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Phonological Evidence for a Distinction
Between Russian Prepositions and Prefixes
[*preprint version*]

1. Introduction

There are cases in which two elements seem to be identical in phonological terms, but pattern differently in morphosyntactic terms. One such case is that of Russian prefixes (1) and prepositions (2), which appear to belong to the same unique phonological class (Matushansky 2002, Zubritskaya 1995, *inter alia*).

(1) **PFX** + -ložit[j] (verbal stem 'lay, put')   (2)   **PREP** + komnata 'room'
     otložit[j] 'to put aside'   **ot** komnaty 'from the room'
     podložit[j] 'to put'   **pod** komnatoj 'under the room'

A less discussed aspect of these data is that prepositions (PREP) and prefixes (PFX) *cannot* be unified as one class morphosyntactically.[1] While it might be tempting to view this fact as indicative of a mismatch between phonology and morphosyntax, the central claim of this paper is that there is no such mismatch, only the superficial appearance of one: PREP and PFX can and should be analyzed as both phonologically and morphosyntactically distinct. In particular, careful examination reveals that the morphosyntactic distinction between PREP and PFX is reflected in their phonology, via differing jer realization patterns PFX- vs. PREP-finally.

In what follows, I present evidence to substantiate the above claims about the morphosyntactic and phonological disunity of PREP and PFX (Section 2), concentrating especially on the phonological evidence. I then discuss a Stratal OT approach to the evaluation of PREP and PFX, with details about how we might accommodate jer vocalization PREP-finally (Section 3). Finally, I argue against an alternative approach of Rubach's (2000), in which PREP and PFX are treated as identical (Section 4).

2. The Nonidentity of PREP and PFX

As a starting point for the discussion, I define a number of the concepts and notational conventions to be used in this work. P is used as a cover term for the class containing PREP and PFX, and P-complex refers to the linearly adjacent phonological units that represent either the PFX-stem complex or PREP with its rightward host. The vowel transcribed throughout as [y] is [+high, +back, -round], and the superscript [j] marks palatalized consonants.

Capitalized vowels are jers, which are posited to be abstract vowels, realized only in certain morphophonological contexts. Russian has two jers, whose surface realizations are [o] and [e]. Following Lightner 1979 and Pesetsky 1979, *inter alia*, I assume that jers are underlyingly present, since, for example, the quality of the surfacing vowel is not predictable. For the purposes of this exploration, we assume that a jer is underlyingly present if we can find a morphological variant of some word in which the jer is realized as a full vowel. The Stratal analysis of jers proposed in later sections of this paper adopts Yearley's (1995) approach, in which jer vowels are assumed to be mora-less in the input to an OT evaluation.

[1] While this point may seem somewhat apparent, the phonological identity of Russian PREP and PFX has led to the proliferation of analyses that treat them as identical in all aspects: (morpho)phonological, (morpho)syntactic, and semantic (Biskup to appear, Ramchand 2004, Rubach 2000, Svenonius 2004b). Matushansky's (2002) work notes that these are separate categories syntactically, but much recent work has overlooked this distinction.

There is good reason to believe, along with Matushansky (2002), among others, that PREP and PFX are indeed identical phonologically. Many PREP and PFX are homophonous (Fig. 1), though not all prefixes have a prepositional counterpart, and vice versa (Fig. 2).[2]

prefix	-ložitʲ	-iti
otO-	otložitʲ 'to put aside'	otojti 'to walk away'
podO-	podložitʲ 'to put under'	podojti 'to walk up to
pri-	priložitʲ 'to apply'	prijti 'to arive'
vO-	vložitʲ 'to invest, insert'	vojti 'to come in'
izO-	izložitʲ 'to recount'	izojti 'to go from'
sO-	složitʲ 'to put together'	sojti 'to leave'
pro-	proložitʲ 'to lay'	projti 'to pass'
do-	doložitʲ 'to report'	dojti 'to reach (by walking)'
preposition	**komnata 'room'**	**ljod 'ice'**
otO 'from'	ot komnaty 'from the room'	oto lʲda 'from the ice'
podO 'under'	pod komnatoj 'under the room'	podo lʲdom 'under the ice'
pri 'by'	pri komnate 'by/near the room'	pri lʲde 'by the ice'
vO 'in'	v komnate 'in the room'	vo lʲdu 'in the ice'
izO 'out of'	iz komnaty 'from the room'	izo lʲda 'from the ice'
sO 'with'	s komnatoj 'with the room'	so lʲdom 'with the ice'
pro 'about'	pro komnatu 'about the room'	pro ljod 'about the ice'
do 'as far as/before'	do komnaty 'as far as/before the room'	do lʲda 'until the ice'

Figure 1: Homophonous prefixes and prepositions

prefix	-ložitʲ	-iti
razO-	razložitʲ 'to place, arrange'	razojtisʲ 'to split up (recipr)'
pere-	pereložitʲ 'to move (elsewhere)'	perejti 'to cross'
preposition	**komnata 'room'**	**ljod 'ice'**
bez 'without'	bez komnaty 'without a room'	bezo lʲda 'without ice'
kO 'to'	k komnate 'to the room'	vo lʲdu 'in the ice'

Figure 2: Non-overlapping prefixes and prepositions

Where they overlap, the two categories do appear identical, and there is good phonological evidence to support such a conclusion. Without entering into an extensive discussion (see Matushansky 2002), we can see that at least four phonological processes unify PREP and PFX.

One such process is palatalization, which does not apply across the P-complex boundary in the case of both PREP and PFX (3a-b). The fact that the palatalization pattern differs from the pattern we find at the word-suffix boundary (3c-d) indicates that a prosodic boundary exists between P and the rest of the complex (Farina 1991, Rubach 2000, 2002).[3]

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[2] In the table below and throughout the paper, many of the prefix-stem combinations have more than one possible gloss. I limit myself to one, since the gloss is not my primary concern here. In a few preposition-noun examples (e.g. *pri lʲde*), the combinations are possible but semantically somewhat unlikely. I also omit larger prepositions (e.g. *okolo, čerez, skvozʲ*), since they can bear stress and appear to hold the status of independent words. Finally, the exposition here concentrates on prefixes in combination with verbal, rather than nominal, stems. Whether prefixes with nominal stems pattern identically to prefixes with verbal stems (especially with respect to the jer realization facts) is an interesting question for future exploration.

[3] For the present discussion, what matters is that the pattern at the P-complex boundary differs from that of the word-suffix boundary. I do not attempt to encompass the very detailed palatalization patterns of Russian here; for discussion, see Padgett 2001 (on the co-occurrence of [ty] and [tʲi] but not *[tʲy]), and Blumenfeld 2003.

(3) a. /obO + iskatʲ/ → [obyskatʲ], (*obʲiskatʲ) 'search.INF'
    b. /obO ide/ → [obyde], (*obʲide) 'about Ida'
    c. /obid + e/ → [obʲide], (*obyde) 'offense.DAT'
    d. /alʲt + ist/ → [alʲtʲist], (*alʲtyst) 'viola player'

Another indicator of the presence of a prosodic boundary is hiatus resolution, which normally takes place at the word-suffix boundary (4a), but not across the P-complex boundary (4b-c).

(4) a. /palʲto + iško/ → [palʲtiško], (*palʲtoiško) 'little coat'
    b. /po + obedatʲ/ → [poobedatʲ] (*pobedatʲ) 'lunch.INF'
    c. /po asfalʲtu/ → [poasfalʲtu] (*posfalʲtu, *pasfalʲtu) 'along the asphalt'

Unlike palatalization and vowel hiatus resolution, other processes exhibit no such prosodic boundary. For example, word-final devoicing does not apply to P-final consonants.

(5) a. /nadO oknom/ → [nadoknom] (*natoknom) 'above the window'
    b. /izOumitʲ/ → [izumitʲ] (*isumitʲ) 'amaze.INF'

Finally, unstressed Russian vowels in words reduce to schwa, while pretonic vowels do not reduce to schwa completely (6a). This pattern is never found across word boundaries (6b). The fact that vowels in PREP and PFX do not reduce to schwa pretonically (6c-d) is therefore indicative of the lack of a prosodic boundary (for one analysis, see Crosswhite 1999).

(6) a. /moloko/ → [məlakó] 'milk'
    b. /malo skazano/ → [málə skázənə] (*málá skázənə) 'little said'
    c. /podO lʲdom/ → [pədalʲdóm] 'under the ice.PREP'
    d. /otObratʲ/ → [ətabrátʲ] 'take away.INF'

This mixed set of characteristics is a reflection of the unique status of PREP and PFX as a class: the two subgroups are like one another, and like nothing else in Russian phonology.

Prosodic Boundary	No Prosodic Boundary
Palatalization	Pretonic Vowel Behavior
Vowel Hiatus Resolution	Word-final Devoicing

Figure 3: Prosodic boundary across the P-complex

Though these phenomena point to the conclusion that PREP and PFX should be counted as one class, in what follows I point out that there are morphosyntactic and jer realization facts that point in the other direction.

2.1 The Morphosyntactic Disunity of P

In this section we concentrate on a set of morphosyntactic facts that distinguish PREP and PFX. Using diagnostics established by Zwicky and Pullum (1983) as a starting point for the discussion, it can be demonstrated that PREP behave like clitics, while PFX behave like affixes.

   One relevant characteristic is Criterion A, which states that affixes exhibit a higher degree of selection with respect to their stems than do clitics with respect to their hosts. Russian PREP exhibit selectional requirements only as syntactic heads; that is, PREP dictate what their complement can be, but not what element can follow them in the P-complex.

(7)   k (etomu) / (krasivomu)   domu
      to this.DAT beautiful. DAT house.DAT
      'to this beautiful house'

By contrast, PFX must be followed immediately by a stem, and nothing else.

Furthermore, there are lexical gaps in the distribution of PFX (8). This contrasts with PREP, which combines with any semantically viable complement.

(8) a. nanesti 'bring (some amount of)'
     b. nabratʲ 'collect (some amount of)'
     c. najti 'find'
     d. navestitʲ 'pay a visit'
     e. napitʲsja 'get drunk'
     f. nastojatʲ 'insist'
     g. *naiskatʲ 'na-search'
     h. *naterjatʲ 'na-lose'
     i. *naimetʲ 'na-have'
     j. *naljubitʲ 'na-love'
     k. *naspatʲ 'na-sleep'

This pattern is consistent with Zwicky and Pullum's Criterion B, which dictates that arbitrary lexical gaps are more characteristic of affixes than of clitics.

A final characteristic that distinguishes PREP from PFX comes from Russian examples in which PREP, but not PFX, can be stranded or can appear with an elided complement (Svenonius 2008, Švedova 1982).

(9) a. Katja krasila   nad oknom,   a   Vasja pod.
         Katja painted.3SG.F above window.INSTR CONJ Vasja under
         'Katja was painting above the window, and Vasja under (it).'

     b. Ne sušestvuet svobody   ot   bez   svobody   dlja.
         NEG exists.3SG freedom.GEN from without freedom.GEN for
         'There is no such thing as freedom from without freedom for.'

     c. Vse   rassčitano   ot   i   do.
         all.NOM calculated.3SG from and to
         'Everything has been thought through, from (beginning) to (end).'

     d. Naš   načalʲnik privyk   kričatʲ po povodu i   bez.
         our.NOM boss.NOM accustomed.3SG.M yell.INF for reason and without
         'Our boss is used to yelling at us, with reason and without.'

Not all PREP can appear without a complement; there appears to be a restriction requiring that complement-less PREP be at least the size of a full syllable (CV). Monoconsonantal PREP, such as *k, s*, and *v*, cannot appear without a complement.[4]

Despite this condition, it is still the case that multiconsonantal PREP can appear without a complement, indicating that any dependence on a host is prosodic, not morphosyntactic. This is not the case for PFX, which cannot under any circumstances appear without the verbal stem.

(10)   *Kostja podošel,   a   Katja ot(O)-.
          Kostja *under*.came.3SG.M CONJ Katja *from-*
          intended meaning: 'Kostja approached, but Katja (moved) away.'

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[4] While realizing a jer in the case of monoconsonantal prepositions would yield a legitimate CV syllable, the prosodic weight requirement here is apparently not the right kind of motivation for jer realization. Some speakers can insert an extra-long schwa (distinct from jer realization) to add weight, but this is non-standard and apparently not acceptable for many speakers.

This fact follows logically if a morphosyntactic distinction is made between PFX (which behaves like an affix, and is morphosyntactically dependent on a stem) and PREP (which behaves like a clitic, and is prosodically, but not morphosyntactically, dependent on a host).

2.2 The Phonological Consequences of Morphosyntactic Disunity

The morphosyntactic distinction between PREP and PFX illustrated in Section 2.1 is also reflected phonologically via P-final jer realization. First, certain types of PREP-final jer realization are subject to more variability than are parallel cases of PFX-final jer realization. Second, the motivation for PREP-final jer realization differs from the motivation for PFX-final jer realization. In later sections, I argue that these phonological differences follow from an analysis that treats PREP and PFX as composed at distinct levels of a stratal phonology.

2.2.1 Variability

Preliminary evidence from Google searches indicates that PREP-final jer realization in certain contexts is more variable than is PFX-final jer realization, in similar contexts.

PREPOSITIONS	VARIATION	PREFIXES	VARIATION
s vzroslym (with adult)	17%	somnevatʲsja (to doubt)	99.99%
so vzroslym	83%	smnevatʲsja	0.01%
s mnogimi (with many)	16%	sožgla (burned.3SG.F)	99.99%
so mnogimi	84%	sžgla	0.01%
s množestvom (with a large quantity)	53%	sžeg (burned.3SG.M)	99.85%
so množestvom	47%	sožeg	0.15%

Figure 4: Jer realization variability in PREP *vs*. PFX

The results were obtained through searches via www.google.ru, using a Cyrillic font. There are numerous problems with considering Google searches as an accurate reflection of the spoken language, so the numbers here should of course be considered with skepticism. Still, there are statistically significant patterns here.[5]

It may be useful to note here that not all PREP exhibit variability of the sort illustrated in Figure 4. The variability appears limited to monoconsonantal PREP, and to cases in which the left edge of the host word begins with a consonant cluster. For example, we can contrast the variability in Figure 4 with the lack of variability when multiconsonantal PREP are involved.

PODO	VARIATION
pod vzroslym (under adult)	99.55%
podo vzroslym	0.45%
pod mnogimi (under many)	99.75%
podo mnogimi	0.25%
pod množestvom (under a large quantity)	99.99%
podo množestvom	0.01%
BEZO	VARIATION
bez vzroslogo (without an adult)	100%
bezo vzrosogo	0%

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[5] A reviewer points out that the Google results could be skewed also by the fact that one cannot control for the level of language competency of texts on the web. While this is certainly true, the statistics in Figures 4 and 5 suggests a robust pattern, abstracting away from any noise that might be introduced by the usual factors. A search in the National Corpus of the Russian Language (http://www.ruscorpora.ru/search-main.html) confirms the trend, though the corpus contains not nearly as many tokens.

bez mnogix (without many)	100%
bezo mnogix	0%
bez množestva (without a large quantity)	100%
bezo množestva	0%

Figure 5: Jer realization variability in multiconsonantal PREP

A natural question arises at this point: to what can we attribute the fact that only monoconsonantal PREP exhibit variability at the P-complex boundary when it comes to jer realization? The relevant observation seems to be that monoconsonantal PREP contribute to the formation of complex consonant clusters when combined with the host word's edge. Jer realization can add a vowel, potentially circumventing the formation of undesirable complex consonant clusters. We can make sense of the results in Figure 5 by observing that within words, a different strategy – resyllabification – can resolve offending complex clusters, without necessitating jer realization. Consonant clusters at the word edge do not have this strategy made available to them, unless a jer vowel is inserted to provide an additional nucleus.[6]

We can attribute the source of the variation, preliminarily, to at least two factors. First, it is possible that there is inter-speaker variability with respect to what a permissible complex cluster is. Second, there may be some cases of lexicalized jer realization, in which the vocalized and non-vocalized PREP-host combination mean different things. This is the case with the last example in Figure 4: s *množestvom* is used to mean 'with a mathematical set', whereas s*o množestvom* is used to mean 'with a great number of (something)'.

Finally, we are in a position to address the question of why PFX-final jers do not exhibit the same kind of variation, even in the case of monoconsonantal PFX with complex consonant clusters at the verb stem's edge. Though the question deserves further exploration, it seems reasonable to claim preliminarily that this invariability is a result of the closer morphosyntactic dependence of the PFX on its verbal stem.

2.2.2 Motivation

A second phonological reflection of the morphosyntactic disunity between PFX and PREP relates to the motivation for jer realization in different kinds of P-complexes. As formulated in Yearley 1995 (see also Pesetsky 1979, Rubach 1984, *inter alia*), there are two different contexts in which PFX-final jers are realized. The first, which holds also for PREP-final jers, is when a jer is realized to resolve an otherwise unparsable word-edge consonant cluster (Matushansky 2002). The second, which holds for PFX-final jers exclusively, is when the verbal stem contains an unrealized jer.

This second motivation has the consequence that PFX-final jers are realized even when the resulting word-edge consonant cluster would not be objectionable. For example, consider the near-minimal pair [podprygnut^j] 'to jump up', and [podopru] 'support.1SG.FUT'. The pair is near-minimal in the relevant sense because the left edge cluster (before the addition of the PFX) is almost identical (-pry / -pru) in both cases. Clearly, it is not the phonotactics of the word-initial cluster that trigger jer realization, since in that case, both words would vocalize a prefixal jer. Additionally, while *[podpru] is clearly unacceptable, no general constraint in Russian phonology can be invoked to rule this form out. The natural suspicion might be that the jer in [podopru] is realized for some other reason: namely, because the verb stem contains an unrealized jer (c.f. podperet^j 'support.INF'). By contrast, there is no jer in the verb stem of [podprygnut^j]. Below I list several more such minimal pairs.

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[6] While, as a reviewer points out, if would be helpful to see an example with the same sort of cluster (not broken up) word-medially, such word-medial clusters will typically be resyllabified so as to resolve the offending consonant combination.

JER-CONTAINING STEMS	STEMS WITHOUT JERS
sogret^j 'heat up.INF' (c.f. gOret^j 'burn.INF')	sgrebat^j 'take/collect.INF'
sobrat^j 'collect.INF' (c.f. razbOr 'dissection, anlysis')	sbrasyvat^j 'throw off.INF'
sodrat^j 'tear off.INF' (c.f. dEret^j 'tear.INF')	sdružit^jsja 'become friends.INF'

Figure 6: Jer-containg stems *vs.* stems with no jer

This pattern indicates that the internal structure of the verb stem must in some sense be accessible when the PFX is attached, so that the PFX-final jer can be sensitive to the presence of the underlying stem-internal jer.

The pattern illustrated in Figure 6 does not seem to hold for PREP-final jers. The PREP-final jer is sensitive only to its immediate environment, but not to jers internal to the neighboring word. For example, consider the near minimal pair [sokrotit^j] 'abbreviate.INF', and [s krotkim] 'with a meek (person)'. The first involves the PFX /sO-/ in conjunction with a verbal stem that contains an unrealized jer (c.f. *kOrotkij* 'short'). The second involves the PREP /sO/ in conjunction with an adjective of an almost identical phonetic contour to the verbal stem. The contrast in PREP-final vs. PFX-final jer realization in these examples suggests that there is no phonetic reason to vocalize a jer to break up the legal consonant cluster [skr] in the prepositional example; the source of PFX-final jer realization is an underlying stem-internal jer.

No such motivation need be invoked to explain PREP-final jer realization, which can always and only be attributed to the need to resolve unparsable word-initial consonant clusters. Consider the prepositional example below, in which the neighboring word contains a jer, but the jer in the preposition /sO/ is not realized (following Steriopolo 2007).

(11)   /sO pOsom/ (c.f. p^jos 'dog') → [s psom] 'with a dog.PREP'

If PREP behaved phonologically just like PFX, then we would expect the form [so psom], with the PREP-final jer realized in response to the presence of an underlying jer in the neighboring word. That this is not the case suggests that the realization of PREP-final jers has nothing to do with whether or not the neighboring word contains an underlying jer.

2.3 Summary

The evidence presented in this section was meant to substantiate the claim that PREP and PFX exhibit morphosyntactically distinct behaviors,[7] and further, that this morphosyntactic distinction has phonological consequences in two domains.

The first domain is PREP-final, but not PFX-final, jer realization variability among speakers. Provisionally I hypothesize that this variation can be attributed to a combination of the morphosyntactic independence of PREP from its host, and the likely possibility that speakers' restrictions on the possible contour of the word-initial cluster vary. The second domain is PFX-final jer realization in the context of unproblematic word-initial clusters. Here the motivation for this seemingly unnecessary jer realization is the presence of an underlying jer in the verb stem.

Any analysis seeking to account for these data must allow for prefixal jers to be sensitive to the internal structure of the verbal stem. The evidence also suggests that no such sensitivity

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[7] A reviewer raises the interesting question of whether PREP and PFX are distinct lexical entries, pointing out that their distinct behavior could be a consequence of the context in which they appear, rather than of their different status as morphosyntactic objects. Though the focus of this work is on accounting for the distinct behavior of the two groups, whether or not these are distinct lexical items is indeed a topic for further research.

need be invoked for PREP. In what follows below, I use this evidence to develop a level-ordered phonology for PREP and PFX in which they are composed at different levels.

3. A Stratal Approach
3.1 Preliminaries and Assumptions

To accommodate the patterns described in Section 2, I develop a three-tiered approach in Stratal OT (Kiparsky, 2000), with stem, word, and postlexical levels (as developed for Russian palatalization by Blumenfeld 2003, and later Gribanova 2008). In this model, a full OT evaluation takes place at each level, and constraint rankings may differ at each level of evaluation, with the output of each level acting as the input to the next level (bearing some resemblance to Rubach's 1997 DOT).[8]

On the approach developed here, PFX and PREP are evaluated at distinct strata, consistent with their differing morphosyntactic and phonological properties. PREP are evaluated at the postlexical level, since they behave like clitics; PFX are evaluated at the word level, since they behave like affixes. I will assume here that jer vocalization takes place at the word and postlexical levels, but not at the stem level. There is independent reason to think that this assumption is well-founded, since other affixes added at the word level may effect jer vocalization and necessitate reference to the internal structure of the stem.

Given the framework outlined here, PFX will be evaluated simultaneously with the verb stem, so that the constraint(s) responsible for jer realization may apply to an input in which any underlyingly present jers in both the PFX and stem are accessible.

INPUT TO WORD LEVEL	OUTPUT OF WORD LEVEL
/sObOratʲ/ 'collect.INF' (c.f. *razbor* 'analysis')	[sobratʲ]

Figure 7: Prefixal jer vocalization schema

On such an approach, jer realization PFX-finally can be triggered by jers internal to the stem, because both PFX-final and stem-internal jers are evaluated simultaneously.

The evidence described in Section 2.2 suggests that the jer realization process for PREP need not refer to the internal structure of the neighboring word. To model this fact, we attach PREP to words that have already undergone word level evaluation. Any jers contained in the relevant word have already been evaluated at the word level, and have been either vocalized (made into full vowels) or deleted. This means that the internal structure of the host word is not accessible at postlexical evaluation.

WORD LEVEL	POSTLEXICAL LEVEL
/lEdom/ → [lʲdom] 'ice.INSTR' (c.f. *ledjanoj* 'icy.NOM.M')	/sO lʲdom/ → [so lʲdom] 'with ice.INSTR'

Figure 8: Prepositional jer vocalization schema

This approach predicts that PREP-final jer realization will be triggered only to resolve prohibited word-initial obstruent clusters. The fact that variation is observed for prepositional, but not prefixal, complexes aligns with the traditional view that variation is more likely to take place in postlexical, rather than word level, phonology (Kiparsky to appear).

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[8] A reviewer notes that another way of looking at these same data might be in terms of a Distributed Morphology approach, in which the prefix and stem are part of one phase, while the preposition and its host are parts of distinct phases (this could be made to correspond phonologically to the idea of the strict cycle). While it would be very interesting indeed to see this worked out, such an account would depend on the existence of a satisfactory analysis of prefixation in Russian.

3.2 Formalization: Prepositional Jer Realization

Here I explore an account of standard cases of prepositional jer realization within the general framework outlined above. Following Yearley (1995), I hypothesize that jers are mora-less vowels, and that correspondingly, constraints can be invoked to regulate when these vowels are assigned moras in an output structure. The relevant constraints are given in (12).

(12)   DEP-μ: A mora in the output corresponds to a mora in the input.
        DEP-V: A mora in the input corresponds to a mora in the output.
        MAX-V: A vowel in the input corresponds to a vowel in the output.
        *CC: Avoid complex codas.

In applying these constraints to Russian inputs, the intuition is that jer realization is discouraged unless it is necessary to avoid violation of a more highly ranked constraint on syllable structure, such as *CC. Ranked as below, these constraints can account for the most basic cases of jer vocalization and deletion.

kusOk 'piece. NOM'	DEP-V	*CC	DEP-μ	MAX-V
a. kusk		*		*
b. ☞ kusok			*	
kusOka 'piece.GEN'	DEP-V	*CC	DEP-μ	MAX-V
a. kusoka			*	
b. ☞ kuska				*

Figure 9: Simple cases of jer realization/deletion

A number of additional constraints are required to deal with the more complicated case of PREP-final jer realization. As has been mentioned before, the jer in P is frequently realized to resolve potentially problematic sonority sequences (Katz 2006, Matushansky 2002, Steriopolo 2007, *inter alia*). One example of a problematic sonority sequence in modern Russian is the case of word-initial fricative geminates not immediately followed by a vowel, as in (13).

(13)   a. so.stra.xom (*sstraxom) 'with fear'
        b. so.sto.lom (*sstolom) 'with a table'
        c. vo.vla.sti (*vvlasti) 'in power'
        d. vo.vre.mja (*vvremja) 'in time'

To capture this generalization, I employ a constraint that forbids geminate fricative sequences not immediately followed by a vowel at the left word periphery: [ₒFFC.[9]
    There are further constraints on the sonority of syllables in Russian phonology (Jespersen 1904, Sievers 1881). The Russian syllable must have only one syllable peak (SSC: every syllable must have one and only one sonority peak), and the relevant hierarchy, as described in Katz 2006, is given below.

(14)   Russian Sonority Hierachy:
        vowels >> glides/liquids >> nasals, v >> obstruents

More generally, and abstracting away from variation, we might be interested in what other constraints are relevant to the understanding of what makes a parsable word-edge obstruent cluster in Russian. Consider the table below, in which unparsable obstruent clusters (on the right-hand side) are derived by not realizing the PREP-final jer.

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[9] This constraint is of course stipulative, but it's not our primary concern here to explain this facts. I consider it sufficient, for now to note that such sequences are marked, cross-linguistically (Katz 2006).

LEGAL CLUSTERS	ILLEGAL CLUSTERS
sdnem (with the day)	***svzgl**jadom (with a glance)
spticoj (with a bird)	***svzd**oxom (with a sigh)
vptice (in a bird)	***vmgn**ovenie (in an instant)
sčteniem (with reading)	***svspl**eskom (with a splash)
kstrane (to the country)	***smst**itelʲem (with an avenger)
kstrofe (to the (poetic) line)	***svš**ivym (with a flea-ridden (person))
smračnostju (with gloom)	***slʲd**om (with ice)
knravstvennosti (toward morality)	***klb**u (to the forehead)
svnešnim (with the outside)	***vmgl**e (in the haze)
smladšim (with the youngest)	***svzr**oslym (with an adult)

Figure 10: Legal *vs*. illegal word-initial obstruent clusters

From this evidence we can draw a number of conclusions about what constitutes a parsable word-edge obstruent cluster in Russian. We have already noted that the syllable must have only one sonority peak, and that the constraint [ωFFC is relevant. The evidence above indicates that these clusters allow one appendix position, but not more than one.[10] This is demonstrated by the contrast between [vptice], in which a sonority violation would result unless the first consonant were in an appendix, and *[smstitelʲem], in which inserting the leftmost consonant into an appendix position does not resolve the sonority problem, and only one appendix position is apparently available. To enforce the one-appendix generalization, we employ the constraint *COMPLEX APPENDIX (*CA): penalize complex word-initial appendices.

The relevant generalization appears to be that appendicizing the leftmost consonant is an initial strategy. If a sonority violation remains, a PREP-final jer is vocalized. This can be reflected by the ranking of DEP-μ over the constraint Parse-seg-σ (parse all segmental material into a syllable). Our final ranking, then, is as follows:

(15)   [ωFFC, SSC, *CC, *CA >> DEP-μ >> Parse-seg-σ, MAX-V

This ranking allows us to model the non-controversial cases of PREP-final jer realization, illustrated in Figure 11. Notice that the system predicts PREP-final jer realization correctly, whether or not the neighboring word contains an underlying jer. This is what we would expect if PREP and PFX are to be analyzed at different strata.

sO dnem 'with day.PREP'	SSC	*CC	*CA	DEP-μ	Parse-seg-σ	MAX-V
a. (s)dnem					*	*
b. sodnem				*		
c. ☞ sdnem						*
d. (s)(d)nem			*		**	*
sO mladšim 'with youngest.PREP'	SSC	*CC	*CA	DEP-μ	Parse-seg-σ	MAX-V
a. (s)mladšim					*	*
b. soladšim				*		
c. (s)(m)ladšim			*		**	*
d. ☞ smladšim						*
sO lbom 'with forehead.PREP'	SSC	*CC	*CA	DEP-μ	Parse-seg-σ	MAX-V
a. ☞ solbom				*		
b. (s)lbom	*				*	*
c. (s)(l)bom			*		**	*
d. slbom	*					*

Figure 11: Jer vocalization at the postlexical level

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[10] For a discussion of appendices in phonology, see Goldsmith 1990.

This formalization, which takes PREP to be evaluated at the postlexical stratum, reflects both the phonological and morphosyntactic properties of PREP described in Section 2. The account is consistent with the variation found for monoconsonantal PREP-final jer realization, if variation is taken to be the result of slight differences in the sonority hierarchy in (14). Though no formalization is given here, the general approach is also consistent with the additional motivation for PFX-final jer realization, because it allows the constraint(s) responsible for jer vocalization to evaluate both PFX and the verbal stem simultaneously.

4. Rubach (2000)

Finally, we are in the position to discuss a previously proposed account of PREP and PFX (Rubach 2000) in which both subgroups are treated as phonologically and morphosyntactically identical. On this view, both groups undergo word-level and postlexical evaluation in a two-tiered derivational OT framework.

Here I would like to present two arguments against such an approach. The first argument has in some sense already been discussed in Section 2: PREP and PFX are not morphosyntactically identical, and treating them as such misses important facts about their morphosyntactic behavior. There is another phonological argument against limiting the analysis to two strata. Recall the hiatus resolution pattern from (4): vowel clusters are normally eliminated via deletion within words, but not across the P-complex boundary.

(16) /paľto + iško/ → [paľtiško] (*paľtoiško) 'little coat'

(17) a. /po + obẹdatʲ/ → [poobedatʲ] (*pobedatʲ) 'lunch.INF'
      b. /po asfaľtu/ → [poasfaľtu] (*posfaľtu, *pasfaľtu) 'along the asphalt'

If, as Rubach's account proposes, PFX and PREP are evaluated at both the word and postlexical levels, hiatus resolution cannot apply at either of these levels, otherwise we could not account for the data in (17). A question then arises about how we can account for the case in (16). In a two-tiered approach, neither level of evaluation will yield the facts in (16), because both levels will be set to accommodate the facts in (17). This problem is easily resolved if we can make use of a third level, stem level, at which hiatus resolution can occur.

5. Conclusion

The evidence presented in this paper is meant to demonstrate that PREP and PFX, while they are very similar and in many cases homophonous, should not be treated as identical, either morphosyntactically or phonologically. The three-tiered Stratal OT approach proposed here models the distinct morphosyntactic behavior of PREP and PFX by evaluating them at distinct strata. The relevant phonological effects (Section 2.2) fall out from this approach.

The preliminary analysis of PREP-final jer realization does not manage to cover two – most likely overlapping – empirical areas. The first is the area of variation; it is as yet unclear what phonological factors govern the variation we see in Figure 4. The second area is the (small) set of words whose initial clusters either cause or do not cause prepositional jer vocalization in a way that is not predicted by the ranking in (15). Of this set, several groups of words can be unified into subsets, based on the similarity of their word-initial clusters.

The first subset contains words with two nasals in the word-initial cluster, such as *mnogimi* 'many.INSTR', and *množestvom* 'multitude.INSTR'. Sonority plateaus are assumed not to violate SSC; therefore, we expect that [mn] combinations will not trigger jer vocalization. But the two cases mentioned here are listed in Figure 4 as ones which exhibit some amount of variation.

A second subset of exceptional cases involves clusters with combinations of /v/ and other obstruents. These are cases for which, given the ranking above, one might expect the realization of a jer, when in fact there is usually some amount of variation.

(18)   a. /sO vskrytiem/ → [s(o)vskrytiem] 'with opening.INSTR'
        b. /sO vstrečej/ → [s(o)vstrečej] 'with meeting.INSTR'
        c. /sO vkladom/ → [s(o)vkladom] 'with input.INSTR'

Without a better understanding of what exactly leads to the variation in (19), it is difficult to propose an analysis of such cases. But it has been noted for quite some time that /v/ occupies a special and unusual status in Russian phonology (Jakobson 1978). The ranking proposed in (15) gives us the correct output candidate for the majority of cases, but the approach proposed here should clearly be developed further.

The most salient and valuable contribution of the proposal put forth here is meant to be an empirical one: we gain a way of understanding the patterns discussed in Section 2 if we accept the view that PREP and PFX can and should be treated as behaviorally distinct.

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