

Phonological Words in the Syntax and in the Lexicon^{*}

Maria Gouskova

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Abstract

Phonological words play a crucial role in phonology, but where exactly they are produced in syntax is not clear. I propose a theory whereby phonological words are created by movement, by issuing a diacritic to the resulting complex constituents. Moreover, certain morphemes can be specified in the lexicon as possessing these diacritics. The phonology then interprets these diacritics, mapping the constituents to words while respecting various language-specific prosodic requirements. The resulting theory is demonstrated on the complex patterning of prepositions in Russian. The class of prepositions in Russian has certain syntactic traits in common, but there are many patterns where prepositions diverge according to their phonological word status. There are correlations between morphological structure and phonological word status: morphologically complex prepositions are always words. On the other hand, the presence of a morphological root, phonological size, and stress do not align with word status. The large range of phonological and morphosyntactic patterns involving prepositions in Russian demonstrates the need for an explicit and rich theory of word formation at the phonology-syntax interface.

1 Introduction

The notion of the word has an odd status in modern linguistic theory. On the one hand, it is probably the least controversial representational level in phonology. Most phonologists would agree that the phonological word is needed to define the smallest string pronounceable in isolation, and to delimit the domain for stress assignment, minimal word constraints, and various demarcative rules. By comparison, the syllable, the foot, and the autosegmental tier have all been questioned; the generalizations they capture could be addressed in other ways (Steriade 1999, Gordon 2002, Downing 2006, Rose and Walker 2004, *inter alia*). On the other hand, the importance of the grammatical, or lexical word has declined in recent theories of syntax: morphemes/morphosyntactic features interact within domains that are not coextensive with the phonological word (Marantz 1997 *et seq.*). The result, as Svenonius (2016) points out, is that phonologists (e.g., Selkirk 1995) rely on the notion of a word to be defined extraphonologically—presumably in the morphosyntax—but it is not clear how such units are generated in the theory of syntax.

The goal of this paper is to present a case that clarifies some of the empirical challenges for a complete theory of phonological word formation: prepositions in Russian. Russian has a number of word-domain phonological rules, which make it possible to diagnose whether the units in question form words. There are also several morphosyntactic patterns that distinguish between strings that form phonological words as opposed to strings that are phonological clitics. Moreover, Russian morphology is sufficiently rich that

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it is possible to demonstrate that common intuitions about lexical vs. functional word status cannot be formalized in terms of lexical words having a root and function ones not having one (contra, e.g., McCarthy and Prince 1994, Urbanczyk 2006, Myler to appear). It is also not possible to simply point to certain projections as the site of phonological word formation (as in Svenonius 2016), because morphosyntactically identical prepositions can differ in word status.

All of this empirical complexity justifies a theory whereby words are formed in multiple places in the grammar: the morphosyntax, the lexicon, and the phonological component. First, morphosyntactic head movement systematically creates complex constituents that map to phonological words. Second, certain morphemes are stored in the lexicon with diacritics for PWD status, ω . Morphosyntactically identical morphemes can either map to words or not. Compare the examples in (1) and (2): the first two prepositions have the phonological characteristics of words, whereas the next two are proclitics. This is despite these prepositions being polysyllabic and containing roots. Third, and finally, phonology can disobey the instructions about phonological word formation that it gets from the syntax and the lexicon. Even prepositions such as $\sqrt{\text{pered}}$ ‘before’ become words when focused or pronounced in isolation. This is consistent with the proposal by Selkirk (1995), in which the phonological component receives instructions from the morphosyntax as part of the input to the derivation, but syntax-phonology mappings are mediated by violable constraints. Phonology can demote words to clitic status, and promote non-words to word status.

(1) Russian root prepositions that systematically get PWD status

- a. $\sqrt{\text{skvóz}^j_\omega}$ [skvós^j níx] ‘through them.GEN’ cf. skvaz-nⁱ-ak ‘draught’
- b. $\sqrt{\text{mimo}_\omega}$ [mímə níx] ‘past them.GEN’

(2) Russian root prepositions that do not normally get PWD status

- a. $\sqrt{\text{pered}}$ [piridnámi] ‘before us.INST.PL’ cf. [piréd-ník] ‘apron’
- b. $\sqrt{\text{tjerez}}$ [tjirizníx] ‘through them.ACC.PL’

I discuss several morphotactic phenomena that treat prepositions differentially in Russian, depending on phonological word status. First, Russian prepositions differ in their ability to host second position clitics—the ones that have phonological word status do so, and the phonological clitics do not (this has already been shown for Serbian by Zec 2005, Diesing and Zec 2017). Second, Russian has a rule called *approximative inversion*, where the order of the noun N with respect to the cardinal numeral in the noun phrase is flipped to mean “approximately so-many Nouns” (see (3a) vs. (b)). When this cardinal-noun phrase is embedded inside a prepositional phrase, the preposition optionally appears inside the inverted structure, as shown in (3c)—let us call this *P-flop*. But P-flop is not available if the preposition in question is usually a phonological word (see (3d)). Both second position clitics and approximative inversion P-flop can be analyzed in my proposal without confronting interface dilemmas about whether phonological derivations are interspersed with morphosyntactic reordering (cf. Embick and Noyer 2001, Halpern 1992).

(3) Approximative inversion: differences between prepositions in P-flop

- | | | | |
|---|---|--|--|
| a. default: <i>Card N</i> | b. appx: <i>N Card</i> | c. appx: <i>NP Card</i> | d. * <i>N P_{Pwd} Card</i> |
| p ^j át ^j tunnéléj | tunnéléj p ^j át ^j | tunnéléj tjeres p ^j át ^j | *tunnéléj skvós ^j p ^j át ^j |
| five tunnels | tunnels five | tunnels through five | tunnels through five |
| ‘five tunnels’ | ‘about five tunnels’ | ‘through abt. five tunnels’ | ‘through abt. five tunnels’ |
| | | | ✓ skvós ^j tunnéléj p ^j át ^j |

The rest of the paper is organized as follows. The proposal is laid out in more detail in section 2. Section 3 follows with a discussion of phonological word diagnostics in Russian, with a special attention to

prepositions. The internal morphosyntax of prepositions is described in section 4, while section 5 contains an analysis of phonological word formation. I then show how the theory handles morphosyntactic patterns where prepositions pattern as a substitution class (section 6) but pattern apart in others (section 7). Section 8 addresses some alternative theories, and section 9 concludes.

2 The proposal and background assumptions

The claim is that phonological words are not formed in just one place in the grammar—instead, there are two stages of word formation, and three separate places in the grammar where it is decided. First, complex morphosyntactic constituents derived by movement receive provisional PwD status. Second, some morphemes already have this status, diacritically, in the lexicon. Third, and finally, the phonology decides how to interpret the word formation instructions from the syntax and the lexicon, and adds its own prosodic conditions.

2.1 PwD diacritics generated by morphosyntactic word formation

I assume with many that words are systematically built by head movement in the morphosyntax (Halle and Marantz 1993, Oltra-Massuet and Arregi 2005, Matushansky 2006, Myler to appear, Kastner 2019). This movement is triggered by morphosyntactic features such as tense and number, which have language-specific settings. Further, I assume is that the end of head movement generates a PwD diacritic. This is similar in spirit to Svenonius (2016), who argues that certain syntactic nodes in any given language are marked with a ω feature that delimits PwD formation.¹

One consequence of this assumption is that morphological complexity should as a rule correlate with PwD status when this complexity is the result of movement, although obviously monomorphemic strings can be words, too. In modern morphosyntax, it is commonplace for an apparently monomorphemic item to be analyzed with extensive functional structure, a lot of which is phonologically null. For example, in Russian, pronouns bear gender, case, and number morphology, which is not always overt (e.g., [ón] ‘he NOM.’ vs. [on-á] ‘she NOM’). If we assume that at least some of this structure is put together through movement, it follows that Russian pronouns should be phonological words, despite lacking contentful, lexical roots. Indeed, Russian pronouns are systematically stressed, and they can host 2nd position enclitics (see §7.3), as well as prepositional proclitics, as we saw in the previous section. Testelefs (2003) argues that Russian lacks “weak” pronouns (in Cardinaletti and Starke’s 1999 sense), and phonologically, Russian pronouns are quite different from their South Slavic counterparts (see Franks and King 2000 for review).

2.2 PwD diacritics marked on individual morphemes in the lexicon

Second, I propose that individual morphemes can be specified with their own PwD lexical diacritics. This will allow a single morphosyntactic class to be phonologically heterogeneous. Examples of idiosyncratic differences between morphemes of the same class have been documented before—see, e.g., Zec (2005), Kaisse (2017), Bennett et al. (2018). In English, the prepositions *of* and *up* differ in PwD status: *up* does not reduce, whereas *of* has reduced or stressed pronunciations depending on context (Selkirk 1995). The present work contributes a detailed case study of such differences from Russian, along with some mor-

¹Unlike Svenonius, I do not assume Mirror Theory (Brody 2000), but rather something along the lines of Distributed Morphology assumptions about how movement works (see, e.g., Myler to appear or Kastner 2019 for recent explicit proposals). Note that some recent morphosyntactic work has distinguished between true head movement and the kind of movement that results in morphosyntactic word formation—Harizanov and Gribanova (to appear) term this latter type of repositioning *amalgamation*. Adopting their term, it is amalgamation that generates PwD diacritics.

phosyntactic causes and consequences; I will devote major effort to the claim that Russian monomorphemic prepositions can differ arbitrarily in PwD status (see §3 and § 7).

2.3 Words created by the phonological grammar

Phonology has the last word on phonological word boundaries. This is a consequence of an important feature of PwD diacritics: whether they come from head movement or the lexicon, they are only suggestions to the phonological grammar. The phonology can interpret them faithfully, add phonological words where no diacritics were given, or ignore PwD diacritics altogether and make bigger words than the morphosyntax suggested. The assumption that phonology translates PwD diacritics into PwD structure imperfectly is familiar from the influential work of Selkirk (1995), who identifies several conditions where English systematically promotes function words to PwD status (focus, utterance-final position, etc.). Translating diacritics into PwD structure is also not altogether novel; compare some recent proposals about other prosodic information in the lexicon—for example, McCarthy and Pruitt (2013) suggest that lexical stress is marked diacritically in an abstract way (rather than as stored structures—see, for example, Inkelas 1989 or Revithiadou 1999 vs. Alderete 2001). The phonology then interprets lexical stress diacritics by mapping them to foot structure.

2.4 What will not be a PwD?

Given these three sources of PwD status, there are certain contexts where we would expect PwD boundaries to be systematically absent. Thus, items that stay in situ will not get PwD diacritics. Neither will items that are repositioned by post-syntactic operations such as *lowering* or *local dislocation* (Embick and Noyer 2001). Indeed, local dislocation depends in some cases on wordhood status, so it will have to happen after PwD diacritics are assigned. We will see examples of both types of cases in Russian: simple prepositions that stay in situ (*po* ‘on’, *za* ‘behind’, *ot* ‘from’),² and second position clitics: *-lʹ(i)*, *-b(i)*, *-z(e)*, *-to*, *-de*, and verbal clitics such as *-sʹ(a)*, *-ka* (see §5.2).

When items are not labeled as PwDs, their affiliation in the prosodic structure of an utterance is determined in language- and structure-specific ways (Selkirk 1995). I will use Alignment constraints (McCarthy and Prince 1993) to account both for the direction of leaning and the type of constituent that the item leans on (Lieber 1980, Klavans 1985, Marantz 1988; see Bennett et al. 2018 and Tyler 2018 for some recent alternatives to alignment).

In any given language, certain morphemes can systematically fail to project PwDs because they are subminimal. In Russian, the vowelless prepositions *k* ‘towards’, *v* ‘into’, *s* ‘with’ (see §7.2) cannot form phonological words and therefore cannot occur in positions where PwDs are required.

Bennett et al. (2018)’s prosodic smothering is the logical opposite of lexically idiosyncratic ω -diacritic-bearing morphemes: some items can rob their sisters of PwD status. They analyze these cases as prosodic subcategorization. As we see, then, the empirical picture of PwD formation is quite complex. There are complex constituents that form words (derived by movement), complex constituents that fail to form words in the presence of certain morphemes (prosodic smothering), morphemes that systematically project PwDs (via lexical ω diacritics), morphemes that fail to project PwDs at all times (because they are subminimal), and morphemes that alternate in PwD status depending on context.

²I assume that stacked/serial prepositions such as *iz-za* ‘from behind’ and *iz-pod* ‘from under’ are pronounced in situ, too (see Roy and Svenonius 2009 for some discussion). I do not discuss these in detail, but impressionistically, they seem to pattern with simplex prepositions morphosyntactically and morphophonologically, as expected.

2.5 Morphotactics and modularity of grammar

A major issue for any theory of the phonology-syntax interface is whether certain phonological factors can affect the positioning of morphemes such as clitics (see, e.g., Shih and Zuraw 2017 for a recent discussion). We will see that in several cases in Russian, several morphotactic patterns depend on phonological word status. This characterization of the phenomena is controversial (compare Franks and King 2000 and Željko Bošković 2001, as well as many others). I am taking the view that phonology can indeed matter, but in a limited way. At some point in the derivation, the pronunciations of morphemes have been decided on, and ω diacritics are available for the phonology's use, but no phonological operations have happened—no predictable stress rules or segmental rules have applied. It is at this point that certain reordering can occur, and it can refer to the diacritic information or morpheme identity. I am not assuming that phonology generates actual PWd structures before this kind of reordering takes place; phonological evaluation may well be serial/cyclic, but this cyclicity is not a necessary corollary of the claim that PWds are the phonology's interpretation of diacritics.³

Another interface question is whether syntactic derivations can fail for phonological reasons, and if so, how. I assume that well-formed syntactic outputs can fail to map to a pronounceable output in the phonological component (Orgun and Sprouse 1999, McCarthy and Wolf 2005, Bye 2007, among others). Some specific examples of this are in §7.2 and §7.4.

2.6 Brief example: PWd diacritic generation in word formation in two languages

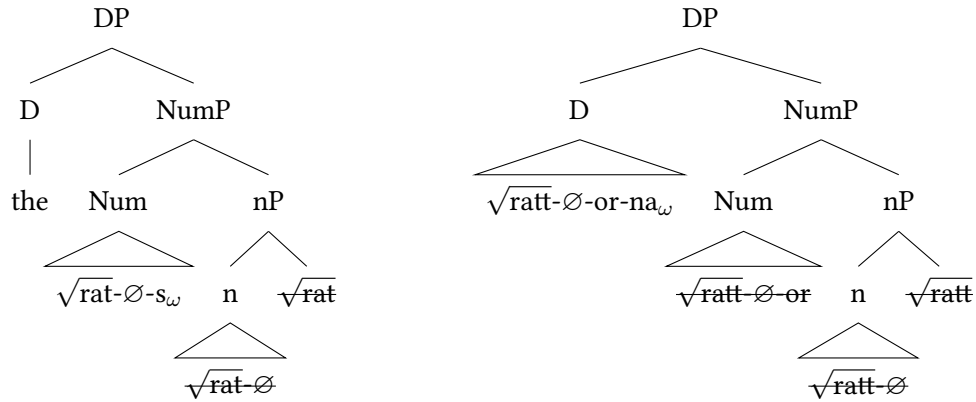
Let's compare two languages that differ in their morphosyntax in a way that has consequences for PWd formation. I assume that in English, even apparently monomorphemic nouns, verbs, and adjectives such as *rat*, *run*, *red* get PWd status by virtue of merging with *n*, *v*, *a* and then undergoing head movement to aspect, number, and so on. The morphosyntactic features require movement even when this movement does not result in overt morphological complexity. The features of the English D head do not compel movement, whereas in languages such as Swedish, they do. In English, the root merges with *n* and raises to number but not D; in Swedish, it raises all the way to D. Once movement stops, PWd diacritics are generated at the relevant node: NumP in English, and DP in Swedish. In English, the morpheme occupying D is outside PWd, and its ultimate prosodification is determined by the phonology, which in English favors procliticization. In another language, the morpheme in that position could “lean” onto the preceding word; see Klavans (1985) or Marantz (1988) for some cases.

(4) English vs. Swedish, after morph insertion

³Some morphotactic positioning must take place in the actual phonology, however—we know that infix positioning can be sensitive to environments like “first non-labial consonant” or “before the stressed syllable”. Whether such infixes differ in meaningful ways from clitics that are sensitive only to PWd status is an open question.

English: *the rat-s* movement stops at Number

Swedish: *rätt-or-na* movement stops in D



3 Russian phonological word diagnostics applied to function words

I next turn to the specifics of the Russian case study. First, I review the diagnostics for phonological words in Russian, paying special attention to prepositions. As has been known since Trubetzkoy (1939), it is not always possible to isolate morphological boundaries definitively by using phonological diagnostics alone, but Russian has enough of these rules to diagnose PWD boundaries in most cases.

3.1 Voicing neutralization patterns

Russian has two rules for obstruent voicing: word-final devoicing, and word-internal voicing assimilation.⁴ The constraint against voiced obstruents is enforced by alternations: inside a word, pre-sonorant obstruents retain their voicing, but at the end of a word, they devoice, even if followed by a sonorant in the next word (shown in (5)). While these alternations may be phonetically incomplete in the lab, they are neutralizing in normal speech (Dmitrieva et al. 2010).

(5) Word-final devoicing (Padgett 2002 and many others):

UR	With [+son]	Gloss	Pre-pausal	Before [_ω +son with 'her']
a. /rod-/	ród-a	'kin, type (GEN.SG)'	rót̚ (NOM.SG)	rót̚_jejó
b. /rod-/	rod-n-á	'related-ADJ-FEM.SG'		(not *ród̚_jejó)
c. /rot-/	rót-a	'company-NOM.SG'	rót̚ (GEN.PL)	rot̚_jejó

Unlike nouns, verbs, and adjectives, prepositions vary in whether their final obstruents devoice before sonorant-initial morphemes. Some, like /skvoz̚_ω/ and /protiv̚_ω/, devoice obligatorily (see (6a–b')). Others, like /pered/, however, remain voiced before a sonorant-initial morpheme but devoice when they occur in utterance-final or prepausal position. By this diagnostic, then, /skvoz̚_ω/ is a separate phonological word in (6a), whereas /pered/ varies: it is grouped with the following pronoun or noun in (6c), but stands alone as a PWD in (6c').

(6) Prepositions vary in pre-sonorant position

⁴A quick note on transcription: I use the IPA throughout, and transcribe stress using acute accents on the vowels. Other details of transcription, such as devoicing, vowel reduction, and palatalization, are given where the relevant phenomena are discussed but abstracted away otherwise, to make the morphemes easier to identify for non-Russian readers.

a.	/skvoz _ω ^j /	skvós ^j nejó	‘through her.GEN’	cf.	a’.	skvoz ^j -n ^j -ák	‘draft’
b.	/protiv _ω /	prótif nejó	‘against her.GEN’		b’.	protív-nik	‘adversary’
c.	/pered/	pered néj	‘before her.INST’		c’.	péret	‘before’
d.	/tʃerez/	tʃerez nejó	‘through her.ACC’		d’.	tʃéres	‘through’

Russian also has regressive voicing assimilation in obstruent clusters. This rule is variable and gradient, which has led to some disagreement about the facts (Hayes 1984, Kiparsky 1985, Burton and Robblee 1997, Padgett 2002, Gouskova 2010, Padgett 2012). It is not controversial that voicing assimilation is obligatory inside phonological words, as in (7a). Sequences with disagreeing voicing can occur across word boundaries—for example, when a devoiced word-final obstruent abuts a word-initial voiced obstruent (as in /god delal/ → [gót délal] in (7b)). Similarly, underlyingly voiceless stops (as in /kot/) do not have to undergo voicing assimilation to the following voiced obstruent when separated by a word boundary (certainly not in careful speech).

(7) Regressive voicing assimilation in obstruent clusters

a. obligatory inside words:

/pod-n ^j os/	pod <u>n</u> ^j ós	‘carried up’	/ot-n ^j ós/	ot <u>n</u> ^j ós	‘carried away’
/pod-sel/	pot <u>s</u> él	‘sat near’	/ot-sél/	ot <u>s</u> él	‘sat away from’
/pod-dal/	pod <u>d</u> ál	‘kicked’	/ot-dál/	ot <u>d</u> ál	‘gave away’

b. gradient/absent across words:

/god n ^j os/	gót <u>n</u> ^j ós	‘carried for a year’	/kot n ^j os/	kót <u>n</u> ^j ós	‘tomcat carried’
/god delal/	gót <u>d</u> élal	‘did for a year’	/kot delal/	kót <u>d</u> élal	‘tomcat did’

Prepositions such as /k, v, s/ pattern as if word-internal with respect to voicing assimilation; this is usually taken to be evidence of their PWd-internal parse. But longer prepositions are not uniform with respect to this diagnostic: /tʃerez/ assimilates to the following voiceless obstruents, but /skvoz_ω^j/ does not have to.

(8) Regressive assimilation in prepositions

	Before V (“Oksana”)	Before (opp. voice) stop	
a.	/k/	koksáne	g <u>b</u> orísu ‘to Boris’
b.	/v/	voksánu	f <u>t</u> eb ^j á ‘in you’
c.	/s/	soksánoj	z <u>b</u> orísom ‘with Boris’
d.	/tʃerez/	tʃerezoksánu	tʃer <u>e</u> steb ^j á ‘through you’
e.	/skvoz _ω ^j /	skvós <u>s</u> oksánu	skvós ^j u <u>b</u> orísa ‘through Boris’

When it comes to enclitics, the picture is more complex. The one sonorant-initial enclitic, [li] ‘question particle’, conditions devoicing (as in /mog=li/ → [mók=li] ‘he could Q’). But enclitics also undergo devoicing after apocope, as in /mog-l-a=bi/ ‘she could irr.’ → [mogla=p]—see §3.3). Further, enclitics condition voicing assimilation, which would only be possible if they were inside the words (e.g., /boris=zɛ/ → [boriz=zɛ] ‘Boris, however’, Halle 1959:22). I analyze apocope and devoicing of enclitics in §3.3 and §5; for solutions to the assimilation problem, see Gouskova (2010), Padgett (2012). On the interaction between enclitics and prepositions, see §7.3.

3.2 Presence of at least one stress

Another diagnostic of phonological wordhood in Russian is stress. Absence of a stress on a morpheme means it is not a word. Each word is required to have and at least one stress, but more than one stress is possible in a word. Stress in Russian is contrastive and lexical; its phonological analysis requires assuming that more than one morpheme is accented in the UR (Halle 1973, Zaliznjak 1985, Melvold 1989, Alderete

1999, Revithiadou 1999, and others)—even though normally, only one of those stresses makes it to the surface. In (9), the underlined vowels are stressed according to Zaliznjak (1985). For example, in /band-it-izm/ → [bandítizm], each morpheme can be shown to be independently accented, but the two suffixes are also dominant, so stress falls on the outermost dominant suffix. When no dominant suffixes are present, the leftmost stressed morpheme wins, as in /band-a/ → [bándə]. Crucially, though, there is no rhythmic secondary stress, nor a limit on the number of unstressed syllables in a row (cf. (9a), with six unstressed syllables following initial stress, and (9b), with four unstressed syllables preceding penultimate stress). Secondary stresses can surface in compounds when the left-hand stem is accented, but not otherwise; there are also some loan prefixes such as /super/ and /psevdo-/ that regularly have stress (Yoo 1992, Gouskova 2010, Gouskova and Roon 2013).

(9) PWds have at least one stress: Single-root words

- | | | | |
|----|---------------------------|--------------------|--------------------------|
| a. | /vi-kristal-iz-ova-tʲ-sa/ | vʲikristəlizəvətsə | ‘to crystallize (perf.)’ |
| b. | /kristal-iz-ova-tʲ-sa/ | kristəlizavətsə | ‘to crystallize (impf.)’ |
| c. | /band-it-izm/ | bəndítizm | ‘banditism’ |
| d. | /band-a/ | bándə | ‘gang’ |
| e. | /golov-a/ | gəlavá | ‘head’ |

Compounds can have more than one stress (but do not have to):

- | | | | |
|----|-------------------------|--------------------|---------------------------|
| f. | /oboron-o-sposob-nostʲ/ | abəronəspasóbənstʲ | ‘defense capability’ |
| g. | /golov-o-kruz-en-ij-e/ | gələvəkruzénijə | ‘vertigo (head-spinning)’ |
| h. | /s-verx-tfelovek/ | svèrxʲfilavék | ‘superman’ |

Consistent with the voicing diagnostic, prepositions vary in stress. Morphologically complex prepositions (discussed in more detail in §4.2) are always stressed in a consistent location, determined by the morphemes in the string: e.g., [v-pered-í] ‘in front of’. Some monomorphemic prepositions are also always stressed: /skvózʲʷ/ ‘through’, /ókolo/ ‘around’. (I will argue below that despite being stressed, *ókolo* is not a phonological word, based on its morphotactic behavior.) Other monomorphemic prepositions are usually unstressed except when stranded or focused (e.g., /tʲerez/ ‘through’, /pered/ ‘before’); others cannot even be stranded (e.g., /u/ ‘by, near’; see §7.2). Prepositions can also be stressed in fixed collocations such as /po neb-u/ [pó nib-u] ‘across the sky’ (Ukiah 1998), with the following noun unstressed.⁵ This ability to be stressed at the expense of the following noun is often taken to be evidence of prepositions being in the same phonological word as nouns, in accordance with other diagnostics.

3.3 Vowel reduction and deletion

Another diagnostic for word boundaries is **unstressed vowel reduction** (Bethin 1998, Crosswhite 1999, Barnes 2003, Padgett and Tabain 2005, Bethin 2006). In Moscow Russian, there is a five-way vowel contrast in stressed syllables: [i, u, e, o, a]. Unstressed syllables have a three-way contrast, [i, u, ə], but in the immediately pretonic position, it is [i, u, a]. Example (10a) shows vowel reduction in the root /golov/, in various word-internal positions. Under one analysis, reduction is conditioned by iambic footing, such that when the reducing vowel is in an unstressed syllable of an iambic foot, it is required to have a greater prominence than a vowel that is unfooted (as in [gə(la.v-á)] ‘head’; see Crosswhite 1999, Gouskova 2010, Bennett 2012 and references therein). This analysis correctly predicts that word-final syllables should reduce as if unfooted even if the following word-initial syllable is stressed, since footing across phonological

⁵This is a fossil of the historical pattern whereby stress defaulted to the first syllable of a phonological word (Halle’s 1973 Basic Accentuation Principle). This initial default for stress may be responsible for the location of stress in prepositions when they are stressed in isolation, (e.g., [péred] ‘in front of’).

words is impossible (see (10b)). The vowel reduction diagnostic is most helpful when applied to prepositions that end in the vowels /o, a/. In the few prepositions that end in those vowels, they reduce as if the prepositions are in the same phonological word as the stressed syllable that follows (see (10c)).

(10) Pretonic vowel reduction inside and across words

- a. Reduction patterns inside a phonological word: /golov-/ ‘head’
 gəlav-á ‘head-NOM.SG’ galóf ‘head.GEN.PL’
 gólav-i ‘head-NOM.PL’ gəláv-ə-kruzénijə ‘vertigo (compound)’
- b. Reduction patterns across phonological words: /zolot-o/ ‘gold’
 zólət-ə ínəkəf ‘Inca gold’ not *zólət-a ínəkəf
- c. Reduction in unstressed prepositions shows they are word-internal
- | | | | |
|-----------------|--------------|-------------------|---------|
| /ob vsex/ | əbá fséx | ‘about all’ | |
| /po gorod-u/ | pá górədu | ‘around the city’ | |
| /pered vseme-i/ | pirida fsémi | ‘about all’ | |
| /na nix/ | ná nix | ‘on them’ | *nə níx |

Some of the examples above show **vowel-zero alternations**—for example, /pered/ ‘before’: [pirida fsémi] vs. [pirid námi] ‘us’ (Pesetsky, 1979, Matushansky, 2002, Gribanova, 2009, 2010, Blumenfeld, 2011, Linzen et al., 2013, Gribanova and Blumenfeld, 2013). These alternations are not the best diagnostic for word boundaries, because they are phonologically variable and lexically specific. The single-consonant prepositions *s(ə)*, *v(ə)*, *k(ə)* are most prone to alternations but differ in details amongst themselves. Longer prepositions such as *iz(ə)*, *pod(ə)*, *ot(ə)*, *pered(ə)*, *tferez(ə)* show up with vowels only before a restricted set of items such as [vséx] (see 10c), and prepositions such as *vsléd*, *prótiv*, and *skvózʹ* never have a vowel-final variant. It seems reasonable to assume that when the vowel in the preposition is realized—as in [sá stén] ‘from walls’—it is because the preposition is in the same phonological word as the following noun. After all, the the vowel is more likely to show up depending on the location of stress in the following word, its initial consonant cluster, and so on (see Linzen et al. 2013). Other diagnostics, such as vowel reduction in the preposition, point to the same conclusion.

Another, unrelated vowel deletion rule applies in final position: **enclitic apocope**. This affects CV enclitics, whose vowelful (CV) variant shows up after a consonant, whereas the C variant shows up after a vowel (see (11)). The alternation is close to categorical in Modern Standard Russian for [sʲa] but more variable for the other three morphemes in (11).⁶ The simplest analysis is that enclitics are parsed as word-internal when the vowel apocopates. The remaining consonant can then be syllabified with the preceding vowel. The devoicing in (11b,c) is just word-final devoicing.

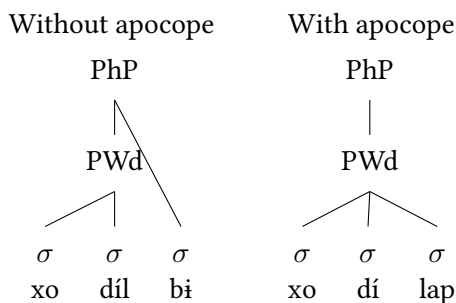
(11) Vowel deletion in C(V) enclitics

After C:		After V:		V retention OK?
a. bojál=sʲa	‘feared (masc.)’	bojál-a=sʲ	‘feared (fem)’	*bojál-a=sʲa
b. xodíl=bi	‘walked (masc.) IRR.’	xodíl-a=p	‘walked (fem.) IRR’	✓xodíl-a=bi
c. xodíl=zɛ	‘walked (masc), though’	xodíl-a=ɕ	‘walked (fem), though’	✓xodíl-a=zɛ
d. búd-eɕ=li	‘you will Q.’	búd-u=lʲ	‘I will Q.’	✓búd-u=li

Thus, enclitics are parsed into one of two structures, depending on whether the vowel has been deleted or kept. These structures are assigned in the phonology, where both devoicing and apocope depend on whether the enclitic has been incorporated into the phonological word or appended to the higher phrase.

⁶The rule could be lexically idiosyncratic—I do not think it is possible to delete the vowel in the clitics [de], [ka] and [to] in my variety of Russian.

(12) Prosodic structures for CV and C enclitics



3.4 Rules that do not diagnose PWd edges

Finally, I turn to some rules that I do not consider to be diagnostic of phonological word edges, even though are sometimes considered to be boundary-sensitive. First is **i-backing**. Russian vowels have backer or fronter allophones depending on whether the consonants preceding them are palatalized or velarized (Padgett 2003, Padgett 2010, and others). The direction of alternations is controversial, but I take it to be that consonant backness is fundamental and determines vowel pronunciation, but in some cases, affixes can effect a change on preceding consonants. It is sometimes claimed (e.g., Rubach 2000) that consonants palatalize before [i] at a suffix boundary (e.g., /rub-it^j/ → [rub^jit^j] ‘to chop’; cf. [ob-rúb-ok] ‘stump’). At prefix and preposition boundaries, the vowel [i] fails to induce palatalization on preceding consonants and maps to [ɨ] instead: /k ivan-u/ → [kivanu] ‘to Ivan’, not *[k^jivanu]. Prefixes likewise velarize following vowels instead of palatalizing themselves: e.g., [s-igr-an-n-ij] ‘played (partic.)’, [igr-at^j] ‘to play (impf)’. But while there is an asymmetry in how consonant-vowel interactions work at prefix and suffix boundaries, it is really not clear that this asymmetry is a diagnostic of a word boundary, since all the other diagnostics point to the opposite conclusion. Moreover, Padgett (2010) points out that palatalization does not apply consistently even at suffix boundaries: /gus^j-in^j-a/ [gus^jin^ja] ‘she-goose’, /blag-ost^j-in^j-a/ [blagost^jin^ja] ‘charity’.

Another rule that I do not consider to be a word boundary diagnostic is **hiatus**, even though it is sometimes claimed to be a boundary signal (Zubritskaya 1995, Halle and Matushansky 2006, Gribanova 2009, vs. Padgett 2008, Gouskova 2010). Hiatus deletion applies at suffix boundaries (under some analyses), but it fails to apply pretty much everywhere else, including root-internally ([á.ist] ‘stork’, [pa.úk] ‘spider’, etc.) at prefix boundaries ([pó-isk] ‘search’), and at compound boundaries [zver-o-obráz-nij] ‘beastlike’.

Finally, there is **no bimoraic or disyllabic minimal word constraint** in Russian. This is not particularly controversial, but it bears pointing out, since split patterning of function words often aligns with prosodic size in other languages. For example, Zec’s (2005) generalization for Serbo-Croatian is that function morphemes project phonological words when disyllabic but cliticize when monosyllabic. Disyllabic English function morphemes are consistently stressed, whereas monosyllables are not consistent (Selkirk 1995 and others). In Russian, there is no such correlation. The only size requirement on phonological words is that they contain at least one syllable—that is, have a vowel. Words can be monosyllabic (e.g., [dn-ó] ‘bottom-NOM.SG’, [tl^j-á] ‘aphid-NOM.SG’, [dó] ‘the note “do”’, and many function PWds such as [já] ‘I’). There is no evidence⁷ for a weight distinction among syllables—no vowel length contrast, and codas do not contribute weight based on any diagnostics.

⁷Ryan (2014) finds gradient effects of onset weight on lexical stress distribution in Russian, but they do not compel categorical distinctions in prosodic cliticization.

3.5 Local summary

To summarize, Russian marks its phonological words fairly well, and by several diagnostics, prepositions are phonologically heterogeneous. Some always procliticize; others usually do but can be PWds in some positions; still others are always PWds. As I will show next, this taxonomy only partially aligns with morphosyntactic characteristics of these items.

4 Prepositions: internal morphosyntax

Morphosyntactically, Russian prepositions can be identified as a uniform class based on some diagnostics (see §6), but they also exhibit many differences. Some of these differences are due to their internal structure. Other differences arise because the patterns in question crucially depend on phonological word status. The main point of this section is that the differences between prepositions cannot be reduced to having or lacking roots.

4.1 Root prepositions vs. head prepositions

Yadroff and Franks (2001) argue that Russian prepositions come in two types: ones that consist of functional structure only, and ones that additionally contain lexical roots. I will adopt this assumption, since the evidence for prepositions having roots is abundant. Many Russian prepositions are monomorphemic and double as prefixes (e.g., /v/ ‘in’, /s/ ‘with’—see Matushansky 2002 et seq.). These prepositions cannot act as roots. There are also, however, monomorphemic prepositions that contain recognizable roots that occur elsewhere in the language, in nouns, verbs, and adjectives (e.g., / $\sqrt{\text{pered}}$ / ‘in front of’ and $\sqrt{\text{mez}}$ ‘between’—see (13)).⁸ As was shown in §3, these prepositions do not pattern as phonological words most of the time—they lack a stress, they fail to undergo final devoicing before sonorant-initial words, etc. Thus, the presence of a root is not sufficient for phonological word status.

(13) Root prepositions that are not PWds: $\sqrt{\text{pered}}$ ‘before, in front of’ and $\sqrt{\text{mez}}$ ‘between’

- | | | | | | |
|----|----------------------------|--------------------|----|---|-----------------------|
| a. | per ^j ód | ‘front (n)’ | e. | mez _z -á | ‘division (n)’ |
| b. | peréd-nik | ‘apron (n)’ | f. | mez _z -ev-á-t ^j | ‘to plow a field (v)’ |
| c. | o-pered-í-t ^j | ‘to outrun (v)’ | g. | pro-méz _z -nost ^j | ‘crotch (n)’ |
| d. | peréd-n ^j -aj-a | ‘entryway (adj/n)’ | | | |

Similar examples of noun, verb, and adjective use are easy to find for prepositions that do systematically form phonological words (such as $\sqrt{\text{skvoz}}_{\omega}^j$ and $\sqrt{\text{protiv}}_{\omega}$). Several examples are given in (13).

(14) Root prepositions that are PWds: $\sqrt{\text{skvoz}}_{\omega}^j$ ‘through’, $\sqrt{\text{protiv}}_{\omega}$ ‘against’

- | | | | | | |
|----|--------------------------|----------------------------|----|-------------------------|---------------------------|
| a. | skvoz-n ^j -ák | ‘draft (n)’ | d. | protív-nik | ‘adversary (n)’ |
| b. | skvoz-íst-ij | ‘see-through, holey (adj)’ | e. | protiv-n-ij | ‘disgusting (adj)’ |
| c. | skvoz-í-t ^j | ‘to be drafty (v)’ | f. | protív-e-t ^j | ‘to become revolting (v)’ |

These examples can be easily multiplied; quite a few Russian prepositions are productive roots (e.g., $\sqrt{\text{króme}}_{\omega}$ ‘except’ in [kromé-š-n-ij] ‘excessive (adj)’, [króm-k-a] ‘edge (n)’, $\sqrt{\text{ókolo}}$ ‘near’ [okól-its-a] ‘vicinity’. The analysis of *okolo* as monomorphemic is non-obvious, since etymologically, the initial *o-* and final *-o* are both affixes (with *kol-* being the root meaning ‘circle’—cf. [kolo] ‘wheel’ in Czech, [koło] in Polish). I argue that this is no longer a morphologically complex word. There is no word [kolo] in modern

⁸Example (13a) demonstrates a lexically idiosyncratic rule of stressed [o]-backing (see Padgett 2010 and others). Note that [mez] has a variant, [mezdu], often pronounced as [mezu] in the multimedia subcorpus of the RNC. The alternation with [zd] is a remnant of an archaic rule that is no longer productive.

Russian, and the relationship between [okolo] and historically related words such as [kolobók] ‘fairytale dough boy’ and [kolʲtso] ‘ring’ is too opaque. Sections 7.4 and 7.3 supply some morphosyntactic evidence that *okolo* is patterning as a proclitic, monomorphemic preposition in the modern language. Its only surprising feature is that it is stressed, but this is consistent with the status of stress in Russian phonology, as reviewed in §3.2.

4.2 Prepositions with roots

Russian has many prepositions that are morphologically complex and alternate between preposition and adverb categories (see (15)). Historically, words like *vperedí* and *sbóku* derive from PPs, where *-i* and *-u* are case morphemes (Hill 1977, Biskup 2017). Some of these case morphemes (esp. *-i*) are no longer productively used elsewhere. As discussed in more detail later, many of these words alternate between preposition and adverb. It is easy to demonstrate that these prepositions contain recognizable roots that occur in nouns, verbs, and adjectives. I show just a few examples in (16).

(15) Morphologically complex preposition/adverb class in Russian

- | | | | | | |
|----|----------------------------|------------------|----|---|----------------|
| a. | v- $\sqrt{\text{pered-í}}$ | ‘in front of’ | f. | $\sqrt{\text{sred-í}}$ | ‘among’ |
| b. | po- $\sqrt{\text{zad-í}}$ | ‘behind’ | g. | vo- $\sqrt{\text{prek-í}}$ | ‘in spite of’ |
| c. | iz- $\sqrt{\text{nutr-í}}$ | ‘from inside of’ | h. | s- $\sqrt{\text{bók-u}}$ | ‘alongside’ |
| d. | v- $\sqrt{\text{nutr-í}}$ | ‘inside’ | i. | so- $\sqrt{\text{glás-n-o}}$ | ‘according to’ |
| e. | v- $\sqrt{\text{bliz-í}}$ | ‘near’ | j. | $\sqrt{\text{blag-o-}}\sqrt{\text{dar}^j\text{-a}}$ | ‘thanks to’ |

(16) Other words with the roots of [sred-í] ‘among/in the middle of’ and [v-bliz-í] ‘near’

- | | | | | | |
|----|-------------|-------------------|----|-------------|-----------------------|
| a. | sred-á | ‘environment (n)’ | d. | bliz-n-éts | ‘twin (n)’ |
| b. | po-sréd-nik | ‘mediator (n)’ | e. | blíz-k-ij | ‘close (adj)’ |
| c. | sréd-n-ij | ‘average (adj)’ | f. | s-blíz-i-tʲ | ‘to bring closer (v)’ |

My analysis of the morphosyntactic structure of prepositions is shown in (17). I assume (with Yadroff and Franks 2001 and others) that prepositions that are morphologically simple and do not contain recognizable roots—e.g., *u*, *za*, *v*, *pro*, *dlia*—occupy the P head position (see (17a)). Morphologically complex prepositions, e.g., [v-pered-í], have a null P head with an adjoined complex PP (see (17b)). Prepositions that have roots but no other overt morphemes consist of a binary branching structure: a root merged with a null P head (see (17d–f)). They differ in whether the pieces that realize them are marked with ω diacritics, but the structures are the same. When such morphemes are used as nouns (e.g., [perʲód] in (17c) below), the roots get PWd status because they have additional functional structure in the extended projection of the noun (case, number, etc.). I show where the ω diacritics are placed in each structure. Note that in some cases, the diacritics are generated syntactically when abstract morphemes move (shown on the resulting complex phrase nodes), and in other cases, they are properties of the vocabulary items (shown on the items). Syntactic diacritics are passed to the strings that realize the structures, once the vocabulary items are inserted.

(17) Structures

<p>a. [u okn-á] ‘by the window’</p>	<p>b. [v-pered-í] ‘in-front-of (prep)’</p>	<p>c. [per^jód] ‘front (noun)’</p>
<p>d. [ókoló] ‘near (prep)’</p>	<p>e. [pered] ‘before (prep)’</p>	<p>f. [skvóz^jω] ‘through (prep)’</p>

5 Analysis of phonological word formation

To analyze phonological word formation, I posit that Russian proclitics and enclitics are parsed differently: proclitics are incorporated into the same PWds as their hosts, whereas enclitics are weakly parsed into phonological phrases. When two ω -marked constituents are nested inside each other, only the outermost gets a PWd—this is similar to a “wrapping” effect (Truckenbrodt 1999), enforced by Selkirk’s (1995) NONRECURSIVITY constraint. Some of the key rankings are summarized below; the constraints are defined in the following section.

(18) Prosodic structure formation in Russian

a. Weak layering for enclitics only: enclitics are dominated directly by PhP.

ω -to-PWd-R \gg EXH(PhP) \gg ω -to-PWd-L

b. Proclitics are incorporated into PWd with hosts.

NONREC(PWd), PWd-to- ω -R \gg ω -to-PWd-L

c. When two ω -marked constituents appear in a nested structure, only the outermost one maps to PWd.

NONREC(PWd), ω -to-PWd-R \gg ω -to-PWd-L

5.1 The basic analysis of proclitics

I start by analyzing proclitics and enclitics, and then discuss some consequences of this analysis. The constraints used in the analysis are standard in work on the syntax-phonology interface (Selkirk and Tateishi 1988, Selkirk and Shen 1990, Ito and Mester 1992, Selkirk 1995, McCarthy and Prince 1993); the main revision I introduce is reference to diacritic-marked constituent edges rather than lexical words.

(19) ω -to-PWd-L (formally, ALIGN-L, ω , L, PWd): “Assign a violation mark for every syllable that stands between the left edge of a string bearing a ω diacritic and the left edge of the nearest phonological word.”

(20) PWd-to- ω -R (formally, ALIGN-R, PWd, R, ω): “Assign a violation mark if the right edge of a PWd does not coincide with the right edge of a string bearing a ω diacritic.”

(21) NONRECURSIVITY(PWd): “Assign a violation mark for every PWd that dominates a PWd.”

- (22) EXHAUSTIVITY(PhP): “Assign a violation mark for every Phonological Phrase that dominates a constituent that is not a Phonological Word.”

Tableaux (23) and (24) treat the prosody of two minimally different Russian prepositions. Prepositions such as /ʃerez/ do not normally project their own phonological words. The Russian phonological word diagnostics reviewed in §3 point to their word-internal parse, suggesting the structure in (23a) is the output. The winner violates the requirement that the string realizing a ω -bearing XP (here, K(ase)P) must coincide with the left edge of the Pwd. The same type of structure will be selected as optimal for rootless prepositions that occupy P heads (incl. [do] ‘til’, [na] ‘on’, [u] ‘by, near’, etc.). All are expected to procliticize and be word-internal.

- (23) Deriving [ʃiriznij_ω] ‘through her’

	(ppʃerez (kpnej-o) _ω)	NONREC(PWd)	PWd-to- ω -R	EXHAUST(PhP)	ω -to-PWd-L
a.	☞ [ʃiriznij _{pwd}]				** (ʃi, riz)
b.	[ʃéris _{pwd}][nijó _{pwd}]		*!(ʃéris) W		L
c.	[ʃéris [nijó _{pwd}]] _{PhP}			*! W	L
d.	[ʃéris [nijó _{pwd}]] _{pwd}	*! W			L

On the other hand, the vocabulary item realizing the preposition *skvoz^j* enters the phonological derivation with its own ω diacritic from the lexicon. Both the pronoun [nej_ω] and the preposition [skvós^j_ω] get their own phonological words, as required by ω -to-PWd-L. The diacritic ensures that the prepositions /skvoz^j_ω/ and /ʃerez/ receive different prosodic parses, even though they have identical morphosyntactic structures. The analysis for /skvoz^j_ω/ extends to prepositions that have more complex structures, derived by movement, such as [v-pered-í_ω] ‘in front of’.

- (24) Deriving [skvós^j nejó] ‘through her’, with a diacritically marked Pwd preposition

	(ppskvoz ^j _ω (kpnej-ó) _ω)	NONREC(PWd)	PWd-to- ω -R	EXHAUST(PhP)	ω -to-PWd-L
a.	[skvəz ^j nijó _{pwd}]				*! (nijo)
b.	☞ [skvós ^j _{pwd}][nijó _{pwd}]				


5.2 Enclitics

As suggested in §3.3, enclitics such as [s^ja], [ze], [bi], and [li] alternate between two prosodic parses, depending on whether they have undergone apocope. A vowelful enclitic is an appendix to the phonological phrase, whereas an apocopated enclitic is word-internal (recall the two structures in (12)). These options exist because the phonology allows for more than one parse, and despite each enclitic being in a consistent morphosyntactic position.

The driver of apocope is EXHAUSTIVITY(PhP). In (25a), the vowel has been deleted, and the enclitic is at the end of the phonological word—as confirmed by devoicing. The alignment constraint ω -to-PWd-R is not violated by the winner because the violations are reckoned by syllable; appending a single consonant does not violate EXHAUSTIVITY.⁹


⁹I do not analyze the variation in apocope, but a basic analysis would assume a ranking or weight tie between EXHAUSTIVITY and MAX-V. Since the variation is lexical, with [s^ja] apocope being basically mandatory in modern Russian, MAX-V would need to be ranked or weighted on an item-specific basis—lower for [s^ja] than for the other enclitics. See Coetzee and Pater 2011, Linzen et al. 2013, Gouskova and Linzen 2015 for pertinent discussion and formalisms.

(25) Analysis of apocope in enclitics

	/xodila _ω bi/ ‘walked (fem) IRR’	ω-to-PWd-R	EXHAUST(PhP)	MAX-V
a. 	[xodilap _{pwd}]			*
b.	[[xodila _{pwd}] bi _{PhP}]		*!	
	[[xodila _{pwd}] bi _{pwd}]			

On the other hand, neither apocopating nor parsing the enclitic inside the PWd is possible when the result of deletion would create a final consonant cluster—a structure known to be marked in Russian on independent grounds (Yearley 1995, Gouskova 2012 and others). When the PWd ends in a consonant, the enclitic is an appendix to the Phonological Phrase (see (26a)), since the alternatives involve fatal misalignment by a whole syllable (as in (26b)) or creating a consonant cluster in final position ((26c)).

(26) Prosodic treatment of enclitics: appendix to the Phonological Phrase

	/xodil _ω bi/ ‘walked (masc) IRR’	ω-to-PWd-R	*CC _{pwd}	EXHAUST(PhP)	MAX-V
a. 	[[xodil _{pwd}] bi _{PhP}]			*	
b.	[xodil bi _{pwd}]	*!			
c.	[xodilp _{pwd}]		*!		*

The interaction of apocope and word-final devoicing in enclitics underscores the ability of the phonological component to disobey some of the instructions it was given by the post-insertion component of the morphosyntax. If enclitics merely subcategorize for right-attachment to phonological words, this requirement would not be satisfied in forms like [xodila=p], where [p] is clearly word-final. If we instead view prosodification as the purview of the phonology proper, then the inconsistent behavior of enclitics follows—as suggested by Selkirk’s (1995) theory, they go wherever the phonology can fit them.

5.3 Diacritic-marked morphemes inside other words

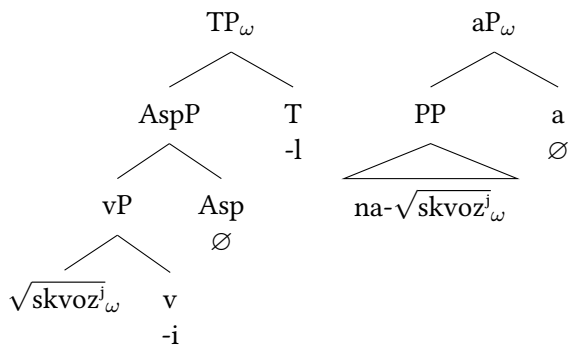
This section treats roots like $\sqrt{\text{skvoz}^i_\omega}$ ‘through’ and $\sqrt{\text{protiv}^i_\omega}$ ‘against’ when they appear inside nouns, verbs, adjectives, and adverbs—the traditional “lexical” words. Some examples (transcribed narrowly, to illustrate all the relevant rules) are given in (27). As these examples demonstrate, a single phonological word is formed over the entire constituent when the root is embedded inside *n*, *v*, *a*. The syntactic structures I assume for suffixed and prefixed words are in (28).¹⁰

(27) Verbs, adjectives, adverbs, nouns with ω-marked roots are single PWds

a.	/skvoz ⁱ -i-l/	skvazíl	‘was drafty (v)’	a’.	/protiv-e-l/	pratívél	‘became revolting (v)’
b.	/skvoz ⁱ -n-oj/	skvaznój	‘drafty (adj)’	b’.	/protiv-n-ij/	pratívijnj	‘nasty (adj)’
c.	/na-skvoz ⁱ /	naskvós ⁱ	‘through (adv)’	c’.	/na-protiv/	naprótif	‘opposite (adv)’
d.	/skvoz ⁱ -n ⁱ -ak/	skvaz ⁱ n ⁱ ák	‘draft (n)’	d’.	/protiv-nik/	pratívnik	‘adversary (n)’

(28) Structure for [skvazíl] and [naskvosⁱ] after constituents have been assembled

¹⁰Work on the syntax of Russian verbs assumes that they rise to Asp or Neg if present, but not T (Bailyn 1995, Gribanova 2013, Harizanov and Gribanova to appear); if that is the case, then tense would have to lower onto the verb using the same mechanisms that are proposed for English tense hopping (see Embick and Noyer 2001 for discussion), and the operation would have to feed ω diacritic assignment.



My analysis of the syntactic structure of words like those in (27) predicts that in addition to the diacritic on the root, a second ω diacritic is generated for the entire structure assembled by head movement. The diacritics of roots like $\sqrt{\text{skvoz}^j_\omega}$ and $\sqrt{\text{protiv}_\omega}$ must be ignored in favor of the ones that are syntactically generated over the larger constituents. As shown in (29), this follows from the previously established ranking of NONREC(PWd) over ω -to-PWd-R (compare (29a vs. c)).

(29) One ω -marked constituent nested inside another, with suffix

	(TP $\sqrt{\text{skvoz}^j_\omega}$ -i- I_ω)	NONREC(PWd)	EXH(PhP)	PWd-to- ω -R	ω -to-PWd-R	ω -to-PWd-L
a.	$\sqrt{\text{skvaz}^j_\omega} \text{ il}_{\text{pzd}}$				*	
b.	$[\text{skv}^j_\omega \text{ os}^j_{\text{pzd}}] [\text{il}_{\text{pzd}}]$				*	*!
c.	$[[\text{skv}^j_\omega \text{ os}^j_{\text{pzd}}] \text{ il}_{\text{pzd}}]$	*!				
d.	$[[\text{skv}^j_\omega \text{ os}^j_{\text{pzd}}] \text{ il}_{\text{PhP}}]$		*!			

To summarize the analysis up to now, then, Russian tolerates PWd-internal proclitics because the constraint that requires PWds to coincide with ω -marked projections is outranked by various well-formedness requirements on prosodic structure. Constituents that enter the system with their own, lexical ω diacritics receive PWd status—except when they are embedded inside larger constituents with syntactically assigned ω diacritics. This is because recursive prosodic words are prohibited categorically in the language.

This analysis predicts that it is possible for another language to have a different outcome: certain ω -marked morphemes should insist on being PWds even when embedded inside other PWds. One could analyze the behavior of the English prefix *un-* this way (see Borowsky 1986, Inkelas 1989 for some discussion).

6 Prepositions pattern as a class

With a basic analysis of the structure of prepositions and their phonology in place, I next turn to how they behave in the larger syntactic contexts. First, we consider some patterns where prepositions pattern as a class: n-allomorphy of pronouns, and split scrambling. I suggest these patterns must be analyzed as syntactic, even though there is a plausibly phonological underpinning for them. I demonstrate that the phonological explanation is not right for these patterns—they must instead stem from the syntactic properties of the P head (null or overt). In §7, on the other hand, the prepositions diverge morphosyntactically, in a manner that aligns with their phonology rather than syntactic properties.

6.1 Syntactic tests for Prepositions?

We need to establish a syntactic test for prepositions—this is not entirely straightforward, and previous studies (e.g., Philippova 2018) sometimes conclude that some of the items in the descriptive class are not prepositions at all, because the class is heterogeneous. A simple, classic test is adverbial modification with

right/straight. Canonical spacial and temporal prepositions in English pass this easily (*right into the box, right at five o'clock, straight past the stop sign*), but some prepositions fail, such as *of*: **right of a table, *right of five o'clock*. The only context where *of* appears to be thus modified is in complex phrasal prepositions, such as *in front of*, but they must be spacial/temporal to work (**right in lieu of, *right in spite of*). Similarly, words such as *despite*, which seem prepositional based on their ability to assign case, nonetheless fail to pass the modification test (**straight despite him*)—presumably because they cannot be used spacially or temporally.

In Russian, the same holds. All canonical head P prepositions (*v* ‘in(to)’, *s* ‘from/with’, *k* ‘towards’, *ot* ‘from’, *na* ‘onto’, etc.) pass modification with *pr’amo* ‘straight/right’, as do root Ps that can be used spacially or temporally:

(30) Modification with *pr’amo* ‘straight’ for head Ps and root Ps

pr’amo + head P		pr’amo + root P	
a.	<i>v</i> dóm ‘into the house.ACC’	a.’	skvóz’ ⁱ tunnél’ ⁱ ‘through the tunnel.ACC’
b.	<i>s</i> déreva ‘from the tree.GEN’	b.’	pered dómom ‘in front of the house.INST’
c.	do pr’atí ‘till five (o’clock).DAT’	c.’	ókolo dóma ‘next to the house.GEN’
d.	u dóma ‘by the house.GEN’	d.’	vnutrí dóma ‘inside the house.GEN’
e.	póсле polúdn’ ^a ‘past noon.GEN’	e.’	vsléd jemú ‘after him.DAT’

Just as in English, prepositions that cannot be used spacially or temporally also cannot be modified this way: **pr’amo blagodar’á druž’ám* ‘right thanks to friends.DAT’, **pr’amo rádi drúga* ‘*right for the sake of a friend.GEN’, *pr’amo soglásno slovar’ú* ‘*right according to the dictionary.DAT’. I take the position that these items are still prepositions, and that this simply reflects a semantic limitation of the test.

6.2 Pronoun n-allomorphy

Russian pronouns have two forms, mostly in complementary distribution (see (31) and (32)): n-forms, which occur with prepositions, and what I’ll call iota-forms, which start with [i] or [j] and which occur as possessors, arguments of verbs, and so on (Hill 1977, Chvany 1982, Timberlake 2004, Philippova 2018).

(31) *Oná uvídela jevó/*nevó.*
 she saw.FEM.SG him.ACC
 ‘She saw him’

(32) *Oná uslá ot nevó/*jevó.*
 she walked.FEM.SG from him.GEN
 ‘She left him.’

(33) Russian pronouns: iota-allomorphs and n-allomorphs

	NOM	ACC, GEN	DAT	INST	LOC/PREP
SG FEM	on-á	jevó/nejó	jevó/nejó	jevó/nejó	nejó
SG MASC/NEUT	ón(ó)	jevó/nevó	jemú/nemú	ím/ním	n’óm
PL	on-í	íx/níx	ím/ním	ími/ními	níx

Historically, the n-allomorphs resulted from a misparse of the prepositions *v*, *s*, *k*, which used to be **vən*, **sən*, **kən*, with yer vowels (Hill 1977). Something similar happened in English: “nother” (<n other), “apron” (<*a napron). What is interesting about the reanalysis in Russian is that it has spread from the three monoconsonantal prepositions to the entire class; as the class of prepositions has been expanding, so has the context for n-allomorphy. With just a few exceptions, prepositions pattern together:

all appear with n-allomorphs under the right conditions (see Philippova 2018 for a recent in-depth study). The table below summarizes some examples of pronouns occurring as objects of verbs (first column), P-head prepositions, and root prepositions. Timberlake (2004:176) notes, “[root prepositions] governing the dative do not use {n} ([v-sléd jemú] ‘after him’) and seem doomed never to develop {n}”. But this might be changing, too: I found one hit in the RNC of *vopreki nemu* ‘in spite of him’ (vs. 60 hits with *jemu*), and Philippova (2018) reports some variation, as well.

- (34) Conditioning of pronoun n-allomorphy: prepositions pattern together (all examples attested in RNC)

	With verb	With P-head	With root prep.
Acc	uvídelí jejó (not (*nejó) ‘saw-pl. her’	na <u>nejó</u> ‘onto her’	skvós ^j <u>nejó</u> ‘through her’
Gen	jevó ne bíló (not *nevó) ‘he was not there’	ot <u>nevó</u> ‘from him’	otnosítel ^j no <u>nevó</u> ‘as regards to him’
Dat	kupíla jemú (not *nemú) ‘bought-fem. for him’	k <u>nemu</u> ‘toward him’	voprekí jemú/ <u>nemú</u> ‘in spite of him’
Inst	risovala <u>imi</u> (not *nimi) ‘drew-fem. with them’	pod <u>nimi</u> ‘under them’	mézdu <u>ními</u> ‘between them’

While this originated as a phonologically conditioned alternation, the conditions on allomorphy are structural. For one thing, it is not sufficient for the preposition to be linearly adjacent to the pronoun. When the pronoun is embedded inside an NP, as in (35), the iota-pronoun is required. When the pronoun is the object of P, the n-form is required:

- (35) Linear adjacency not enough to condition n-allomorphy:

Vót sto virisovivalos^j skvóz^j [jejó bessv^jázni^j rasskáz] (*nejó)
 here what drew.intrans. through her-GEN incoherent-ACC story-ACC
 “Here is what emerged from her incoherent story.” (RNC)

- (36) Compare when “she” is the object of the preposition:

Póstnikov gl^jadél skvóz^j nejó (*jejó)
 Postnikov looked through her-acc
 “Postnikov looked through her.” (RNC)

Words that alternate between prepositions and adverbs, such as [vperedí], can only condition n-allomorphs when used as prepositions. This is shown in (37) and (38).¹¹

- (37) Adverbial use of “vperedí” does not condition n-allomorphy on adjacent “them”:

Vperedí ix zdál tól^jko vól^jni^j véter i volnújucci^je prikl^jufénija
 Ahead them-ACC.PL waited only free wind and exciting adventures
 “Ahead, only free wind and exciting adventures awaited them.” (RNC)

¹¹N-allomorphy can also be conditioned by comparative adjectives: e.g., *beléje nejó* ‘whiter than her’. But the conditions on it are a bit different and resemble a more phonologically conditioned alternation; see Philippova (2018).

- (38) Compare when “they” are an object of the preposition “vperedí” instead

Vperedí níx *naxodílsʹa* *otrʹád* *uzé* *iz* *nastojáccix* *vóinov*
 In front of them-GEN.PL was squadron already from real warriors
 “Ahead of them was a squadron of already seasoned warriors.” (RNC)

This suggests that n-allomorphy is a property of the syntactic P head. To the extent that prepositions do not (yet) uniformly pattern as a class, the distinctions between them are syntactic (e.g., which case does the preposition assign), not lexical/phonological. As the work on this change in progress indicates (Hill 1977, Philippova 2018), it may eventually result in uniform conditioning of n-forms by all the prepositions.

6.3 Left Branch Extraction/split scrambling

Another feature that I argue is a syntactic property of the P head rather than a phonological one is the Preposition-First constraint in split scrambling. Split scrambling is a feature of colloquial Russian: an adjective appears away from the noun it modifies, either preceding or following it in the linear string (Sekerina 1997, Nowak 2000, Fanselow and Cavar 2002, and others). The simple example below shows split scrambling in Wh-movement, which is known as left-branch extraction (Ross 1967 et seq.). Note that the adjectival wh-word appears away from the noun it is modifying:

- (39) Kak-oj *sgorel* dom-Ø?
 which-masc.sg burned house-masc.sg
 “Which house burned?”

This scrambling can also apply to prepositional phrases, but it is subject to several constraints. One of them is dubbed the “P-First constraint” by Sekerina (1997). The constraint is descriptively stated in (40) and exemplified in the series of examples in (41)–(44).

- (40) *P-First Constraint*: “Discontinuity within the PP can occur only if the prepositional object is modified by an adjective, and no part of the prepositional object may precede the preposition.” (Sekerina 1997)

- (41) Vperedí/u kakóvo *oní* *priparkoválisʹ* dóma?
 in.front.of/next.to which.GEN.SG they parked house.GEN.SG
 “What kind of house did they park in front of?”

- (42) Vperedí/u bolʹšóvo *oní* *priparkoválisʹ* dóma
 in.front.of/next.to big.GEN.SG they parked house.GEN.SG
 “They parked in front of the big house”

- (43) Vperedí/u dóma *oní* *priparkoválisʹ* bolʹšóvo
 in.front.of/next.to house.GEN.SG they parked big.GEN.SG
 “They parked in front of the big house”

- (44) *Bolʹšóvo dóma *oní* *priparkoválisʹ* vperedí/u
 house.GEN.SG big.GEN.SG they parked in.front.of/next.to
 “They parked in front of the big house”

Analogous examples can be easily constructed with other prepositions, regardless of length or PWd status. While the acceptability of splitting varies by speaker (it is an informal register), the ungrammaticality of (44) is striking: the word *vperedí* can appear in sentence-final position when used adverbially, but not as a result of split scrambling. Prepositions such as [u] cannot be used adverbially and cannot appear in final position (under any circumstances—see §7.2).

(45) *Oní priparkovális^j vperedí*
 they parked in.front
 “They parked in front”

(46) **Oní priparkovális^j u*
 they parked next.to
 “They parked in front”

The syntactic analysis of the P-First constraint remains a mystery (see Željko Bošković 2005 for a review). Movement analyses are problematic because various constraints on movement appear to be violated—constraints that do otherwise hold of movement in Russian. Approaches using base-generation or partial copy pronunciation (e.g., Fanselow and Cavar 2002) can generate the apparently discontinuous constituents, but they also overpredict. Under such an analysis, it is not clear why the preposition must appear first. But one explanation that is ruled out is a phonological one. It cannot be the case that prepositions resist stranding due to their phonological dependency, because even phonological word prepositions have this property. The P-First constraint appears to be due to a syntactic property of P, common to all of them. Since the generalization is not sensitive to the lexical identity of prepositions or their PWd status, it seems likely that the restriction is enforced in the narrow syntax, before lexical insertion.

7 Phenomena that interact with preposition phonology

Having established that there are several cases where prepositions pattern as a syntactic class, I next turn to phenomena where prepositions are more heterogeneous, which turn out to be quite numerous. The facts below suggest at least a three-way distinction: prepositions that are obligatorily cliticized, prepositions that are obligatorily phonological words, and ones that oscillate between these statuses—sometimes in an inconsistent way.

7.1 Doubling

Provided the Preposition-First constraint is satisfied, prepositions may be doubled in colloquial Russian. But this doubling is only possible under certain information structure conditions (Goncharov 2015), and, I argue, only for phonological proclitic prepositions. An example from Goncharov is given in (47); similar examples can be constructed for *v* ‘in’, *s* ‘from’, *na* ‘on’, and other rootless prepositions. As noted by Yadroff (1999:54), doubling is not possible for morphologically complex prepositions such as *v-pered-i*. Yadroff also notes that in Modern Russian, verbal prefixes (etymological relatives of prepositions) are often doubled as prepositions in the complement of the verb (see (49)). This again would only be available to procliticizing prepositions, since morphologically complex and root prepositions do not appear as verbal prefixes.

(47) *iz čáški ja pilá iz krásnoj.*
 from cup.F.GEN I drank from red.F.GEN
 ‘I drank from a red cup.’

(48) *vperedí dóma ja stojála vperedí krásnovo.
 in.front.of house.m.gen I stood in.front.of red.m.gen
 ‘I stood in front of a red house.’

(49) ot-stupíl dobrovól’no ot Kíeva
 from.retreated.MASC.SG voluntarily from Kiev
 ‘He retreated from Kiev voluntarily’ (Yadroff, gloss mine)

If this doubling is enabled by the phonological properties of prepositions, we would expect procliticizing root prepositions such as *pered* to be able to double, whereas prepositions such as *skvóz^j* and *prótv* shouldn’t double. This is indeed what we find in the spoken subcorpus of the RNC. There are numerous examples of doubled *pered*, but no examples of doubled *skvóz^j* (and I would judge the analog of (50) ungrammatical with that preposition).

(50) pered étoj/mmm pered veránoej
 in.front.of this.F.INST/mmm in.front.of porch.F.INST
 ‘In front of this, um, porch’ (RNC)

As expected, doubling is also a feature of sentential clitics *bi* ‘irrealis’ and *ze* ‘topic’, as the following RNC examples show. The first of the doubled clitics appears in the 2nd position (after the first phonological word), and the subsequent ones are optionally attached to phonological words that follow.

(51) A já bi soglasíls’a bi rabótat’i i za 5,000 rublélj.
 whereas I IRR agree IRR work.INF even for 5,000 rubles
 ‘Whereas I would have agreed to work for a mere 5,000 rubles.’ (RNC)

(52) né bilo b tebé xorošó, t’í b ne razmnozál’s’a bi
 not was IRR you.DAT good you IRR not reproduce IRR
 ‘If it didn’t feel good to you, you wouldn’t reproduce.’ (RNC)

(53) ved’ bez problémi ze nám ze níkák nelz’á ze.
 However without problem TOP we.DAT TOP no.way cannot TOP
 ‘However, without a problem, there simply is no way for us.’ (RNC)

The requirement that multiply instantiated constituents be phonologically weak suggests that doubling happens at PF. It could be captured if doubling is filtered out or prohibited for constituents marked with ω . I do not formalize an analysis of doubling here for lack of space, but an analogous pattern of prosodic conditions on ellipsis is analyzed in such terms in the following section.

7.2 Stranding in ellipsis

Russian is similar to many non-Germanic languages in its reluctance to strand prepositions. As the example in (54) shows, some prepositions can be stranded by a kind of inversion under the right information structure conditions.¹² But this is not typical of the class as a whole (see Philippova 2018 for more discussion of Russian prepositions that can either precede or follow their complements).

¹²This type of inversion is likely not available to all speakers. I can strand *radi* in my own speech quite freely, but stranding *dl’a* is not grammatical for me. If I had to read (54), I would destress both the prepositions. Hence the stress markings. The RNC subcorpus this came from is from written sources, which do not mark stress.

- (54) *Ne pjanstva radi, a udovol'stviya dl'ja.*
 not drunkenness for.the.sake.of but pleasure for
 Not for the sake of drunkenness but for the sake of pleasure. (RNC)

In contrast, stranding in ellipsis is available to a broader class of prepositions (Gribanova 2008). Gribanova observes that the non-syllabic prepositions {v, k, s} cannot be stranded, but most others can, as shown in (55)–(57). The elided parts of these examples are struck out:

- (55) *Kapitonov pofti ne pomnit, što bilo posle etovo, i plóxo pomnit,*
 Kapitonov almost not remembers what was after ~~this.GEN~~ and poorly remembers
što bilo dó etovo
 what was before ~~this.GEN~~
 Kapitonov almost does not remember what happened afterward, and doesn't remember too well
 what happened before. (RNC)
- (56) *V dánnom slúfaje m'i rassmátrivajem kófe ne posle závtrak-a, a pèred*
 In given event we consider coffee not after breakfast-GEN.SG but before
zavtrak-om
~~breakfast-INST.SG~~
 In this case, we consider coffee not after breakfast, but before. (RNC)
- (57) ... *i sám kagán v néj ili ókolo nejo.*
 and self khagan in her.ACC or around ~~her.GEN~~
 And the Khagan (Khan of Khans) is in it or thereabouts. (RNC)

Crucially, this kind of ellipsis stranding seems to always involve paired/coordinated PPs, suggesting some sort of contrastive pragmatics, and the prepositions are obligatorily stressed and have a H* . . . L* international contour. In light of this, the example in (57) is particularly important, since it shows that the preposition in the first coordinated PP does not need to be syllabic and have a stress/pitch accent on itself. When one of the prepositions is monoconsonantal, however, it must be in the first PP. Inverting the phrases results in sharp ungrammaticality:

- (58) *... *i sám kagán ókolo nejo ili v nej.*
 and self khagan around ~~her.GEN~~ or in ~~her.ACC~~

In analyzing this pattern, I assume that the distinction between prepositions that can be stranded and those that cannot hinges on their ability to express the contrastive focus pitch accent. This can explain why [v] and other C prepositions cannot be stranded: the prepositions must be focused, but there is no vowel to head a syllable/PWd, and vowel epenthesis is ruled out by DEP-V (in order for this to work, these prepositions have to be treated as underlyingly vowelless; see Gouskova 2012, Linzen et al. 2013, Gribanova 2014). The constraints needed for the analysis are defined below. ASSOCIATEPITCHACCENT is an undominated constraint that requires a pitch accent to be on a stressed syllable. Also undominated is MAX-PITCHACCENT, a familiar faithfulness constraint. Both of these constraints dominate MPARSE_{Foc} (and are abbreviated together in tableaux as as PITCHACC). This constraint is violated when phonology fails to supply an output candidate for an input—producing the candidate ⊙ instead. This is the candidate that wins in cases where a particular input is morpho-syntactically well-formed but phonologically ineffable, such as (58). The derivation for this is shown in tableau (62).

- (59) ASSOCIATEPITCHACCENT (Selkirk 1995): “A pitch accent associates to a stressed syllable (i.e., the head of a foot)”

- (60) MAX-PITCHACCENT: “Assign a violation mark for every pitch accent in the input that does not have a correspondent in the output” — *this protects Foc from deletion*
- (61) MPARSE_{Foc}: “Assign a violation mark if the input containing Foc lacks a correspondence relation to the output” (*Informal; see McCarthy and Wolf 2005*)

As shown in (62), the input has been linearized and includes two Foc tones, H* and L*. Candidate (62b) fails because it fails to realize the second pitch accent, L*. The second loser, (62c), inserts a vowel to give the preposition a syllable head. But, while epenthesis happens to resolve illicit segmental clusters and next to certain specific pronouns, it cannot happen for pitch accent realization. The last alternative, (62d), is to realize the L* on the wrong morpheme and to encliticize the preposition onto it—and this, too, is out.

- (62) Stranding non-syllabic preps fails in the phonology: “around it or in <it>+Foc”

	/ókolo _ω +H* nejó _ω ili v+L*/	DEP-V	PITCHACC	MPARSE _{Foc}	ω-TO-PWD-L
a. ☞ ⊙				*	
b.	[ó ^H kolo _ω] [nejó ili v _ω]		*!		
c.	[ó ^H kolo _ω] [nejó _ω] [iliv ^{L*} _ω]	*!			*(ili)
d.	[ó ^H kolo _ω] [nejó _ω] [íliv ^{L*} _ω]		*!		*(ili)

The vowelless preposition v ‘in’ can associate with the pitch accent when it is a proclitic, as in (63). This must be because the pitch accent is sufficiently close to it phonologically—that is, ASSOCIATEPITCHACC is satisfied. In such a case, the MPARSE_{Foc} constraint becomes active, ruling out the null parse ⊙ candidate.

- (63) Focus associates to syllable that [v] is in: “in it or around <it>+Foc”

	/v+H* néj _ω ili ókolo _ω +L*/	DEP-V	PITCHACC	MPARSE _{Foc}	ω-TO-PWD-L
a. ☞ ⊙	[vné ^{H*} j _ω] [ili ó ^{L*} kolo _ω]				*(ili)
b.	[vó ^{H*} _ω][néj _ω] [ili ó ^{L*} kolo _ω]	*!			
c.	⊙			*!	

Another condition on stranding is that some prepositions appear to resist stressing in this context altogether—e.g., [u]. The ungrammatical example in (64) is all the more striking since it is syntactically quite parallel to (57). Another preposition that does not seem to be strandable in this way is [pro] ‘about’.

- (64) *... *i sám kagán v néj ili ú neje.*
 and self khagan in ~~her.GEN~~ or near ~~her.ACC~~

To explain this, I stipulate that some prepositions idiosyncratically resist stress, possibly due to a high-ranked morphologically specific constraint against stress insertion.¹³ There is evidence for this: Ukiah (1998) does note that these same prepositions are never stressed in fixed collocations.

7.3 Ability to host 2nd Position Clitics

Yet another split between PWD prepositions and non-PWD ones is their ability to host second position clitics. Second position clitics attach to constituents that are initial in a particular domain (Klavans 1985 et seq.). The treatment of 2nd position clitics has long been a matter of controversy in Slavic and beyond

¹³High ranked but not undominated, since any preposition (except *v, k, s*) can be focused in other contexts, as in *já zabrál knígu ú óli* ‘I took the book FROM Olga’.

(Marantz 1988, King 1995, Franks and King 2000, Embick and Noyer 2001, Željko Bošković 2001, and many others). At issue is the nature of the cliticization context—is it syntactically or phonologically defined? Russian prepositions supply an argument in favor of phonological conditioning. The facts resemble the patterns reported for Serbian by Diesing and Zec (2017).

Second position enclitics such as *li* ‘Question’ appear after the first phonological word as shown in examples (65)–(66). The negation particle *ne*, itself a proclitic, does not count as a word for the purposes of cliticization, so the prepositions *radi* and *mimo* host two clitics each in these examples.

(65) *Ne rádi li níx tak uproccenó dvizénije v tséntre, po kol'tsú*
 not for-the-sake-of Q them so simplified.pred traffic in center along ring
 Is it not for them that traffic has been simplified so much downtown, along Ring Road? (RNC)

(66) *Ne mimo li níx tefót reká i unósitsa vníz. . .*
 not past Q them flows river and rushes downward
 ‘Is it not past them that the river flows, and rushes downward?’ (RNC)

Russian has several other PWD-targeting enclitics: irrealis *bi* and contrastive topic *ze*. They also follow a 2nd position clitic distribution:

(67) *Skvóz' bi zémli-u im v tartarar'í proval-ít'-s'á*
 through IRR earth-ACC.SG them into hell fall-INF-INTR
 ‘Would that they fall through the earth into hell.’ (RNC)

(68) *Vperedí ze pl'ónk-i molékul-i vózduxa dvígaj-ut-s'á naprávlenno. . .*
 in.front.of though film-GEN.SG molecules-NOM.PL air-GEN.SG move-pl-intr directionally
 In front of the film, however, the air molecules move directionally. (RNC)

But prepositions do not appear to be promotable to PWD status for the purposes of hosting these enclitics. I did not find any examples of **pered li*, **ferez ze*, let alone **na ze*, **k ze*, and so on.

The distribution of these particles suggests that they live in some high clausal position on the left periphery (say, CP), but are reordered to 2nd position after the first ω -bearing constituent, once the vocabulary items have been inserted. Adapting a Local Dislocation-style rule (Embick and Noyer 2001), we can state this more formally as below. The rule states that the constituent in C is repositioned after the first ω -bearing word it is adjacent to:

(69) Second position sentential clitics after the first PWD
 $[_{CP} C * X_{\omega}] \rightarrow [_{CP} X_{\omega} * C]$

One of the consequences of this analysis is that it allows us to position clitics without doing phonology before syntax; whether the first ω -marked constituent is actually prosodified as a full PWD or not is still up to the phonology. This seems right. In some fixed expressions, e.g., $[xót^j b\grave{i}]$ ‘even-irrealis’, the syllable before the clitic may optionally be destressed. Under my analysis, the clitic is positioned with reference to the PWD diacritic of $[xót^j]$, which is subsequently destressed, with both morphemes procliticizing onto the following word.

Recall from §4.1 that *okolo* ‘around’ is claimed to be a monomorphemic preposition that is undergoing reanalysis and becoming a procliticizing preposition like *pered* ‘before’ and *ferez* ‘through’. The RNC supports this: all the examples of $[ókol\grave{o}]$ hosting 2nd position clitics (only $[z\grave{e}]$ and $[b\grave{i}]$, no $[li]$) are archaic, from the 1800s. Searching larger corpora such as the search engine Yandex yields mostly Bible translation examples, again in archaic Russian. The most straightforward explanation for this is that the preposition is no longer morphologically complex and is not ω -marked. Additional evidence for this is in the next section.

7.4 Approximative inversion

Another phenomenon in Russian morphosyntax that is sensitive to phonology is approximative inversion (recall (3)); see Billings 1995, Franks 1995, Yadroff and Franks 2001, Matushansky 2015, Khrizman and Rothstein 2015, Pereltsvaig 2006, inter alia). As defined by Matushansky (2015), “approximative inversion . . . reverses the normal linear order between a cardinal and a noun with the semantic effect of imprecision”. One crucial aspect of this phenomenon is that it clearly has an effect on interpretation, suggesting it happens in the narrow syntax (before the derivational Y-split into PF and LF). And yet it is subject to several phonological constraints on the inverted constituents (see especially Billings 1995, Matushansky 2015). The constraint I will focus on here is on prepositions. When approximative inversion applies to an NP that is an object of a preposition, the preposition can appear between the inverted noun and cardinal numeral—if P is not a phonological word. Thus, the non-syllabic and CV prepositions such as [k], [za], and [na] normally appear in the middle of the inverted construction, procliticizing onto the cardinal. As shown in (70) and (71), the P-Cardinal order is more common than P-N in the RNC but both orders are possible:

(70) *fʃasám k pʲatí* (66 hits), ✓ *k fʃasám pʲatí* (3 hits)
 hour-DAT.PL towards five-DAT
 ‘towards about 5 o’clock’ (RNC)

(71) *fʃása za pɔltorá* (31 hits), ✓ *za fʃása pɔltorá* (1 hit)
 hour-GEN.SG during one.and.a.half
 ‘In the course of 1.5 hours’ (RNC)

On the other hand, morphologically complex prepositions that systematically project phonological words, such as [vperedí] ‘in front of’ and [soglásno] ‘according to’, cannot appear inside the inverted construction—they obligatorily precede it (Yadroff and Franks 2001). These prepositions cannot appear between Noun and Cardinal (*N P C), so inversion happens inside the complement without the preposition procliticizing onto the Cardinal (✓P [N C]):

(72) *blagodarʲá zaprós-am desʲatí* **zaprósam* *blagodarʲá desʲatí*
 thanks inquiries-DAT.PL ten.DAT
 ‘thanks to about 10 inquiries’

(73) *szádi fʃelovék pʲatí* **fʃelovék szádi pʲatí*
 behind people-GEN.PL five.GEN
 ‘behind about five people’

One of the conditioning factors in approximative inversion is prepositional semantics. Temporal approximation lends itself to inversion more easily than spacial approximation. This makes it difficult to test prepositions that tend to only be used spacially, such as [pered] ‘in front of’. But Russian does supply a minimal pair that allows to control for semantics. The two prepositions meaning “through”, [fʃerez] and [skvózʲ], primarily differ in phonological properties, and this difference correlates with ability to invert: [skvózʲ] is always a phonological word and cannot invert, whereas [fʃerez] is not a phonological word and does invert:

(74) **Mi projéxali tunnéléj skvózʲ pʲátʲ, a mózet i séstʲ*
 we drove tunnels through five or maybe even six
 We drove through about five tunnels, or maybe even six

- (75) *Mi projéxali tunnéléj iferez p'át^j, a mózet i sést^j*
 we drove tunnels through five or maybe even six
 We drove through about five tunnels, or maybe even six

Another feature of this rule is that the Cardinal (e.g., [p'át^j] in (75)) bears a strong pitch accent (H* in the simplest case). I think this is key to analyzing the behavior of prepositions, as well as some other aspects of the rule that I do not discuss at length, such as the restriction of the pitch accent-bearing Cardinal to one PWd (Billings 1995, Matushansky 2015).

I propose the following analysis. The movement that creates the approximative inversion must happen in the narrow syntax in order to feed the semantic interpretation at LF.¹⁴ Prepositions are relocated to the middle of the inverted structure after vocabulary insertion, once PWd diacritics have been generated. The preposition swaps places with the immediately adjacent N in order to be left-adjacent to a Cardinal bearing the H* accent—again, as long as that Cardinal is a PWd and P is not.

- (76) Local dislocation of P in Approximative Inversion

$$P * [N_{\omega} * [Card_{\omega}, H^*]] \rightarrow [N_{\omega} * P + [Card_{\omega}, H^*]]$$

Before concluding, let's consider what appears to be an exception to the generalization that only non-PWd prepositions can appear in the middle of an approximative inversion construction. Matushansky (2015) notes that [ókolo] inverts, and indeed there are many many (temporal) examples such as the following in the RNC:

- (77) *Dn-éj iferez dés'at^j, f'asóv ókolo p'atí, v dvér^j mojéj kómnati-kvartíri*
 day-gen.pl through ten hour-gen.pl around five in door my room-apartment
postuǰáli.
 knocked

About ten days later, around five o'clock, someone knocked on the door of my studio apartment.
 (RNC)

This would be problematic if *ókolo* was a PWd, but I argue that it is not one—despite bearing stress. Recall from §3 that Russian does not have a one-to-one match between stresses and phonological words. Every PWd must have one, but some can have more than one (Gouskova and Roon 2013 and others). There is evidence that *ókolo* can be stressed even inside another PWd—for example, Zaliznjak (1977) consistently transcribes secondary stress for words containing it and other roots (e.g., [òkolo-zemnój] 'near-Earth (adj)'). We can count the ability of *ókolo* to invert in approximation among the signs that it is moving away from being a morphologically complex root preposition toward one that is merely a root categorized with a null P, just like *pered* and *iferez*.

8 Alternatives

8.1 Lexical Phonology

In the past, it has been suggested that Russian prepositions are attached in the lexicon, as if they were prefixes (Kiparsky 1985). A Lexical Phonology analysis along these lines does have several appealing features. It could explain why morphologically complex prepositions have the phonological properties of “finished” phonological words—they would have to pass through the lexical phonology strata as they were

¹⁴In order to explain the single-word effects discussed by Billings and Matushansky, we could say that cases where the Cardinal exceeds one PWd are generated in the syntax but crash in the phonology (i.e., map to ☉) when trying to combine with the pitch accent, which for some reason requires a single PWd to bear it.

assembled. It could also be extended to explain the differences between monomorphemic prepositions that always form PWds vs. ones that do not by stipulating passage through a certain stratum for the former class but not for the latter. Many arguments have been adduced against lexicalism—both on general, architectural grounds (Marantz 1997) and specifically with Russian prepositions in mind (Padgett 2002, Gouskova 2010, Linzen et al. 2013). These arguments have not convinced everyone (Bermúdez-Otero 2010, Kaisse 2017, and many others). This is possibly due to the appeal of the underlying intuition that syntactic domains correspond indirectly to phonological ones (for particularly clear discussion, see Wolf 2008 and , inter alia).

I think that several of the facts discussed in §7 suggest that the positioning of the prepositions cannot be determined in the lexicon—it is determined in the syntax. This determination sometimes happens fairly late in the derivation, and it is subject to syntactic constraints. If PWd-sized units were formed in the lexicon and submitted to the syntactic component for moving around as units, then some fairly elaborate additional explanations would be needed to get prepositions into place. Undoubtedly, a Lexical Phonology account could be made to work with these facts, but it would need to address the syntactic complexity of the phenomena surrounding Russian prepositions, not just their phonology and internal morphology.

8.2 Everything is a PWd as a default

Tyler (2018) discusses some facts from English that are similar to the Russian pattern, e.g., the “up” vs. “of” contrast, and proposes an interesting analysis: the proposal is that PWd formation at every syntactic node is the default, and that certain morphemes (e.g., *of* in English) must be prosodic clitics because of their special subcategorization frames. Empirically, this would give the right coverage for Russian monomorphemic prepositions: regardless of their root vs. head status, the ones that obligatorily cliticize would be given the right subcategorization frames, while prepositions such as [skvozʲ] would follow the default pattern—this simply flips what is the norm and what is the exception compared to my analysis.

The main problem I see for this type of analysis is that it is unclear how to derive the fact that morphologically complex prepositions are PWds. There is no obvious connection between morphosyntactic complexity/derivedness and word status in this analysis, and it seems to me that this is a generalization worth capturing. Conversely, just because something is monomorphemic does not altogether predict its behavior. There are different flavors of prepositional monomorphemic clitics in Russian: some cliticize because they phonologically have to (*v*, *k*, *s*), others cliticize because they are not labeled as PWds, and there are subtle differences in their syntactic patterning based on stress characteristics. Reducing all of these differences to subcategorization frames does not seem possible; the system is richer than that.

9 Conclusion

Syntactically, Russian prepositions form a substitution class in that they are able to take objects, much as verbs do. Phonologically, however, they run the gamut from single consonant clitics (*v*, *s*, *k*) to monosyllabic clitics (*do*, *iz*, *pri*), polysyllabic clitics (*pered*, *iferez*, *ókolo*) and phonological words of varying lengths (*skvozʲ*, *pozadí*, *otnosítelʹno*). I presented some evidence that many of the differences in the morphosyntax of prepositions follow from their phonological, as opposed to semantic or syntactic characteristics. Prepositions that normally form phonological words have certain morphosyntactic behaviors in common that set them apart from clitics: they cannot be doubled; they can host clitics such as *li*, and they must appear initially in a PP that contains an approximative inversion construction. Conversely, clitic prepositions, regardless of size, can be doubled, cannot host clitics, and optionally cliticize onto cardinal numerals in approximative inversion PPs. Within this class, the single consonant clitics further pattern apart from most of the others in that they cannot be stranded in ellipsis—some Ps can be promoted to phonological word status in such cases, while others cannot.

Any complete theory of the interface must account for apparently arbitrary distinctions between prepositions that always form PWds and prepositions that never do, vs. prepositions that fluctuate back and forth. I suggested several ways to analyze these patterns. Some patterns follow straightforwardly from familiar classic approaches to the prosodification of function words, such as Selkirk (1995): when the position of P requires PWd status, it is conferred in the phonological component, to satisfy the relevant constraints. Other patterns must be analyzed outside the phonology proper, but the phonology can still be a dead end for certain derivations that are syntactically well-formed but phonologically unmanageable—these map to null outputs. Finally, there are movement operations after syntax that refer to phonological words—I used a variety of Local Dislocation to analyze those, with the main new contribution being that in my framework, it can happen before phonology proper starts. The diacritic information about PWd status is available before the phonology begins, but it is not the final word on where phonological word boundaries will lie.

PWds are not homogeneous in origin within the theory. Some are created in the syntax, others are morphemes lexically labeled as PWds, still others are created in the phonological component when they end up in certain positions or are combined with certain pitch accent morphemes. This is a richer theory than those that allow PWd creation at certain syntactic nodes only (Svenonius 2016), but this enrichment is motivated by the existence lexically pre-designated PWd prepositions.

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