

Phonological Words in the Syntax and in the Lexicon: A Study of Russian Prepositions*

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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 the syntax issues phonological word diacritics to the complex constituents it creates. Additionally, certain morphemes can be specified in the lexicon as possessing these diacritics. The phonology then interprets the diacritics—sometimes it ignores them, and other times it makes phonological words to satisfy 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 morphosyntactic 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

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have all been questioned; the generalizations they capture could be addressed in other ways (Steriade 1999; Gordon 2002; Rose and Walker 2004; Downing 2006, *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 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 functional ones not having one (contra, e.g., McCarthy and Prince 1994; Urbanczyk 2006; Myler 2017). 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, the morphosyntactic component systematically creates complex constituents (mostly via head movement), and designates them as phonological words via diacritics. 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 *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

¹ A note on transcription: instead of the *JSL* standard transliteration using the scientific system, because of the desirability of phonetic and phonological accuracy, as well as the need to segment in a way that cannot be accommodated within the Rus-

- (1) Russian root prepositions that systematically get PWD status
- a. $\sqrt{\text{skv}^{\text{v}^{\text{z}}}\text{ó}^{\text{z}}\text{í}}_{\omega}$ [skvósʲ níx] ‘through them_{GEN}’ cf. skvaz-nʲ-ak ‘draught’
 - b. $\sqrt{\text{mim}^{\text{v}}\text{o}}_{\omega}$ [mímə níx] ‘past them_{GEN}’
- (2) Russian root prepositions that do not normally get PWD status
- a. $\sqrt{\text{per}^{\text{v}}\text{ed}}$ [piridnámi] ‘before us_{INST.PL}’ cf. [piréd-nik] ‘apron’
 - b. $\sqrt{\text{te}^{\text{v}}\text{erez}}$ [teirizníx] ‘through them_{ACC.PL}’

I discuss several morphotactic phenomena that treat prepositions differently 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
- | | |
|---|--|
| <p>a. default: Card N</p> <p> pʲátʲ tunnéléj
 five tunnels
 ‘five tunnels’</p> | <p>b. appx: N Card</p> <p> tunnéléj pʲátʲ
 tunnels five
 ‘about five tunnels’</p> |
|---|--|

sian orthography (either in Cyrillic or in transliteration), I use the IPA throughout and transcribe stress using acute accents on the vowels. Russian <ч> is rendered as [tɕ], and <ш, ж> as [ɕ, ʒ]; see Padgett and Žygis 2007. 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.

- | | | | |
|--------|-------------------------------|----|---------------------------------|
| (3) c. | appx: N P Card | d. | *N P _{Pwd} Card |
| | tunnélej <u>teerez</u> p'íati | | *tunnélej <u>skvózi</u> p'íati |
| | tunnels through five | | tunnels through five |
| | 'through about five tunnels' | | 'through about five tunnels' |
| | | | ✓ <u>skvózi</u> tunnélej p'íati |

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 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 together 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 2017; Kastner 2019). This movement is triggered by morphosyntactic features such as tense and number, which have language-specific settings. Further, I assume 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.²

² Unlike 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 2017 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

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-áj] ‘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 a 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 (e.g., Zec 2005; Kaisse 2017; Bennett, Harizanov, and Henderson 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 morphosyntactic 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 condi-

Gribanova (2019) term this latter type of repositioning **amalgamation**. Adopting their term, it is amalgamation that generates PwD diacritics.

tions 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 via abstract diacritics (as Alderete 2001; as opposed to as stored foot structure in Inkelas 1989; Revithiadou 1999). 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 in the syntax. Neither will items that are repositioned by post-syntactic operations such as **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’)³ and second position clitics: *-l(i)*, *-b(i)*, *-z(e)*, *-to*, *-de*, and verbal clitics such as *-s(a)*, *-ka* (see 5.2). On the other hand, Lowering—the operation Embick and Noyer propose to get tense marking into position in English, for example—does generate a PwD diacritic on the resulting branching structure.

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, Harizanov, and Henderson 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.

³ I 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. More interesting are related cases where non-terminal nodes correspond to PwDs, such as *gonna*, *wanna*, *I'ma* (= *I am going to*) in English. It seems unlikely that all such portman-teaux can be ascribed to the application of regular phonological rules, but they could be handled if non-terminal insertion is allowed in DM (see Gouskova and Bobaljik to appear for a review).

Bennett, Harizanov, and Henderson's (2018) 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.

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 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.⁴

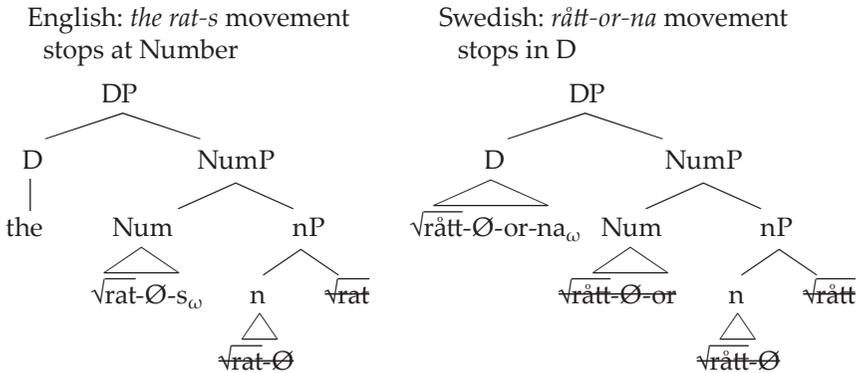
Another interface question is whether syntactic derivations can fail for phonological reasons, and if so, how. I assume that well-formed syntactic outputs can fail to map to a pronounceable output in the phonological component (Orgun and Sprouse 1999; Wolf and McCarthy 2010; Bye 2007; among others). Some specific examples of this are in §7.2 and §7.4.

⁴ Some 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" (see Zuraw and Lu 2009 on Toba Batak *um-/up-*) or "after the stressed syllable" (many examples, e.g., Ulwa; McCarthy and Prince 1990). Whether such infixes differ in meaningful ways from clitics that are sensitive only to PWD status is an open question.

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 (Delsing 1993). 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



It should be acknowledged that head movement in cases like this is controversial. Critics point out that movement fails to account for the position of adjuncts—e.g., adjectives in both Swedish and English NPs. Their positioning suggests that Ns do not need to move to D to get definiteness marking (see Embick and Noyer 2001 on similar issues for Bulgarian DPs, as well as Svenonius 2017, 2018; Harizanov and Gribanova 2019 for general discussion). The key alternative to movement would be the one explored by Embick and Noyer, namely, Lowering—and it is compatible with my proposal; so is Harizanov and Gribanova’s amalgamation as distinct from movement.

As I will show in §4, some Russian prepositions provide clear evidence of having morphological structure, which automatically translates into PWD status. Others get PWD status sometimes by virtue of being focused or ending up in final position, à la Selkirk 1995 (see §7.2). Still others get PWD status because the pieces realizing them are diacritically marked as PWDs in the lexicon (see §7.3–7.4).

3. Russian PWD 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. 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, Jongman, and Sereno 2010).

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

UR	With [+son]	Gloss	Pre-pausal	Before [ω+son with <i>jejo</i> 'her'
/rod-/	ród-a	'kin, type _{GEN.SG} '	ró <u>̣</u> _(NOM.SG)	ró <u>̣</u> tjejó (/ *ró <u>̣</u> djejó)
/rod-/	rod-n-á	'related _{ADJ.FEM.SG} '		
/rot-/	rót-a	'company _{NOM.SG} '	ro <u>̣</u> t _(GEN.PL)	ro <u>̣</u> tjejó

Unlike nouns, verbs, and adjectives, prepositions vary in whether their final obstruents devoice before sonorant-initial morphemes. Some, like /skvozi_ω/ and /protiv_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, /skvozi_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
- | | | | |
|-----|------------------------|-------------|-------------------------------|
| a. | /skvozi _ω / | skvósʲ nejó | 'through her _{GEN} ' |
| a'. | skvozi-nʲ-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. | /tʰerez/ | tʰerez nejó | 'through her _{ACC} ' |
| d'. | tʰéres | '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, 2012; Gouskova 2010). 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:
- | | | | |
|------|------------|-----------------|-----------------|
| i. | /pod-nʲos/ | pod <u>n</u> ós | 'carried up' |
| ii. | /ot-nʲos/ | ot <u>n</u> ós | 'carried away' |
| iii. | /pod-sel/ | pot <u>s</u> él | 'sat near' |
| iv. | /ot-sel/ | ot <u>s</u> él | 'sat away from' |
| v. | /pod-dal/ | pod <u>d</u> ál | 'kicked' |
| vi. | /ot-dal/ | od <u>d</u> ál | 'gave away' |
- b. gradient/absent across words:
- | | | | |
|------|-------------|-------------------|----------------------|
| i. | /god nʲos/ | gót <u>n</u> ós | 'carried for a year' |
| ii. | /kot nʲos/ | kót <u>n</u> ós | 'tomcat carried' |
| iii. | /god delal/ | gót <u>d</u> élal | 'did for a year' |
| iv. | /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: /tʰerez/ assimilates to the following voiceless obstruents, but /skvozi_ω/ does not have to. This difference correlates with morphotactic behavior; the prepositions that voicing phonology diagnoses as PWDs (such as /skvozi_ω/) can host

2nd-position clitics, cannot double, and fail to invert in approximative inversion; the ones that behave as non-words in voicing cannot host 2nd-position clitics, can double, and do invert (see §7 for more).

(8) Regressive assimilation in prepositions

	Before V ("Oksana")	Before (opp. voice) stop	
a. /k/	koksáne	<u>g</u> borísu	'to Boris'
b. /v/	voksánu	<u>f</u> téb'á	'in you'
c. /s/	soksánoj	<u>z</u> borísom	'with Boris'
d. /tʃerez/	tʃerez <u>o</u> ksánu	tʃeresteb'á	'through you'
e. /skvoz'ω/	skvó <u>s</u> o <u>l</u> ksánu	skvó <u>s</u> l <u>o</u> borísa	'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 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/ [bánda]. 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-ti-sa/ | v'ikristəlizəvətsə | 'to crystallize _(PERF) ' |
| b. | /kristal-iz-ova-ti-sa/ | kristəlizavətsə | 'to crystallize _(IMPF) ' |
| c. | /band-it-izm/ | bənditizm | '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-nosti/ | abarònəspasóbənsti | 'defense capability' |
| g. | /golov-o-kruz-en-ij-e/ | gələvəkruzénijə | 'vertigo (head-spinning)' |
| h. | /s-verx-telovek/ | svèrxteilavék | '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-i] 'in front of'). Some monomorphemic prepositions are also always stressed: /skvózi_ω/ '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., /təerez/ '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; Blumenfeld 2012), 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, 2006; Crosswhite 1999; Barnes 2003; Padgett and Tabain 2005). 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

⁵ This 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').

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 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’

gə <u>l</u> v-á	‘head- _{NOM.SG} ’	gə <u>l</u> óf	‘head- _{GEN.PL} ’
góləv-i	‘head- _{NOM.PL} ’	gələv-ə-kruzénijə	‘vertigo (compound)’

- b. Reduction patterns across phonological words: /zolot-o/ ‘gold’

zólət-ə ínkaĕ ‘Inca gold’ (*zólət-ə ínkaĕ)

- c. Reduction in unstressed prepositions shows they are word-internal

/ob vsex/	ə <u>b</u> a fséx	‘about all’	
/po gorod-u/	p <u>a</u> górədu	‘around the city’	
/pered vsem-i/	pirid <u>a</u> fsémi	‘about all’	
/na nix/	n <u>a</u> níx	‘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, Kasyanenko, and Gouskova 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)*, *teerez(ə)* show up with vowels only before a restricted set of items such as [vséx] (see 10c), and prepositions such as *vsléd*, *prótiv*, and *skvóz’* never have a vowel-final variant. It seems reasonable to assume that when the vowel in the preposition is realized as [a]—as in [sa stén] ‘from walls’—it is because the preposition is in the same phonological word as the following noun. After all, 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, Kasyanenko, and Gouskova 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 af-

ter a consonant, whereas the C variant shows up after a vowel (see (11a–d)). The alternation is close to categorical in Modern Standard Russian for [sʲa] but more variable for the other three morphemes in (11), compare (11a–d) with (11a'–d').⁶ The simplest analysis is that enclitics are parsed as word-internal when the vowel apocopes. 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

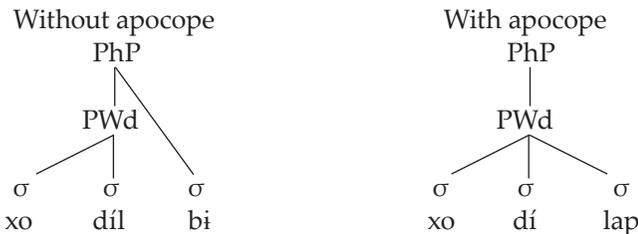
After C:	After V:
a. bojál=sʲa 'feared _{(MASC)'}	bojál-a=sʲi 'feared _{(FEM)'}
b. xodíl=bi 'walked _{(MASC)IRR'}	xodíl-a=p 'walked _{(FEM)IRR'}
c. xodíl=zɛ 'walked _{(MASC),} though'	xodíl-a=ɕ 'walked _{(FEM),} though'
d. búd-eɕ=li 'you will Q.'	búd-u=lʲ 'I will Q.'

V retention OK?

- a'. *bojál-a=sʲa
- b'. xodíl-a=bi
- c'. xodíl-a=zɛ
- d'. 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. I analyze apocope and devoicing more fully in §5.2.

(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 they are sometimes considered to be

⁶ The 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.

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, 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-itʲ/ [rubʲitʲ] ‘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 *[kʲivanu]. Prefixes likewise velarize following vowels instead of palatalizing themselves (e.g., [s-igr-an-n-ij] ‘played (partic.)’, [igr-atʲ] ‘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: /gusʲ-inʲ-a/ [gusʲinʲa] ‘she-goose’, /blag-ostʲ-inʲ-a/ [blagostʲinʲa] ‘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; Griбанова 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.istʲ] ‘stork’, [pa.úk] ‘spider’, etc.) at prefix boundaries ([pó-isk] ‘search’), and at compound boundaries [zver-o-obrázʲnij] ‘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}’, [tʲlʲ-á] ‘aphid_{NOM.SG}’, [dó] ‘the note “do”’, and many function PWds such as [já] ‘I’). There is no evidence for a weight distinction among syllables⁷—no vowel length contrast, and codas do not contribute weight based on any diagnostics.

⁷ Ryan (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. I listed the results of the diagnostics, applied to a range of Ps, in Table 1. Asterisks mean qualifications (* = cannot be stressed except in idiosyncratic collocations, ** = devoicing or stress applies if P is uttered in isolation or finally).⁸ Some prepositions 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.

Table 1. Phonological diagnostics for PWd status

Prep.	Gloss	Devoicing	Voicing assim.	Stressed?	V Reduction
k(o)	‘towards’	N/A	yes	no*	N/A (yes if <i>ko</i>)
pod(o)	‘under’	yes	yes	no*	yes
teérez(o)	‘through’	no**	yes**	no**	yes**
péred(o)	‘before’	no**	yes**	no**	yes**
ókolo	‘around’	N/A	N/A	yes	unclear
skvózi _ω	‘through’	yes	no	yes	no
próti _ω	‘against’	yes	no	yes	no

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

Russian prepositions come in at least two types: ones that consist of functional structure only, and ones that additionally contain lexical roots (as argued, for

⁸ The vowel reduction patterns for the final vowel of [ókolo] require further study. My impression is that it can reduce, but optionally so.

example, by Yadroff and Franks 2001). 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)).⁹ 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'ód | 'front (n)' | e. | mez-á | 'division (n)' |
| b. | pered-nik | 'apron (n)' | f. | mez-ev-á-tʃ | 'to plow a field (v)' |
| c. | o-pered-í-tʃ | 'to outrun (v)' | g. | pro-méz-rostʃ | 'perineum (n)' |
| d. | pered-ni-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 $\sqrt{\text{skvozi}}_{\omega}$ and $\sqrt{\text{protiv}}_{\omega}$). Several examples are given in (14).

- (14) Root prepositions that are PWds: $\sqrt{\text{skvozi}}_{\omega}$ 'through', $\sqrt{\text{protiv}}_{\omega}$ 'against'
- | | | |
|----|--------------|----------------------------|
| a. | skvoz-ni-ák | 'draft (n)' |
| b. | skvoz-íst-ij | 'see through, holey (adj)' |
| c. | skvoz-í-tʃ | 'to be drafty (v)' |
| d. | protiv-nik | 'adversary (n)' |
| e. | protiv-n-ij | 'disgusting (adj)' |
| f. | protiv-e-tʃ | 'to become revolting (v)' |

These examples can be easily multiplied; quite a few Russian prepositions are productive roots (e.g., $\sqrt{\text{krómé}}_{\omega}$ 'except' in [kromé-š-n-ij] 'excessive (adj)', [króm-k-a] 'edge (n)', $\sqrt{\text{ókoló}}$ 'near' [okól-its-a] 'vicinity'. The analysis of *ókoló* as monomorphemic is nonobvious, 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 Russian, and the relationship between [okolo] and historically related words such as [kolobók]

⁹ Example (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.

‘fairytale dough boy’ and [kolʲtso] ‘ring’ is too opaque. Sections 7.4 and 7.3 supply some morphosyntactic evidence that *ókolo* 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 2019). Some of these case morphemes (esp. *-i*) are no longer productively used on corresponding nouns (though *-i* survives as a case morpheme in another declension). 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.	$\sqrt{\text{blag-o-dar-}}$ 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-étš	‘twin (n)’
b.	po-sréd-nik	‘mediator (n)’	e.	blíz-k-ij	‘close (adj)’
c.	sréd-n-ij	‘average (adj)’	f.	s-blíz-i-ti	‘to bring closer (v)’

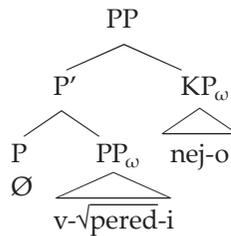
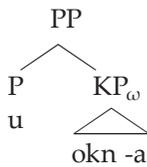
My analysis of the morphosyntactic structure of prepositions is shown in (17). I assume (with Yadroff and Franks 2001 and others) that prepositions that are morphologically simple and do not contain recognizable roots—e.g., *u*, *za*, *v*, *pro*, *dljá*—occupy the P head position (see (17a)). Morphologically complex prepositions (e.g., [v-pered-í]) have a more complex internal structure, with the null P head merged last (see (17b)). I assume that the root in *v-pered-i* combines with *-i* first, then with *v-*, then merged with the null P-head (as shown in (17b)) or with a null adverbializing category head (not shown).¹⁰ Prepositions

¹⁰ I do not show a full derivation for lack of space, and because it is somewhat peripheral to the main point. For my purposes, the crucial assumption is that some move-

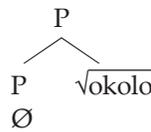
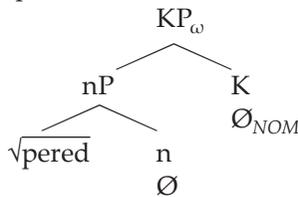
that have roots but no other overt morphemes (e.g., *pered*) consist of a binary branching structure: a root merged with a null P head (see (17d–f)). Such prepositions differ in whether the pieces that realize them are marked with ω diacritics, but the structures are the same. When such morphemes are used as nouns (e.g., [periód] 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: for presentation purposes, they are shown on the phrase nodes, though they are really the property of the complex heads contained inside. In other cases, they are properties of the vocabulary items, as shown in (17f). Syntactic diacritics are passed to the strings that realize the structures, once the vocabulary items are inserted.

(17) Structure

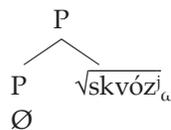
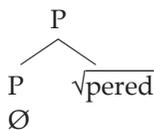
- a. [u okn-à] ‘by the window’, simple P b. [v-pered-í nejó] ‘in front of (prep) her’



- c. [periód] ‘front (noun)’ d. [ókolo] ‘near (prep)’



- e. [pered] ‘before (prep)’ f. [skvózi_omega] ‘through (prep)’



ment be involved in the derivation of *vperedí* ‘in front of’ but not *pered* ‘before’. Interested readers should consult Svenonius 2006 for a detailed treatment, albeit with different assumptions.

I assume that the semantic role of null P is to introduce a relational interpretation, which these same roots will lack in, say, nominal contexts, unless additional functional structure is present. The null P also is the explanation for the shared syntactic properties of these prepositions, such as their inability to be stranded by split scrambling and their selection for *n*-forms of pronouns (see §6).

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.

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; McCarthy and Prince 1993; Selkirk 1995); the main revision I introduce is reference to diacritic-marked constituent edges rather than lexical words.

- (18) 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.”
- (19) 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.”
- (20) NONRECURSIVITY(PWd): “Assign a violation mark for every PWd that dominates a PWd.”
- (21) EXHAUSTIVITY(PhP): “Assign a violation mark for every Phonological Phrase that dominates a constituent that is not a Phonological Word.”

Tableaux (22) and (23) treat the prosody of two minimally different Russian prepositions. Prepositions such as /teerez/ 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 (22a) 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. (Presentation note: when two PwDs are shown side by side, as in (22b), they are dominated by a PhP, which is not shown for brevity. This applies throughout the analysis.)

(22) Deriving [tɛiriznij_ω] ‘through her’

(pptɛerez (Kpnej- ω))	NONREC (PwD)	PwD-to- ω -R	EXHAUST(PhP)	ω -to-PwD-L
☞ a. [tɛiriznij _{pwd}]				** (tɛi, riz)
b. [tɛ́ris _{pwd}][nij _{pwd}]		*!(tɛ́ris) W		L
c. [tɛ́ris[nij _{pwd}]] _{PhP}			*! W	L
d. [tɛ́ris[nij _{pwd}] _{pwd}]	*! W			L

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

(23) Deriving [skv_ωs_ω nej_ω] ‘through her’, with a diacritically marked PwD preposition

(ppskvozi _ω (Kpnej- $\acute{\omega}$))	NONREC (PwD)	PwD-to- ω -R	EXHAUST(PhP)	ω -to-PwD-L
a. [skv _ω z _i nij _ω] _{pwd}				*!(nijo)
☞ b. [skv _ω s _ω] _{pwd} [nij _ω] _{pwd}				

5.2. Enclitics

As suggested in §3.3, enclitics such as [sja], [zɛ], [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 (24a), 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.¹¹

(24) Analysis of apocope in enclitics

/xodila _{ω} bi/ 'walked (fem) IRR'	ω -to-PWd-R	EXHAUST(PhP)	MAX-V
☞ a. [xodílap _{pwd}]			*
b. [[xodila _{pwd}] bi _{phP}]		*!	

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 (25a)), since the alternatives involve fatal misalignment by a whole syllable (as in (25b)) or creating a consonant cluster in final position (25c).

(25) 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. [[xodíl] _{pwd} bi _{phP}]			*	
b. [xodíl bi _{pwd}]	*!			
c. [xodíl _{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,

¹¹ I 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'a] apocope being basically mandatory in modern Russian, MAX-V would need to be ranked or weighted on an item-specific basis—lower for [s'a] than for the other enclitics. See Coetzee and Pater 2011; Linzen, Kasyanenko, and Gouskova 2013; Gouskova and Linzen 2015 for pertinent discussion and formalisms.

this requirement would not be satisfied in forms like [xodíla=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.

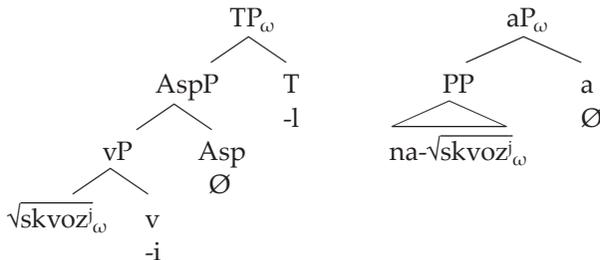
5.3. Diacritic-Marked Morphemes inside Other Words

This section treats roots like $\sqrt{\text{skvozi}}_\omega$ ‘through’ and $\sqrt{\text{protiv}}_\omega$ ‘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 (26). 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 (27).¹²

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

- a. /skvozi-i-l/ skvazíl ‘was drafty (v)’
- a’. /protiv-e-l/ pratível ‘became revolting (v)’
- b. /skvozi-n-oj/ skvaznój ‘drafty (adj)’
- b’. /protiv-n-ij/ pratívnij ‘nasty (adj)’
- c. /na-skvozi/ naskvósʲ ‘through (adv)’
- c’. /na-protiv/ naprótif ‘opposite (adv)’
- d. /skvozi-n-ʲak/ skvaznʲák ‘draft (n)’
- d’. /protiv-nik/ pratívnik ‘adversary (n)’

(27) Structure for [skvazíl] and [naskvosʲ] after constituents have been assembled



¹² Work 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 2019); 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 (26) predicts that in addition to the diacritic on the root, a second ω diacritic is generated for the entire structure assembled by head movement. (As before, the diacritic is shown on the TP and aP nodes, and is assumed to be the property of the branching structures they dominate.) The diacritics of roots like $\sqrt{\text{skvozi}}_{\omega}$ and $\sqrt{\text{protiv}}_{\omega}$ must be ignored in favor of the ones that are syntactically generated over the larger constituents. As shown in (28), this follows from the previously established ranking of NONREC(PWd) over ω -to-PWd-R (compare (28a vs. c)). The ω -marked morpheme *skvozi* is separated by a syllable nucleus, [i], from the right edge off the PWd, but the alternatives are worse.¹³

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

(TP $\sqrt{\text{skvozi}}_{\omega}$ -i-I $_{\omega}$)	NONREC (PWd)	EXH (PhP)	PWd-to- ω -R	ω -to- PWd-R	ω -to- PWd-L
a. [skvazi] $\dot{\text{i}}_{\text{pWd}}$				*	
b. [[skvós] _{pWd}] $\dot{\text{i}}_{\text{pWd}}$	*!				
c. [[skvós] _{pWd}] $\dot{\text{i}}_{\text{PhP}}$		*!			

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. The analytic points along with the rankings that derive them are summarized in (29). I do not present a detailed analysis of how non- ω -marked morphemes get promoted to PWd status in the phonology here; though see §7.2, where I adopt Selkirk's analysis.

(29) 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

¹³ The tableau leaves out another candidate, [skvós]_{pWd} $\dot{\text{i}}_{\text{pWd}}$, which has two prosodic words in a sequence. This satisfies ω -to-PWd-R and violates only the lower-ranked ω -to-PWd-L. But the problem with this candidate is that it incurs a violation of ONSET, faithfulness to voicing /z/ [s], and the constraints that negotiate stress patterns in such verbs. I assume all of these must outrank ω -to-PWd-R.

- (29) b. Proclitics are incorporated into PWd with hosts:
 NONREC(PWd), PWd-to- ω -R >> 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 >> ω -to-PWd-L

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). For my constraints to derive this, NONREC would be ranked below the alignment constraints.

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, but 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 spatial 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 spatial/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 spatially 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 *prámo* 'straight/right', as do root Ps that can be used spatially or temporally:

(30) Modification with *prámo* 'straight' for head Ps and root Ps

prámo + head P

- a. *v* dóm 'into the house_{ACC'}
- b. *s* déreva 'from the tree_{GEN'}
- c. *do* p'atí 'till five (o'clock)_{DAT'}
- d. *u* dóma 'by the house_{GEN'}
- e. *pó*сле polúdnja 'after noon_{GEN'}

prámo + root P

- f. *skvó*zj tunněl'j 'through the tunnel_{ACC'}
- g. *pered* dómom 'in front of the house_{INST'}
- h. *ókolo* dóma 'next to the house_{GEN'}
- i. *vnutří* dóma 'inside the house_{GEN'}
- j. *vsléd* jemú 'after him_{DAT'}

Just as in English, prepositions that cannot be used spatially or temporally also cannot be modified this way: **prámo blagodarjá druž'jám* '*right thanks to friends_{DAT'}, **prámo rádi drúga* '*right for the sake of a friend_{GEN'}, *prámo soglásno slovarjú* '*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 ušlá ot nevó/*jevó.

she walked_{FEM.SG} from him_{GEN}

'She left him.'

The *n*-forms and iota-forms of all the third person pronouns that exhibit this alternation are shown in (33); nominatives cannot be objects of prepositions, and locative/prepositional case forms are always objects of prepositions, so there is only one set of forms in each column.

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

	Nom	Acc, Gen	Dat	Inst	Loc/Prep
SG FEM	on-á	jejó/nejó	jéj/néj	jéj/néj	néj
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 **vbn*, **sbn*, **kbn*, with yer vowels (Hill 1977). Something similar happened in English: *nother* (**< an other*), *apron* (*< *a n apron*). 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	uvídélí jejó (<i>/*nejó</i>) ‘saw _{PL} her’	na <u>nejó</u> ‘onto her’	skvózí <u>nejó</u> ‘through her’
GEN	jevó (<i>/*nevó</i>) ne biló ‘he was not there’	ot <u>nevó</u> ‘from him’	otnosítel’no <u>nevó</u> ‘as regards to him’
DAT	kupíla jemú (<i>/*nemú</i>) ‘bought _{FEM} for him’	k <u>nemu</u> ‘toward him’	voprekí jemú/ <u>nemú</u> ‘in spite of him’
INST	risovala <u>ími</u> (<i>/*nimi</i>) ‘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 a possessive embedded inside an NP, as in (35), the *iota*-form 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 što virisovivalosí skvózi [jejó/*nejó bessvázniž rasskáz].
 here what drew_{INTRANS} through her_{POSS} incoherent_{ACC} story_{ACC}
 ‘Here is what emerged from her incoherent story.’ (RNC)

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

Póstnikov g’ladél skvózi nejó/*jejó.
 Postnikov looked through her_{ACC.PRON}
 ‘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).¹⁴

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

Vperedí ix zdál tól’ko vól’niž véter i volnújuceije
 ahead them_{ACC.PL} waited only free wind and exciting
 prikl’utseénija.
 adventures
 ‘Ahead, only free wind and exciting adventures awaited them.’ (RNC)

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

Vperedí níx naxodíls’ia otríád užé iz
 in.front.of them_{GEN.PL} was.located squadron already from
 nastojáceix vóinov.
 real warriors
 ‘Ahead of them was a squadron of already seasoned warriors.’ (RNC)

¹⁴ N-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).

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 Ćavar 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. (In the more formal register, the order would be *kakoj dom sgorel?*).

- (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). These show that both complex prepositions (*v-pered-i* ‘in front of’) and simplex ones (*u* ‘next to’) pattern alike with respect to P-First.

- (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 priparkováliš' 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 bolšóvo oní priparkováliš' 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 priparkovális' bolšóvo.
 in.front.of/next.to house_{GEN.SG} they parked big_{GEN.SG}
 'They parked in front of the big house.'
- (44) *Bolšóvo dóma oní priparkovális' vperedí/u.
 big_{GEN.SG} house_{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' vperedí.
 they parked in.front
 'They parked in front.'
- (46) *Oní priparkovális' u.
 they parked next.to
 'They parked in front.'

The syntactic analysis of the P-First constraint remains a mystery (see 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 Ćavar 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 teáški ja pilá iz krásnoj.
 from cup_{FEM.GEN} I drank from red_{FEM.GEN}
 ‘I drank from a red cup.’

- (48) *Vperedí dóma ja stojála vperedí krásnovo.
 in.front.of house_{MASC.GEN} I stood in.front.of red_{MASC.GEN}
 ‘I stood in front of a red house.’

- (49) Ot-stupíl dobrovólno ot Kíeva.
 from-retreated_{MASC.SG} voluntarily from Kiev
 ‘He retreated from Kiev voluntarily.’ (Yadroff 1999: 71, 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 *skvózi* and *prótiv* 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 *skvózi* (and I would judge the analog of (50) ungrammatical with that preposition).

- (50) pered étoj mmm pered verándoĵ
 in.front.of this_{FEM.INST} mmm in.front.of porch_{FEM.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 second position (after the first phonological word), and the subsequent ones are optionally attached to phonological words that follow.

- (51) A já bi soglasíls'ia bi rabótat'ⁱ i za 5,000 rubléj.
 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'i b ne razmnozál'sia 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'ⁱ bez problémi ze nám ze níkák nelz'já 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 is generated in the syntax, but whether copies get pronounced is resolved at PF (see Barbiers 2014). The Russian pattern suggests that doubling is filtered out or prohibited for constituents marked with ω ; the first copy of non- ω morphemes is pronounced obligatorily, and the later ones optionally. 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.¹⁵ But this is not typical of the class as a whole (see Philippova 2018

¹⁵ This type of inversion is likely not available to all speakers. I can strand *radi* in my own speech quite freely, but stranding *d'la* is not grammatical for me. If I had to read (54), I would destress both the prepositions, hence the stress markings. The RNC subcorpus from which this example is taken is based on written sources, which do not mark stress.

for more discussion of Russian prepositions that can either precede or follow their complements).

- (54) Ne p'jánstva radi, a udovól'stvija d'l'a.
 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) Kapitónov potetí ne pómnit, što bilo pósle ~~etovo~~, i
 Kapitonov almost not remembers what was after this_{GEN} and
 plóxo pómnit, što bilo dó ~~etovo~~.
 poorly remembers 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 slúteaje m'í rassmátrivajem kófe ne pósle
 In given event we consider coffee not after
 závtraka, a péred ~~zavtrakom~~.
 breakfast_{GEN.SG} but before breakfast_{INST.SG}
 'In this case, we consider coffee not after breakfast, but before.' (RNC)

- (57) ... I sám kagán v néj ili ócolo ~~nej~~.
 ... 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* intonational 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 monosyllabic, however, it must be in the first PP. Inverting the phrases results in sharp ungrammaticality:

- (58) *... I sám kagán ócolo nej 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, Kasyanenko, and Gouskova 2013; Gribanova 2015). 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 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 morphosyntactically 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 Wolf and McCarthy 2010)

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. I assume that a candidate where stress is shifted, [iliv^{L*}_ω], is categorically out because stress on *ili* can never be final.

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

	/ókolo _ω +H* nej _ω ili v+L*/	DEP-V	PITCHACC	MPARSE _{Foc}	ω-to-Pwd-L
☞ a. ⊙				*	
b. [ó ^H kolo _ω] [nej _ω ili v _ω]			*!		
c. [ó ^{H*} kolo _ω] [nej _ω] [iliv _ω ^{L*}]	*!				*(ili)
d. [ó ^{H*} kolo _ω] [nej _ω] [íliv _ω ^{L*}]			*!		*(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, ASSOCIATE_{PITCHACC} 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 (e.g., [u]) appear to resist stressing in this context altogether. 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 khagan v néj ili ú neje.
 and self kagán in her_{GEN} or near her_{ACC}

A few explanations are available. One is that some prepositions idiosyncratically resist stress, possibly due to a high-ranked morphologically specific constraint against stress insertion.¹⁶ There is evidence for this: Ukiah (1998) does note that these same prepositions are never stressed in fixed collocations; this is all the more puzzling as the vowelful allomorphs of *v*, *k*, *s* can be (e.g., in the archaic and stylistically marked [vó pole] ‘in a field’). Since Russian speakers see other evidence of arbitrary prosodic distinctions between morphemes,

¹⁶ High ranked but not undominated, since any preposition (except *v*, *k*, *s*) can be focused in other contexts, as in *já zabráł knígu ú óli* ‘I took the book **from** Olga’.

they have this hypothesis available for the distinction between *u* ‘by, near’ and *ókolo* ‘around’. The other possibility is that the condition is syntactic, since prepositions are known to be syntactically variable.

7.3. Ability to Host Second 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 (Marantz 1988; King 1995; Franks and King 2000; Embick and Noyer 2001; 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 the question particle *li* 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 uprošćenó dvizénije v
 not for.the.sake.of Q them so simplified_{PRED} traffic in
 tséntre, po kol'šú?
 center along ring
 ‘Is it not for them that traffic has been simplified so much downtown,
 along Ring Road?’ (RNC)

- (66) Ne mímo li níx teteót 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 *že*. They can occur on the main tensed verb, but they also commonly follow a 2nd-position clitic distribution:

- (67) Skvózi bi zémli-u im v tartarar'í proval-ít-sa.
 through IRR earth-_{ACC.SG} them into hell fall-_{INF-INTR}
 ‘Would that they fall through the earth into hell.’ (RNC)

- (68) *Vperedí* *že* *pl'ónk-i* *molékul-i* *vózdux-a*
 in.front.of though film-*GEN.SG* molecules-*NOM.PL* air-*GEN.SG*
dvígaj-ut-sa *naprávlenno ...*
 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*, **teerez že*, let alone **na že*, **k že*, 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.¹⁷ 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., [xóʈʲ bʲ] '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 [xóʈʲ], which is subsequently destressed, with both morphemes procliticizing onto the following word.

Recall from 4.1 that *ókolo* 'around' is claimed to be a monomorphemic preposition that is undergoing reanalysis and becoming a procliticizing preposition like *pered* 'before' and *teerez* 'through'. The RNC supports this: all the examples of [ókolo] hosting 2nd-position clitics (only [že] and [bi], 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.

¹⁷ The rule must be lexically specific, since there are some 1st-position unstressed clitics in Russian, too: the difficult-to-translate *nu* and adversative *da* come to mind. While both are normally 1st-position proclitics, they differ in their stress properties and differ in their ability to invert (thanks to Masha Esipova for drawing my attention to these facts).

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 nonsyllabic 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) teásám k p'iatí (66 hits), ✓ k teásám p'iatí (3 hits)
 hour_{DAT.PL} towards five_{DAT}
 ‘towards about 5 o’clock’ (RNC)

- (71) teása za poltorá (31 hits), ✓ za teása poltorá (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) blagodaríá zaprósam des'iatí *zaprósam blagodaríá des'iatí
 thanks inquiries_{DAT.PL} ten_{DAT}
 ‘thanks to about 10 inquiries’

- (73) *szádi* *t̩eelovék* *p̩iáti* **t̩eelovék szádi p̩iáti*
 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 spatial approximation. This makes it difficult to test prepositions that tend to only be used spatially, such as [pered] ‘in front of’. But Russian does supply a minimal pair that allows to control for semantics. The two prepositions meaning “through”, [t̩eerez] and [skvózi], primarily differ in phonological properties, and this difference correlates with ability to invert: [skvózi] is always a phonological word and cannot invert, whereas [t̩eerez] is not a phonological word and does invert:

- (74) **Mi projéxali t̩unnélej skvózi p̩iáti*, a *mózet i sést̩i*.
 we drove tunnels through five or maybe even six
 ‘We drove through about five tunnels, or maybe even six.’
- (75) *Mi projéxali t̩unnélej t̩eerez p̩iáti*, a *mózet i sést̩i*.
 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., [p̩iáti] in (75)) bears a strong pitch accent (H* in the simplest case).¹⁸ 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.¹⁹ Prepositions are relocated to the middle of the inverted structure after vocabulary insertion, once PWD diacritics have been

¹⁸ Another possibility, suggested by an anonymous reviewer, is that inversion is similar to 2nd-position cliticization, rather than being due to a pitch adjacency requirement. I suspect that pitch plays some role in 2nd-position cliticization, too: in Russian, the clause-initial PWD that hosts 2nd-position clitics is usually marked by prosodic focus of some sort. This is clear in the case of *li* ‘Q’, as well as the discourse particles, which are associated with intonational as well as positional prominence. So 2nd-position cliticization and approximative inversion could ultimately be unified.

¹⁹ In 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.

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 [ócolo] inverts, and indeed there are many (temporal) examples such as the following in the RNC:

- (77) Dn-éj teerez désiatj, časóv ókolo p'atí, v dvéri
 day-_{GEN.PL} through ten hour_{GEN.PL} around five in door
 mojéj kómnati-kvartíri postuteáli.
 my room-apartment 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 *teerez*.

7.5. Local Summary

To summarize, I have argued that the prepositions of Russian pattern as a class in narrow syntactic phenomena (n-allomorphy, P-First constraint in split scrambling), but are heterogeneous with respect to morphotactic and morphosyntactic patterns that are sensitive to their phonology (doubling, stranding in ellipsis, hosting 2nd-position clitics, and P-flop in approximative inversion). The patterns are summarized in Table 2 on the opposite page for a few key prepositions.

Table 2. Summary of morpho(syn)tactic pattern differences among Russian Ps. (*~yes* means 'is starting to', *~no* means 'used to')

		n-Allo. P-First Doubling Ellipsis				2p. Clitics	Appx. Inv.
k	'towards'	yes	yes	yes	no	no	yes
u	'by, near'	yes	yes	yes	no	no	yes
do	'till, up to'	yes	yes	yes	yes	no	yes
pod	'under'	yes	yes	yes	yes	no	yes
tčerez	'through'	yes	yes	yes	yes	no	yes
okolo	'around'	yes	yes	yes	yes	~no	yes
skvozi _ω	'through'	yes	yes	no	yes	yes	no
vperedi	'in front of'	yes	yes	no	yes	yes	no
blagodar'ja	'thanks to'	~yes	yes	no	yes	yes	no

I argued that the prepositions pattern together in the first two patterns because they all have or are P heads. The differences with respect to the last four patterns stem from two properties of these prepositions. First, some default to proclitic status, and others default to PWD status—either because their vocabulary items bear lexical ω diacritics (*skvozi*, *protiv*) or because they were put together in the syntax. These Ps will pattern differently with respect to morphological rules that refer to these diacritics (2nd-position clitic positioning, P-flop in approximative inversion). Second, some prepositions can be promoted to PWD status in the phonology when the syntax puts them in certain places, and others cannot be. Promotion is categorically out for monoconsonantal *k*, *v*, *s* for obvious reasons, and for prepositions such as *u* and *pro* for murkier reasons. Longer prepositions can be promoted to PWDs, Selkirk (1995) style, and this allows them to be stranded by ellipsis and prevents them from being doubled. The syntax does not differentiate between Ps in these patterns, but the phonology treats them differently.

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 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, Kasyanenko, and Gouskova 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).

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.

8.3. Every Step of Movement Adds a PWd Diacritic

Another possibility, suggested by an anonymous reviewer, would tweak my proposal slightly so that every step of movement generates a PWd diacritic. The phonological component would then decide which bracketings to treat as words via the action of constraints such as NONRECURSIVITY(PWd). This is an interesting idea that could be viewed as a combination of traditional cyclicity (Chomsky and Halle 1968) with modern assumptions about the syntax (for proposals that could be interpreted as employing this idea, see, e.g., Marvin 2002; Bachrach and Wagner 2007). These proposals cannot be addressed in the detail they deserve here, but I see two main issues. One is recognizing that morphemes are heterogeneous with respect to supposedly cyclic rules. Some morphemes are consistent with the cyclic treatment, while other, similar ones ignore phase boundaries (see Gouskova and Linzen 2015 on Russian diminutives; for English, Benua 1997 has a particularly clear discussion of arbitrary distinctions between affix classes). Another issue is getting the phonology to be appropriately sensitive to differences between morpheme boundaries and word boundaries. Such differences have been recognized for a long time (starting at least with Trubetzkoy 1939; see Gouskova 2018 for an overview), and I doubt they can be viewed as a purely phonological matter. I am willing to suspend my skepticism pending a more developed exploration of this idea.

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*, *teerez*, *ócolo*), and phonological words of varying lengths (*skvózj*, *pozadí*, *otnositel'no*). 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 of lexically pre-designated PWD prepositions.

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