suggesting that this sequence also forms a single word. In the cases where a prepositional *yer* fails to realize despite phonological conditions requiring its realization, diagnostics conflict on the nature of the boundary between P and the host.

This paradox can be resolved by establishing the correct representation of the relevant structures. It is standard in prosodic phonology that prosodic constituency can be misaligned with morphosyntactic constituency. Such misalignment can take the shape of resyllabification, bracketing paradoxes, or adjunction (e.g. Ito and Mester 2003[1992], 2006). Adjunction is a violation of Strict Layering (Selkirk 1984), i.e. the principle that each higher-level category contains only members of the next-lower-level category. It is commonly assumed to be not an inviolable principle, but an optimum which is not always attained. Given the possibility that Strict Layering can be violated, the paradox is resolved. There is a representation that allows us to have the cake and eat it – one that treats as a prosodic word both the host of P as well as the entire P-host complex. This is shown in (11).

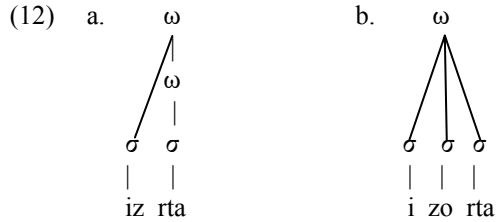


For representations like (11), two types of each prosodic category can be defined:  $CAT_{max}$ , which is dominated by no other category of the same type, and  $CAT_{min}$ , which does not dominate any category of the same type (cf. Ito and Mester 2006). In case there is no adjunction,  $CAT_{max}$  and  $CAT_{min}$  coincide.

Phonological processes apply within prosodic domains, and can be specified to apply within either the maximal prosodic word ( $\omega_{max}$ ), or the minimal prosodic word ( $\omega_{min}$ ). In Russian, stress, reduction, and devoicing take  $\omega_{max}$  as their domain, while YR takes  $\omega_{min}$ .

The difference between phrases where YR applies and those where it is inapplicable can be represented in (12). In the general case, the preposition adjoins to a prosodic word as in (11). In a lexically restricted set of cases, the preposition does not adjoin but forms a prosodic word together with its host (12)b. The phonological processes mentioned in Section 1 (devoicing, reduction, etc.) take  $\omega_{max}$  as their domain, and hence apply to both structures. But because lexical YR takes  $\omega_{min}$  as its domain, it applies only to the inner word in (12)a, as well as to the entire structure of (12)b. It does not apply to the maximal word in (12)a. This expresses the fact that, in the default case, a sequence of a preposition with the following word does not undergo YR.<sup>3</sup>

<sup>3</sup> For reasons of space I am not able to explain in detail the phonological difference between lexical and phonotactic YR. In sum, lexical YR applies in  $\omega_{min}$ , phonotactic YR also applies in  $\omega_{max}$ .



This picture represents a familiar pattern where lexicalized phrases undergo univerbation. Idiosyncrasy in meaning entails formal reduction, in this case, reduction from a structure like (12)a to (12)b.

Before taking up Gribanova’s claim that the prepositions and verbal prefixes differ phonologically in their level of attachment — i.e. the Unity Paradox — it is necessary to investigate Stress Retraction, another phonological process that variably applies to prepositional phrases.

### 3. Stress retraction

The nature of the prepositional *yer* behavior can be made clearer with a parallel to another idiosyncratic aspect of their phonology: the so-called stress retraction rule (SR). The conditions under which the two processes take place, and restrictions on them, are similar.

#### 3.1. Lexical SR

In Common Slavic and Old Russian, each morpheme was either lexically accented on one of the syllables, or unaccented. By the Basic Accentuation Principle (BAP), the leftmost accent surfaces; if all morphemes are unaccented, the leftmost syllable is accented (e.g. Kiparsky and Halle 1977). Prepositions are part of the phonological word, and unaccented. Thus, when combined with unaccented nouns, they bear stress. This has the appearance of “retraction” of stress onto the preposition. While SR was obligatory in Old Russian, it gradually lost its productivity in the 12th-16th centuries, as documented by Zalizniak (1989). The synchronic situation, investigated by Ukiah (1998), is the result of that loss of regularity.

SR is subject to lexical effects similar to those that restrict YR, as I show in the following sections.

#### 3.2. Conditions under which lexical SR does not apply

##### 3.2.1. Lexical splits

Just as with YR, there are a large number of idioms that require SR, while identical strings in their non-idiomatic use are produced without SR. For example, *za gorod* ‘for the city’ has the idiomatic meaning ‘to the countryside’ with SR (*zá gorod*), and the literal meaning without SR (*za górod*). This can be seen, for example, in that the complement noun cannot be modified: *\*zá gorod Moskvu* ‘for the city of Moscow’ is impossible with SR. These and other similar examples are shown below; in each case, the expression without SR has the literal meaning and the expression with SR the idiomatic one.

(13)	WITHOUT SR		WITH SR	
	<i>za górod</i>	‘for a city’	<i>zá gorod</i>	‘to the countryside’
	<i>za górodom</i>	‘behind the city’	<i>zá gorodom</i>	‘in the countryside’
	<i>pod góru</i>	‘under the hill’	<i>pód goru</i>	‘downhill’
	<i>do sméрти</i>	‘until death’	<i>dó smerti</i>	‘extremely’

##### 3.2.2. Non-complements

Syntactic restrictions parallel to those seen in YR are found with SR. The noun must be the object of the preposition in order to be eligible for retraction. While (14)a is ungrammatical, lack of SR greatly improves the phrase (14)b (this is the reading where *gólovu* is the object of *mojuščix*; an alternative

irrelevant reading ‘on the head of the people who wash’, where *gólovu* is the object of the preposition, is also available).

- (14) a. \*ná golovu mojuščix ľudej  
 on head washing people  
 ‘on people washing the head’
- b. ?na gólovu mojuščih ľudej

### 3.2.3. *Non-transparent prepositional semantics*

Just as YR, SR is subject not only to formal restrictions but also to semantic ones. The dispreference for SR in constructions with non-transparent prepositional semantics is illustrated below. It parallels the similar effect observed with YR.

- (15)a. nadejat<sup>l</sup>s<sup>l</sup>a ‘have one’s hope set in’ \*ná spinu ‘back’, \*ná golovu ‘head’  
 b. vystupať ‘voice support of’ \*zá gorod ‘city’  
 c. zastupit<sup>l</sup>s<sup>l</sup>a ‘defend’ \*zá gorod ‘city’  
 d. borot<sup>l</sup>s<sup>l</sup>a ‘fight for’ \*zá golovu ‘head’  
 e. serdit<sup>l</sup>s<sup>l</sup>a be angry at \*ná zimu ‘winter’

### 3.2.4. *Possession*

As observed by Ukiah (1998), SR displays a possession effect similar to the one found with YR. In phrases with retraction, if the noun is inalienably possessed, its possessor must be its binder.

- (16) a. íz domu ‘from (necessarily one’s own) house’  
 iz dóma ‘from (possibly someone else’s) house’  
 b. ná spinu ‘on (one’s own) the back’  
 na spínu ‘on (possibly someone else’s back’

### 3.2.5. *Conclusions*

The pattern of SR further supports the picture in (12). If the stress rule (the BAP) takes  $\omega_{\min}$  as its domain, then retracting sequences can be represented as having a preposition unverbated with its host, as in (12)b, while non-retracting ones have an adjoined preposition, as in (12)a. Once again, the lexically restricted and idiosyncratic uses involve a structure that is phonologically more reduced.

The consequence of the preceding two sections is that there are two prosodic types of prepositions. In the general case, prepositions attach as in (12)a. In a few lexically restricted cases, they form the structure as in (12)b, which manifests itself through the application of YR and SR. I will refer to the two prosodic types of prepositions as ‘inner P’ and ‘outer P’. It bears emphasizing that the distinction is made here only on prosodic grounds; I make no claim about the syntactic differences between them.

In the following section I turn to verbal prefixes, where YR and SR also apply, and argue that the same prosodic division between inner and outer P is also relevant.

## 4. YR and SR in verbs

The starting point of the discussion of verbal prefixes is the standard distinction between the so-called lexical and superlexical prefixes made on morphosyntactic grounds (Svenonius 2004). Lexical prefixes are distinguished by semantic idiosyncrasy and an ability to modify the aspectual and argument structure of the verb. Lexical prefixes have the hallmarks of being in some strict syntactic sense ‘closer’ to the stem of the verb than superlexical prefixes (Gribanova 2010). As I show here, the distinction also has phonological consequences.

First, consider SR. It applies in verbs as well as nouns, where it leads to stressing the initial syllable. Whether the prefix counts as ‘initial’ for SR is just as idiosyncratic as whether the preposition counts as initial in the nominal context (Ostrogorskaia-Jakšič 1987).

However, the distribution of SR is not random. Only *lexical* prefixes may receive stress according to SR. Examples of typical prefixes undergoing SR are in (17)a; all are lexical by the standard criteria. Most telling is the semantic idiosyncrasy of the derived form, whose meaning cannot be fully predicted either from the meaning of the stem or the prefix. SR treats these prefixes as part of the stress domain.

Because lexical prefixes cannot stack, in any verb with two or more prefixes, all but the innermost one must be superlexical. In (17)b, the same items are shown with second prefixes, which must therefore be superlexical. Here, SR never treats the outer prefix as part of the stress domain.

- |      |    |                        |               |    |                            |                        |
|------|----|------------------------|---------------|----|----------------------------|------------------------|
| (17) | a. | pó-zvannyj             | ‘called’      | b. | pod-ná-n <sup>1</sup> atyj | ‘hired in addition to’ |
|      |    | íz-brannyj             | ‘chosen’      |    | ras-pró-dannyj             | ‘sold out’             |
|      |    | ná-n <sup>1</sup> atyj | ‘hired’       |    | za-pró-dannyj              | ‘sold in advance’      |
|      |    | pró-dannyj             | ‘sold’        |    | ne-dó-pityj                | ‘not drunk up’         |
|      |    | pére-dannyj            | ‘transferred’ |    | pere-pró-dannyj            | ‘sold a second time’   |
|      |    | dó-pityj               | ‘drunk up’    |    |                            |                        |

In other words, the syntactic closeness of the lexical prefixes and the stem is reflected in their phonological closeness, in that they form the domain in which SR applies.

The next question is whether YR also distinguishes lexical and superlexical prefixes. Unfortunately, here the facts are somewhat murky but suggestive in the same direction: YR is more likely with lexical prefixes. The limiting factor is that there are only two C-final superlexical prefixes, the completive *ot-* and the exhaustive *iz+RFL*; neither of which is fully productive. Further, superlexical prefixes attach to imperfective stems, which are realized with a *yer* due to an independent lengthening rule. Thus no *yer* in the prefix is expected to surface anyway, at least not due to lexical YR.

However, in some marginal cases the superlexical prefixes do attach to stems whose structure makes YR phonologically possible. The data suggest that the YR in superlexical prefixes is *variable*. The following examples are from Google.

- (18) a. ja svoi tri s polovinoj žizni uže **ot-spal**  
‘I have already slept my three and a half lives’
- ja uže ves<sup>j</sup> **iz-ždals<sup>1</sup>a**  
‘I am sick and tired of waiting’
- b. na prirode v palatke uže svoe **oto-spal**  
‘I’ve slept my share in the tent out in nature’
- teb<sup>1</sup>a ja **izo-ždals<sup>1</sup>a** v pux i prax!  
‘I am completely sick and tired of waiting for you!’

The distinction between lexical and superlexical prefixes appears to have phonological consequence in both SR and YR. SR is possible in lexical prefixes and ruled out in superlexical ones; YR is necessary in lexical prefixes and possible in superlexical ones. This parallels the division between inner and outer prepositions, and can be represented prosodically by the two structures in (12).

The basic consequence of this discussion is that the phonological behavior of prepositions and prefixes is unified. Gribanova’s (2009) conclusion to the contrary is due to comparison of inner prefixes and outer prepositions, which indeed are starkly different with respect to both YR and SR. An added difficulty that clouds the comparison is that prepositions are much more productive than even superlexical prefixes – indeed, fully productive. For these reasons, the lexically restricted type that results in (12)b is easier to spot in the case of prefixes. Once the right categories are compared, however, Matushansky’s (2001) generalization about the phonological unity of P is vindicated.



Let me summarize the findings of the paper in the following table, which shows the phonological domains which the various processes take.

(19)

$\omega_{\min}$	$\omega_{\max}$
lexical YR	vowel reduction
SR	devoicing

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