Chapter 2

PHONOLOGY. VOWEL–ZERO ALTERNATIONS IN RUSSIAN PREPOSITIONS: PROSODIC CONSTITUENCY AND PRODUCTIVITY

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I. Introduction

Many Russian prepositions have two realizations, with and without the final vowel. For example, *s* 'with,' *k* 'to' and *iz* 'from' sometimes appear as *so*, *ko*, and *izo*, respectively. Sometimes only the consonant-final variant is possible, such as *v*(**o*) *dome* 'in the house,' *s*(**o*) *drugom* 'with a friend,' etc. Sometimes, both versions are acceptable: *v*(*o*) *sne* 'in sleep/dream,' *s*(*o*) *množestvom* 'with many.' In some cases, the variant with the final vowel predominates, such as *ko mne* 'to me,' *so mnoj* 'with me.'

In this chapter, I investigate the conditions determining the choice between the variants with and without the vowel *-o* (which surfaces as either [a] or [ə], and is called a "*yer*," as explained below), and relate those conditions to syntactic and semantic factors, as well as to other aspects of Russian phonology, most notably the behavior of stress.

The discussion below is couched in standard generative phonology (Halle 1959; Chomsky and Halle 1968; Lightner 1972). In this framework, underlying (phonemic) forms are related to surface forms via a series of transformations, also known as rules or processes, which affect the features and segments of the representations. The standard Chomsky-Halle framework is enriched by the theory of prosodic hierarchy (Selkirk 1984; Hayes 1989). The sequence of segments is understood to form a hierarchy of constituents of progressively increasing size – syllable, stress foot, prosodic word, and phrase. In this chapter, only syllables and prosodic words will be relevant.

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The choice of the theoretical framework is made for expository convenience. The facts discussed below can be easily accommodated in another theory, although the details of their interpretations might be different. With these theoretical preliminaries in place, let me turn to a more detailed description of the problem presented by Russian prepositions.

Before turning to the choice between the prepositions with and without vowels, it is necessary to establish the prosodic structure of preposition-noun sequences, and sequences of prefixes and verbs, which behave similarly. Evidence for these structures is contradictory (Matushansky 2001; Steriopolo 2007; Gribanova 2009, 2010). Some processes that apply across the boundary between a preposition or prefix and the following word diagnose it as a word boundary, while other processes diagnose no prosodic boundary at that location. This contradiction can be called the "Cliticization Paradox," explained in detail in Section I.1 below.

Secondly, there is evidence both for and against the notion that prepositions and verbal prefixes – which are largely homophonous and have a common historical source – have identical prosodic structure and phonological behavior. I will refer to this problem as the "Unity Paradox." In particular, vowel reduction, devoicing and palatalization apply in the same way across a preposition-noun boundary as they do across a prefix-verb boundary (Matushansky 2001). On the other hand, the vowel–zero alternation known as *yer* realization appears to distinguish the two categories (Gribanova 2009).

The key to solving the paradoxes is that the empirical complexity of the *yer* facts have been underappreciated in the literature. Here I take a closer look at the data on *yer* realization with prepositions, using both the Russian National Corpus (RNS) and Google.[1] 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 involving prefixes and prepositions.

As I show, all of these conditions point to the existence of two types of preposition-noun and prefix-verb groups whose prosodic structure is shown in (1)a and (1)b. The choice between them depends on syntactic and lexical grounds, and the phonological behavior of *yer* realization and other processes

1 Data and statistics from the RNS were collected using manual searches of the entire corpus. Google was used to approximate the statistical distribution of variants (see below); the numbers in the tables in this chapter represent Google's reported number of occurrences using manual searches of the entire Internet. Individual examples reported in this chapter were selected from the top results of the searches in the RNS or Google.

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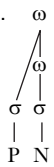
follow from prosodic structure. As I will argue below, establishing the correct prosodic structure will lead to a resolution of the Unity Paradox.

(1) a. 

b. 

The starting point of the discussion in Section I is the claim by Matushansky (2001) that verbal prefixes and prepositions share many phonological characteristics and the contrary claim by Gribanova (2009) that they are distinguished by the behavior of the *yers*. In the remainder of this section I lay out the arguments showing the phonological unity of the two categories, and show that both prefixes and prepositions form a prosodic unit with the following word. In Section 2 I turn to *yer* realization, which has been claimed to distinguish prefixes from prepositions phonologically. I show the difference between lexical and phonotactic versions of that process and argue that it applies only in a lexically restricted set of cases. The key proposal of the chapter is found at the end of Section II, where I sketch out the analysis of *yer* realization in prepositions. Section III summarizes the facts of the so-called rule of stress retraction, whose behavior parallels that of *yers* in relevant ways. In Section IV, I argue that the behavior of *yers* and of stress retraction in verbal prefixes, while superficially dissimilar to that of prepositions, shows the same characteristics, and must be analyzed in the same way, vindicating the phonological unity of prefixes and prepositions.

Before proceeding, a word is in order on the nature of the data. While the focus of the investigation is the standard Moscow dialect, as described in prescriptive manuals such as Avanesov (1968), and used by native speakers, certain practical idealizations have been made. These idealizations are standard in generative linguistics, and do not generally undermine the soundness of the conclusions. First, no distinction is assumed between 'spoken' and 'written' versions of the language as far as the factors under investigations are concerned. This is, of course, a simplification, but a necessary one, given that all of the data comes from corpora that comprise both written language and transcriptions of speech. Secondly, the speech community of the corpus is assumed to be dialectally homogeneous. That this is an idealization will become especially clear below once the variable nature of the data comes to light, but one that is not damning, given the size of the corpus and the clarity of the tendencies that are discussed in this chapter.

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I.1. Diagnostics of phonological wordhood: Prepositions and prefixes

There are a number of diagnostics of phonological wordhood that suggest that both verbal prefixes and prepositions are cliticized to the following words and that the two categories, even though they are distinct syntactically, behave in a phonologically identical way (Matushansky 2001).

I will start with prefixes. Most basically, the prefix-stem complex is assigned a single stress. Final devoicing does not apply to the prefix-final Cs (2)a but does devoice word-final consonants in the identical environment in (2)b (here and below, consonants and vowels are denoted as C and V, respectively).

(2) a. /pod-igratʲ/ → podygratʲ 'play into someone's hands'
b. /rod # igry/ → rot ygry 'type of play'

Vowel reduction also treats the prefix-verb complex as a single word. In Standard Russian, unstressed /o/ and /a/ surface as [a] either when word-initial or when a stressed syllable follows in the same phonological word, and surface as [ə] elsewhere (Avanesov 1968). The boundary between the prefix and the stem is not treated as a word boundary by this rule, because prefix vowels which precede a stressed syllable (pretonic vowels) come out as [a] (3)a, in contrast to pretonic vowels in the preceding phonological word, which are [ə] (3)b.

(3) a. /pod-lézʲtʲ/ → padlézʲtʲ 'climb up to'
b. /górod # ómsk/ → górəd # ómsk 'the city of Omsk'

Likewise, the stem-initial vowel in a prefixed verb does not count as word-initial for the purposes of reduction and its vowel surfaces as [ə], not [a], as the following illustrates.

(4) a. /ostorožničatʲ/ → astaróžničatʲ 'behave carefully.$_{\text{IMPF}}$'
b. /s-ostorožničatʲ/ → səstaróžničatʲ 'behave carefully.$_{\text{PF}}$'

The final diagnostic for wordhood is the behavior of the second-position clitic *že*, which normally attaches after the first phonological word of the phrase. Clearly, *že* is never inserted after a prefix in the middle of a prefixed verb, which once again confirms that prefixes are not words.

The diagnostics mentioned above behave identically for the unit formed by a preposition and the following word. Only one stress is assigned to the sequence. Final devoicing does not apply to the preposition (5)a. The reduction rule treats the preposition as part of the following phonological word, because its vowel, when pretonic, is realized as [a] (5)b. The word-initial vowel, which

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normally surfaces as [a] when unstressed, is not treated as word-initial when preceded by a preposition (5)c. Finally, the second-position clitic *že* cannot be inserted between a preposition and the following noun (5)d.

(5)	a.	/iz okon/	→ iz ókon	'from windows'	(final devoicing)
	b.	/pod óknami/	→ pad óknəmi	'under windows'	(pretonic reduction)
	c.	/oguréc/	→ aguréc	'cucumber'	(word-initial reduction)
		/s ogurcóm/	→ s əgurcóm	'with a cucumber'	
	d.	na léto že 'but for the summer'		*na že léto	(2nd position clitic)

In sum, the diagnostics suggest that both prefixes and prepositions form part of the phonological word with the following material and that the two categories behave alike. Following Gribanova (2009), I will refer to this unified phonological category as "P."

However, there are at least two processes which diagnose the boundary between a prefix or preposition and the following word as a full word boundary. The behavior of underlying /Ci/ sequences is sensitive to the type of boundary separating the consonant *C* and the following vowel *i*. Within words, the outcome depends on whether the consonant in question is a velar and on the identity of the suffix to which the vowel belongs. For velars, the outcome of word-internal /Ki/ (where /K/ is any velar) is different from what happens across words. Before suffixes the velar is palatalized, resulting in [kʲi], while between words the vowel is backed, resulting in [ky].

For verbal prefixes, the behavior of the boundary cannot be ascertained because there are no prefixes ending in a velar. Prefixes which end in other consonants condition backing of the following vowel, not palatalization of the final consonant of the prefix, as evident from the example in (2)a above.

The one velar-final preposition *k*, however, unambiguously behaves like a separate word because it conditions backing of the following vowel.

(6)	a.	/k ide/	→ k yde	'to Ida'
	b.	/k igre/	→ k ygre	'to a game'

The second diagnostic that suggests a word boundary between a prefix or preposition and the following word is hiatus resolution, i.e., what happens when two vowels become adjacent to each other. Word-internally, hiatus is resolved by deleting the first vowel (7)a, but it is tolerated across word boundaries (7)b. Both prefixes and prepositions fail to lose their vowel when attached to vowel-initial words (7)c.

(7)	a.	/palʲto-iško/	→ palʲtʲiško	'coat.$_{DIM}$'
	b.	/palʲto iry/	→ palʲto Iry	'Ira's coat'

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c. /po-igratʲ/ → poigratʲ ‘play for some time’
d. /na obed/ → na obed ‘for dinner’

The evidence from backing and hiatus resolution is consistent with the phonological unity of P, but appears to contradict the conclusion that P and following hosts form a single prosodic word. This paradox can be solved by appealing to other phonological pressures that prevent palatalization and hiatus resolution from applying across the P-stem boundary.

For palatalization, the simplest solution is to assume that all the consonants at the ends of prepositions are [+back] in their underlying form, and this feature protects the consonant from palatalizing. Some have objected that it is an accident that all prepositions seem to have such a feature – a richness of the base problem (Gouskova 2012). Such an objection carries little weight, however, because the *only* preposition that requires such underlying specification of [+back] is the velar *k*.

As for hiatus-resolving vowel deletion, it is plausible that the rule does not in fact exist at all (Gouskova 2010). Not only does it fail to apply within words, but the examples commonly cited in support of the hiatus resolution like (7)a have an alternative analysis: the final *-o* might be treated as a morpheme, not part of the stem.

Finally, it is important that the phonological unity of P and the host is supported by the most productive phonological rules of Russian, such as final devoicing and vowel reduction.

A supporting piece of evidence for the treatment of P as phonologically unified with the following item is that the class of prepositions which behaves as described above is defined prosodically, not syntactically. There are stressed prepositions which behave like separate phonological words, e.g. *ókolo* ‘near,’ *méždu* ‘between,’ *vokrúg* ‘around.’ They bear their own stress, in addition to the stress of their complement; they undergo final devoicing (8)a; they behave as a separate domain for vowel reduction, in that their final vowel surfaces as [ə] even when pretonic and the initial vowel of the following word counts as word-initial (8)b; finally, a second-position clitic can be inserted between a stressed preposition and the following word (8)c.

(8) a. /vokrúg dóma/ → vakruk dóma ‘around the house’ (final devoicing)
b. /ókolo dóma/ → ókələ dóma ‘near the house’ (pretonic reduction)
/vokrúg ogurcóv/ → vakrúk agurcóv ‘around cucumbers’ (word-initial reduction)
c. vokrúg že ogurcóv ‘but around cucumbers’ (2nd position clitic)

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Another behavior that distinguishes stressed from unstressed prepositions is the inability of the latter to stand on their own, without a following word (9)a, in contrast to stressed prepositions (9)b.

(9) a. **v ili iz* 'in or out'
b. *ókolo ili méžđu* 'near or between'

All these behaviors point to the phonological unity of P, and to the prosodification of P with the following word.

II. *Yer* Realization

II.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–∅ alternations that have their origin in the fall of the Common Slavic short vowels *ŭ* and *ĭ*, 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 get deleted (see e.g., Borkovsky and Kuznetsov 1965; V. Kiparsky 1979). Havlík's Law deposited vowel–∅ alternations in the synchronic grammar of Russian, as illustrated in the following examples. The *yer* may be in the root (10)a, or it may be the final sound of a prefix or a preposition (10)b.

		Old Russian	Russian	
(10) a.	Root alternations	rŭt-ŭ	rot	'mouth.$_{\text{NOM/ACC}}$'
		rŭt-a	rt-a	'mouth.$_{\text{GEN}}$'
b.	Prepositions	vŭ rŭt-ŭ	v rot	'into mouth.$_{\text{ACC}}$'
		vŭ rŭt-u	vo rtu	'in mouth.$_{\text{LOC}}$'
c.	Prefixes	podŭ-žĭg-l-ŭ	pod-žog	'kindled.$_{\text{MASC.PST}}$'
		podŭ-žĭg-l-a	podo-žg-l-a	'kindled.$_{\text{FEM.PST}}$'

Based on Havlík's Law, it is expected that a P-final *yer* should be realized whenever the P attaches to a root containing a *yer* which is itself not realized. In other words, YR in P is conditional upon attaching to the zero alternant of a morpheme with a V–∅ alternation.[2]

2 The analysis of YR as a synchronic rule has a long tradition in generative phonology. See Halle (1959); Lightner (1972); Matushansky (2001).

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This expectation is generally borne out for prefix-verb sequences, but not for preposition-noun ones. The data below show that YR applies before some nouns (11)a, but not before others of similar structure (11)b.

(11)	a.	son	'sleep.$_{NOM}$'	vo sne	'in sleep.$_{LOC}$'
		denʲ	'day.$_{NOM}$'	ko dnʲu	'to day.$_{DAT}$'
		vesʲ	'all.$_{NOM}$'	so vsem	'with all.$_{INSTR}$'
		rot	'mouth.$_{NOM}$'	izo rta	'from mouth.$_{GEN}$'
	b.	penʲ	'tree.stump.$_{NOM}$'	s pnʲa	'from tree.stump.$_{GEN}$'
		pʲos	'dog.$_{NOM}$'	k psu	'to dog.$_{DAT}$'
		lʲon	'flax.$_{NOM}$'	iz lʲna	'from flax.$_{GEN}$'

In addition to nearly exceptionless failure of YR on the preposition in examples such as *s pnʲa*, there is much inter- and intra-speaker variability (Steriopolo 2007; Gribanova 2009; see also Eskova 2000). Such failure of YR and variability are absent at the prefix-verb juncture, which leads Gribanova (2009) to conclude that prefixes and prepositions are phonologically different, and attach in different levels in Gribanova's serial framework.

In what follows I will explore the underpinnings of the variability and exceptions to YR in prepositions and show that the distribution of variants with and without YR is systematic. The facts, together with their analysis in terms of the prosodic structure of the P-noun complex, support the claim that prefixes and prepositions are phonologically unified.

II.2. Phonotactic and lexical YR

One of the difficulties with synchronic YR in prepositions is that phonotactics influences it, but does not completely determine the outcome. The core phonotactic generalization is that 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.

(12)	*#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 where sonority increases toward the nucleus, against the Sonority Sequencing Principle (the SSP; Clements 1990), such as the ones consisting of a liquid and an obstruent.

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In order to verify these claims, I gathered data from the Google corpus, i.e., the corpus that comprises the Russian portion of the Internet (searches performed in November 2010).[3] The following table contains the frequency of YR across the phonotactic contexts and in three monoconsonantal prepositions. Each cell of the table corresponds to the cluster type at the beginning of the noun to which the preposition attaches. The first consonant of that cluster is indicated by the row and the second consonant by the column. I selected two or three words of each type for the search. For example, in the *labial fricative-stop* cell, I searched for prepositional phrases containing *vdova* 'widow,' *vpadina* 'crevasse' and *vdox* 'inhalation.' The full list of words searched is shown in this chapter's appendix. The three numbers in each cell show the averaged frequency of YR for all the words of that type with the monoconsonantal prepositions *s*, *v* and *k*. Thus, for example, the average rate of YR for the three words just cited is 65.4 percent with *s*, 87.8 percent with *v* and 3.17 percent with *k*.

Cells where data are impossible to collect are shaded (for example, there are no words beginning with velar fricatives followed by stops). Some cells are pooled together, such as those where the first consonant is a liquid, because there are not enough words exemplifying individual cluster types.

(13)

	Stop	Coronal fricative	Velar fricative	Labial fricative	Nasal	Liquid	
Stop	0.35 0.97 0.26	1.63 0.06 0.08		0.17 1.84 2.37	0.05 0.02 0.17	0.15 0.61 0.22	*s* *v* *k*
Cor.fr.	99.2 0.1 0.18	31.0 0.07 0.13	97.3 0.01 0.02	96.8 0.44 0.82	98.9 0.09 0.16	96.9 0.14 0.07	*s* *v* *k*
Vel.fr.				0.1 0.08 0.23	3.98 0.45 2.42	0.16 0.59 0.16	*s* *v* *k*
Lab.fr	65.4 87.8 3.17	93.0 98.5 11.97		1.19 60.87 2.14	41.09 96.05 9.81	1.77 98.11 0.55	*s* *v* *k*
Nasal					0.8 (92.45) 2.69	4.1 15.42 6.88	*s* *v* *k*
Liquid	32.31 16.62 6.14						*s* *v* *k*

3 The limitations of using Google as a corpus are too well known to rehearse here. Yet its use here is justified, because for the purpose of getting a rough picture of the statistical tendencies of YR in various contexts, Google's weaknesses are outweighed by its chief strength – its size.

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The table generally corroborates the standard claims: that the clusters in (12) condition YR, and that sonority-violating clusters condition optional YR. One exception is the low frequency of YR in *s+ss* sequences (31 percent, compared to nearly obligatory YR in other #*s+sC* clusters). Also, contrary to the standard claims, the clusters beginning with *v* do not cause the preceding *s* to be realized with a *yer* when a liquid or another labial follows.

The abnormally high frequency of YR in *v* + nasal + nasal context, parenthesized in the table, is due to the idiom *sojtis*^{j} *vo mnenii* 'agree,' which is so frequent that it drowns out the general pattern of lack of YR in that phonological context.

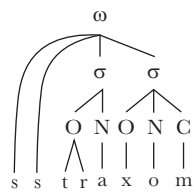
A plausible analysis of the pattern makes use of syllable structure. Consonants in the syllable margin which violate sonority sequencing are not part of the syllable itself, but are adjoined to it at the level of the foot or the prosodic word (the so-called syllable appendix) (Green 2003; Kiparsky 2003; Steriopolo 2007). In Steriopolo's (2007) analysis, the pattern in (13) results from constraints that prohibit a complex appendix, high-ranked for appendices consisting of two fricatives, and lower-ranked for other appendices.

The following figure illustrates the structure of a phrase such as *s straxom* 'with fear,' where YR applies to yield *so straxom*. Since the *s* of the stem violates sonority sequencing, it is not parsed as part of the initial syllable, but adjoined to it at the higher level. The preposition *s* also must form part of the syllable appendix. The high-ranked constraint against two-fricative appendices forces YR. (O, N and C stand for 'onset,' 'nucleus' and 'coda,' respectively).

The fact that the preposition *iz* does not exhibit YR under the circumstances illustrated in (13) corroborates the analysis: its final consonant can form a coda of the preceding syllable and thus does not render complex the appendix of the following syllable. I refer the reader to Steriopolo (2007), where this analysis is spelled out in more detail.

However, not all instances of YR are phonotactically motivated; in (11)a, for example, *izo rta* and *ko dn*^{j}*u* are not, in terms of (13). I will call the version of YR that applies in such cases 'lexical.' It applies to prepositions before roots with V–∅ alternations, as would be expected from a synchronic reflex of Havlík's Law. As mentioned above, not all words with the *yer* alternation in the root condition YR in the preposition. In the following table I placed the

Figure 2.1. Syllable structure of a phrase *s straxom* (with fear)



CVC items that could potentially condition YR on the preposition, i.e., those that have V–∅ alternations. They are placed in the cells that correspond to the initial two consonants in the zero alternant, e.g. *pʲos* 'dog' (genitive *psa*) is in the *stop-coronal fricative* cell of the table. The items that in fact undergo YR with significant frequency are shaded.

(14)

	Stop	Coronal fricative	Velar fricative	Labial fricative	Nasal	Liquid
Stop		pʲos			denʲ, penʲ, tʲma	
Cor.fr.				šov	son	
Vel.fr.						zlo
Lab.fr.		vesʲ	vošʲ			
Nasal			mox		1SG *mne*, *mnoj*	
Liquid	lʲod, lob, rot			lev, rov	lʲon	

This table shows that lexical YR is distinct from phonotactic YR. There are words like *denʲ* and *tʲma* which have a structure that does not cause phonotactic YR, but the prepositions before these nouns are still often realized with a *yer*. The pattern is truly lexical: *denʲ* and *penʲ* 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 the two versions of 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' and *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. Verbs like *so-svatatʲ* 'match (for marriage),' *vo-vleč* 'drag into' and *so-vratitʲ* 'lead into temptation' have no V–∅ alternations in the stem and thus provide no motivation for YR in the prefix, but it still applies due to the constraints in (12).

Even though both phonotactic and lexical YR apply in verbal prefixes, they lack the variability characteristic of prepositional YR. In the following sections I show that at least some of this variability is not random, but is due to syntactic restrictions on YR.

II.3. Restrictions on YR

II.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 (2009) pointed out the example of *množestvo*, when meaning 'many' the word

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conditions YR, but when meaning 'mathematical set' it does not. Nearly all of the examples of *v množestve* in the Russian National Corpus (RNC) refer to the mathematical concept.

In some cases, the lexical split is not as clear. One example is the behavior of *vvod*, which can mean 'bringing in troops,' or 'enter(ing)' in the computer context. The following table shows the highly significant difference in YR in *v(o) vvode voisk* 'in bringing in troops,' where it is relatively more likely, compared to *v(o) vvode parolʲa* 'in entering the password,' where it is less likely.

(15) Google data

	voisk	parolʲa
v vvode	3580	2470
vo vvode	8910	1280

$c^2 = 1706.15$; $p < 0.0001$

In both 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.

Sometimes the forms with YR are parts of fixed idioms, like earlier mentioned *sojtisʲ vo mnenii* 'agree,' which skewed the statistics in (13). The idiomatic nature of this expression can be seen in the following data from the RNC, which shows that YR in that phrase is nearly obligatory, while it is far from being so in the general case.

(16) RNC data

	YR	no YR
v(o) mnenii	390	141
soitisʲ v(o) mnenii	43	1

In other words, these examples can be thought of as (partial) idioms. The phrase with YR is restricted to a special meaning. For a more detailed discussion of lexical aspects of YR in prepositions, see Eskova (2000).

II.3.2. Non-complements

YR does not apply indiscriminately any time a potential trigger follows a potential target but is favored in a narrow set of syntactic environments. Most basically, YR is more likely to occur when the triggering noun is the complement of the target preposition. For example, the forms of the 1SG pronoun

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require YR on the preceding monoconsonantal preposition (17)a. However, when the same form of the pronoun is the complement of some other word, YR does not apply (17)b. The corpus example in (17)e illustrates the same effect.

(17) a. k*(o) mne 'to me'
v*(o) mne 'in me'
s*(o) mnoj 'with me'

b. k(*o) mne neizvestnomu čeloveku
to I.$_{DAT}$ unknown.$_{DAT}$ person.$_{DAT}$
'to a person unknown to me'

c. v(*o) mne neizvestnom gorode
in I.$_{DAT}$ unknown.$_{LOC}$ city.$_{LOC}$
'in a city unknown to me'

d. s(*o) mnoj interesujuščimsja čelovekom
with me.$_{INST}$ taking.interest.$_{INST}$ person.$_{INST}$
'with a person who takes interest in me'

e. posle "Emblematiki", nesoveršennogo skolka k mne jasnoj teorii
after *Emblematics* imperfect replica to I.$_{DAT}$ clear.$_{DAT}$
theory.$_{DAT}$
'after *Emblematics*, an imperfect replica of a theory that was clear to me'
(A. Bely, "Why I Became a Symbolist")

This constraint is nearly obligatory for lexical YR. In phonotactic YR the effect is weaker, as in the word *vsʲo* 'all,' which is eligible for phonotactic YR with all three monoconsonantal prepositions. The Google corpus contains examples with and without YR, two of which are shown below. In these cases, *vsʲo* is not the complement of the preposition, but of the following participle.

(18) a. prosʲba k vsʲo znajuščim i vsʲo umejuščim
request to all.$_{ACC}$ knowing.$_{DAT}$ and all.$_{ACC}$ capable.$_{DAT}$
'a request to those who know everything and are capable of doing everything'

b. obraščajusʲ ko vsʲo znajuščim
address.I$_{SG}$ to all.$_{ACC}$ knowing.$_{DAT}$
'I address those who know everything'

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A special case of this effect is that lexical YR fails to apply in front of quoted material, while phonotactic YR variably applies in such circumstances.

(19) a. videla ego v "vdove blanko"
see.$_{PST.FEM}$ him in *La viuda de Blanco*
'I saw him in *La viuda de Blanco*'

b. v(o) "Sne Nikanora Ivanoviča"
'in "Nikanor Ivanovič's dream"'

In (19)a, YR fails to apply before a quotation despite the phonotactic conditions that favor it. The example (19)b. refers to a well-known and often mentioned chapter in Bulgakov's novel *The Master and Margarita*. The title of this chapter begins with the word 'dream' and thus the preposition before it is eligible for YR. The following statistics from Google compare the frequency of YR before *sne* 'dream.$_{LOC}$' in general with that before *sne Nikanora* and show that YR is much less frequent when the preposition precedes quoted material.

(20) Google data

	sne	*sne nikanora*
v	41000	72 (0.18%)
vo	3060000	2370 (0.08%)

$c^2 = 48.18$; $p < 0.0001$

The RNC is too small to carry out the same comparison, but the same effect can be seen by comparing YR frequency in the general case with that the context where *sne* precedes any personal name.

(21) RNC data

	sne	*sne*+name
v	42	15
vo	6076	210

Fisher's exact, $p < 0.0001$

The upshot of this section is that the best circumstances for YR are those where the structure is the most basic: a P followed by its complement N.

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II.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.

(22) a. videtʲ v*(o) sne 'see in a dream'
videtʲ v*(o) tʲme 'see in the darkness'

b. delatʲ čto-l. v*(o) sne 'do something in a dream'
delatʲ čto-l. v*(o) tʲme 'do something in darkness'

c. nuždatʲsʲa v(ʔo) sne 'need sleep/dream'
nuždatʲsʲa v(*o) tʲme 'need darkness'
razuveritʲsʲa v(ʔo) sne 'lose faith in the dream'
preuspvatʲ v(ʔo) sne 'excel at sleeping'
zaklʲučatʲsʲa v(ʔo) 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 percent of the time. But when it is the object of the verb *need*, that figure rises to 35 percent, a highly significant difference.

(23) Google data

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

Non-transparent ("quirky") prepositions favor *yer*-less forms

II.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

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as possessed by the syntactic binder of the noun, in these cases the subject of the sentence.

(24) 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'

RNC examples of *v sne* are rare, but support this claim.

(25) a. dit^{j}o plačet **v sne** Dmitrija
child cries in dream Dmitry.$_{GEN}$
'a child is crying in Dmitry's dream'
(Bakhtin, *Problems of Dostoevsky's Poetics*)

b. V^{j}ačiku xotelos^{j} kak možno dol^{j}še ostavat^{j}s^{j}a **v sne** Gul^{j}nary
Vjačik wanted as-long-as-possible remain in dream Gulnara.$_{GEN}$
'Vjačik wanted to stay in Gulnara's dream as long as possible'

The effect is also found with the nouns *rot* 'mouth' and *lob* 'forehead.'

(26) a. Pet^{j}a vynul izo rta šarik.
P removed from mouth ball.$_{DIM}$
'Peter took out a ball from (his own) mouth'

b. Pet^{j}a vynul iz rta šarik.
'Peter took out a ball from (possibly someone else's) mouth'

(27) a. Pet^{j}a našel vo rtu šarik.
P found in mouth ball.$_{DIM}$
'Peter found a ball in (his own) mouth'

b. ?Pet^{j}a našel v rtu šarik.
P found in mouth ball.$_{DIM}$
'Peter found a ball in (possibly someone else's) mouth'

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,

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statues and more generally, individuals other than the subject of the phrase with the preposition. This effect is supported by corpus evidence. In the RNC the sequence *v rtu* refers mostly to dead bodies, as the following examples show.

(28) a. U mʲortvyx naxodili **v rtu** seno
'They found hay in dead people's mouths'

b. trup zaxripel, **iz rta** vypolzla černaja, kak smertʲ, slʲuna
'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'

d. vypuskanie ognʲa **iz rta** […] vovse ne est nečto, svojstvennoe tolko skazke
'letting out fire from the mouth […] is not something that occurs only in folk tales' (Propp, *Morphology of the Folk Tale*)

e. šnuroček tolʲko čudesnyj, kak makaronina, visit **iz rta** puški
'only a lovely string, like a strand of spaghetti, hangs from the cannon's mouth' (B. Žitkov)

The effect is found only for inalienably possessed Ns ('mouth,' 'dream,' 'forehead') but not alienably possessed ('ditch,' 'day,' 'ice,' 'moss,' 'tree stump'). The syntactic analysis of this effect need not concern us here. What is crucial is that the phrases with YR are restricted in their meaning in a way that phrases without YR are not. Once again, both structurally and semantically, the application of YR is the special case.

II.3.5. Analysis

The significance 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.[4]

4 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.

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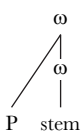
Before proceeding with the analysis, there should be a comment on the variable nature of the data. As table (13) and other corpus data presented above show, none of the effects are absolute. However, the statistical tendencies displayed by the data are clearly grammatical in nature and can be explained by many standard approaches to variability (e.g., Hayes 2000; Boersma and Hayes 2001; Anttila 2006) which analyze the data using the same mechanisms as categorical 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.

Assuming that YR is a rule of the phonology, the distinction between the cases where YR applies and those where it does not can be explained by differences in prosodic structures. As shown in the introductory section, there is ample evidence to prove that the prepositions and prefixes (P) are prosodified together with their host. Assuming that YR, just like the processes discussed in Section 1, also 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 pretonic reduction of the realized *yer* [izartá]. On the other hand, there are cases like *iz rta* where YR fails, but there is no other indication that this sequences does not form a single prosodic word. Final devoicing fails to apply in *i*[z]*rta* just as in the examples from (2). In the cases where a prepositional *yer* fails to be realized 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 common 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., Itô and Mester [1992] 2003, 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 not to be 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 too – one that treats as a prosodic word both the host of P as well as the entire P-host complex. This is shown in (29). The preposition is not just prosodified with the following phonological word, but adjoined to it.

(29)



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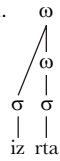
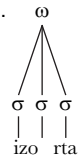
For the analysis in (29), it is necessary to define two types of each prosodic category: a maximal one which is dominated by no other category of the same type and the minimal one which does not dominate any category of the same type (30) (cf. Ito and Mester 2006). In case there is no adjunction, CAT_{max} and CAT_{min} coincide.

(30) a. CAT_{max}: not dominated by any other CAT of the same type
b. CAT_{min}: not dominating any other CAT of the same type

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

The difference between phrases where YR applies and those where it does not are represented in (31). In the general case, the preposition adjoins to a prosodic word as in (29). In a lexically restricted set of cases, the preposition does not adjoin but forms a prosodic word together with its host (31)b. The phonological processes mentioned in Section 1 (devoicing, reduction, etc.) take ω_{max} as their domain and hence apply to both structures. But because lexical YR takes ω_{min} as its domain, it applies only to the inner word in (31)a, as well as to the entire structure of (31)b. It does not apply to the maximal word in (31)a This expresses the fact that in the default case, a sequence of a preposition with the following word does not undergo YR.

(31) a. 

b. 

Phonotactic YR is different from lexical YR in that it also applies (optionally) within ω_{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 (31)a to (31)b.

Before taking up Gribanova's (2009) 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.

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III. 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.

III.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 (in the so-called "mobile accentual paradigm") 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 twelfth to sixteenth centuries as documented by Zalizniak (1989). The synchronic situation, investigated by Ukiah (1998) is the result of that loss of regularity.

SR has a status in the phonology of Russian similar to that of YR, but in a sense the situation with SR is simpler than with YR. There is no complicating factor of phonotactics and the lexical effects similar to those observed in the preceding section are more apparent. In the following sections, I briefly describe those lexical effects and show the formal connection between SR and YR.

III.2. Conditions under which lexical SR does not apply

III.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.

(32)

WITHOUT SR		WITH SR	
za górod	'for a city'	zá gorod	'to the countryside'
za górodom	'behind the city'	zá gorodom	'in the countryside'
pod góru	'under the hill'	pód goru	'downhill'
do smérti	'until death'	dó smerti	'extremely'

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In some cases, the forms with SR only occur as part of larger idioms, e.g., *podnʲatʲ* *<u>ná smex</u>* 'make fun of' (lit. 'lift on laughter'); *vzʲatʲ grex* *<u>ná dušu</u>* 'take responsibility for' (lit. 'take the sin on one's soul'); *zub* *<u>ná zub</u>* *ne popadaet* 'extremely cold' (lit. 'one tooth doesn't hit the other'). Just as with YR, the failure of the application of the rule is the general case, while forms with SR are restricted to a few special cases.

III.2.2. Non-complements

Syntactic restrictions parallel to those seen in YR are found with SR as well. Most basically, the noun must be the object of the preposition in order to be eligible for retraction. The relevant examples are difficult to construct due to awkward word order, but there is a clear contrast between the sentences with SR (33)a and those without (33)b. The example (33)a is ungrammatical. Lack of SR greatly improves the phrase (33)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).

(33) a. *ná golovu mojuščix lʲudej
on head washing people
'on people washing the head'

b. ?na gólovu mojuščih lʲudej

c. *ná zimu žduščix kanadcev
on winter waiting Canadians
'on Canadians waiting for winter'

d. na zímu žduščix kanadcev

III.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.

(34) a.	nadejatʲsʲa	'have one's hope set in'	*ná spinu 'back',	*ná golovu 'head'
b.	vystupatʲ	'voice support of'	*zá gorod	'city'
c.	zastupitʲsʲa	'defend'	*zá gorod	'city'
d.	borotʲsʲa	'fight for'	*zá golovu	'head'
e.	serditʲsʲa	'be angry at'	*ná zimu	'winter'

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III.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.

(35) 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'
c. dó smerti 'until (resulting in one's own) death'
do smérti 'until (possibly someone else's) death'
d. ná bok 'onto (its own) side'
na bók 'onto the side (of possibly something else)'

A consequence, also observed by Ukiah (1998), is that SR is disfavored when the possessor of the complement of the preposition is overtly expressed.

(36) a. ná golovu 'on the head'
ná spinu 'on the back'
ná nogu 'on the leg'

b. na gólovu Petra Ivanoviča 'on the head of Petr Ivanovič'
na spínu Petra Ivanoviča 'on the back of Petr Ivanovič'
na nógu Petra Ivanoviča 'on the leg of Petr Ivanovič'

The accentual subcorpus of the RNC supports this proposition with examples like the following.

(37) i vot narvalsja **<u>na nógu</u>** Krisa […] Keržakov
and there struck on leg Kris.$_{GEN}$ Keržakov
'and Keržakov […] stuck Kris's leg'

III.2.5. Conclusion

The pattern of SR further supports the picture in (31). If the stress rule (the BAP) takes ω_{min} as its domain, then retracting sequences can be represented as having a preposition univerbated with its host as in (31)b, while non-retracting ones have an adjoined preposition as in (31)a. Once again, the lexically restricted and idiosyncratic uses involve a structure that is phonologically more reduced.

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The consequence of the preceding two sections is that there are two types of prepositions, prosodically speaking. In the general case, prepositions attach as in (31)a. In a few lexically restricted cases, they form the structure as in (31) 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 warrants emphasizing that the distinction is made here only on prosodic grounds; I make no commitments 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.

IV. 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. For a formal implementation of what this closeness means, see Svenonius (2004) and Gribanova (2010).

The distinction between the two types of prefixes has not been previously claimed to have direct phonological consequences. As I show here, it does.

First, consider SR. It applies in verbs as well as nouns where it leads to stressing the initial syllable, potentially including the prefix, if all morphemes are lexically unaccented. Whether the prefix counts as 'initial' for the purposes of the stress rule is just as idiosyncratic as whether the preposition counts as initial for SR in the nominal context. The pattern of lexicalization of verbal SR was investigated by Ostrogorskaia-Jakšič (1987).

Based on her data, it appears that there is a previously unnoticed generalization: only lexical prefixes may receive stress according to SR. Examples of typical prefixes undergoing SR are in (38)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. Another example that supports the argument that the prefixes in (38)a are lexical is that they attach to perfective stems (see Svenonius 2004 and Gribanova 2010 for discussion of this criterion). As the data show, SR treats the lexical prefix as part of the stress domain.

If a verb has both a superlexical and a lexical prefix, the superlexical one will appear outside of the lexical one. Further, because lexical prefixes cannot stack, in any verb with two or more prefixes all but the innermost one must be

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superlexical. In (38)b, the same items are shown with second prefixes which must be superlexical. Here, SR never treats the outer prefix as part of the stress domain.

(38) a.	pó-zvannyj	'called'	(past passive participles)
	íz-brannyj	'chosen'	
	ná-nʲatyj	'hired'	
	pró-dannyj	'sold'	
	pére-dannyj	'transferred'	
	dó-pityj	'drunk up'	
b.	pod-ná-nʲatyj	'hired in addition to'	
	ras-pró-dannyj	'sold out'	
	za-pró-dannyj	'sold in advance'	
	ne-dó-pityj	'not drunk up'	
	pere-pró-dannyj	'sold a second time'	

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 patterns differently in lexical and superlexical prefixes. Unfortunately, here the facts are somewhat murky but suggestive in the same direction: YR appears 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.

(39) a. ja svoi tri s polovinoj žizni uže **ot-spal**
'I have already slept my three and a half lives'

deti uže pol dnevnogo sna **ot-spali**
'the children slept half of their daily measure of sleep'

ja uže vesʲ **iz-ždalsʲa**
'I am sick and tired of waiting'

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b. na prirode v palatke uže svoe **oto-spal**
'I've slept my share in the tent out in nature'

ja v armii uže svoe **oto-spal**
'I've already slept my share in the army'

teb^{j}a ja **izo-ždals^{j}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 (31).

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 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 – in fact, the prepositions are fully productive. For these reasons, the lexically restricted type that results in (31)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.

The findings of the paper can be summarized in the following table, which shows the phonological domains which the various processes take.

(40)

ω_{min}	ω_{max}
lexical YR SR	phonotactic YR vowel reduction devoicing

Let me now highlight the conclusions of this study. The distribution of the prepositional variants with and without the final vowel was found to depend on a large number of factors: lexical, syntactic, semantic and phonological. In a nutshell, the variants with the vowel (where YR applies) occur in a narrower set of contexts than the general variants without YR, even if in particular circumstances the YR cases might be more frequent. Those narrower contexts are limited to particular idioms, to narrow syntactic contexts where the noun that follows the preposition is its syntactic object, and to contexts where the object is possessed by the referent of the higher syntactic constituent, typically the subject of the phrase. The key finding is that these restrictions are not unique to YR, but they also determine whether an unrelated rule of stress

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retraction applies to the preposition-noun sequence. The upshot is that there must be some representational difference between sequences that undergo YR and SR, and the ones that do not. In the theoretical context of this chapter, the representational difference is expressed in terms of the structures in (1) and (31): the processes apply whenever the preposition forms a single prosodic word with the following item.

Appendix. Words used in the Google searches in (13)

	Stop	Coronal fricative	Velar fricative	Labial fricative	Nasal	Liquid
Stop	ptitsa ptenec tkač	psarʲ psix kseroks		gvozdʲ kvas dverʲ	kniga knopka tmin	trʲapka plač kren
Cor.fr.	stul spor skorostʲ	ssora ssuda ssadina	sxema sxodka	svet svʲazʲ svinʲja	sneg smena smex	srub sryv sladkoe
Vel.fr.				xvat xvost	xmyrʲ xna	xrap xlopok xram
Lab.fr	vdova vpadina vdox	vzʲatka vzor vzdox		vvod vvedenie vvoz	vnušenie vmestilišče vnimanie	vlastʲ vranʲjo vlaga
Nasal					mnenie mnitelʲnostʲ	nrav mrazʲ
Liquid	rtutʲ; rvotnoe; lʲdina; lʲvica; lʲvenok					

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