

Russian prefixes and prepositions in Stratal OT*

Vera Griбанова
University of California, Santa Cruz

This is work in progress. Comments appreciated.

0 Introduction

The empirical focus of this paper is the behavior of Russian prepositions (1a) and prefixes (1b),¹ which has been demonstrated — by the work of Zubritskaya (1995) and Matushansky (2002), among others — to be identical with respect to a variety of phonological processes.

- (1) a. **ot** komnati
from room.GEN
'from the room'
- b. **otložit'**
PFX.lay.INF
'to put away/off'

A less discussed point — though equally evident — is that Russian prefixes and prepositions *cannot* be unified as a class on the basis of their morphosyntactic characteristics. The theoretical aim of the present work is to resolve the apparent contradiction between the phonological unity and the morphosyntactic disunity of these two categories, by proposing a Stratal Optimality Theoretic approach (Kiparsky, 2000) in which prefixes and prepositions are evaluated at distinct strata (word and postlexical levels, respectively).

The account takes as its foundation recent work by Blumenfeld (2003), in which different classes of suffixes in Russian are analyzed within a three-tiered stratal system. In extending this analysis,

*Many thanks to Jaye Padgett, for his advice, suggestions, and enthusiasm. He made working on this project a true pleasure, and a lot of fun. Thanks to Lev Blumenfeld, who sacrificed his time on many occasions to give me crucial guidance. Thanks to Jorge Hankamer, Jonah Katz, Jim McCloskey, Armin Mester, Geoff Pullum, and the participants of the 2006/2007 Phonology and Research Seminars for helpful discussion and feedback at various stages of this project. As always, I thank Irina and Alexander Griбанов for native speaker consultation.

¹For convenience, I will refer to the class containing prefixes and prepositions as P throughout this work. The term P-*complex* will be used to refer to the set of linearly adjacent phonological units that represent either the prefix-stem complex or the complex containing a preposition and its adjacent host. Since prepositions can lean on any following phonological word, the term P-*complex* in these cases refers to the preposition and whatever it “leans” on.

the empirical aim is to treat the apparently identical behavior of prefixes and prepositions with respect to palatalization, jer vocalization, word-final devoicing, pretonic vowel lengthening and vowel reduction, and hiatus resolution, while still accommodating the observation that the two categories are morphosyntactically distinct.

To this end, I begin with a discussion of the existing phonological (§1.1) and morphosyntactic (§1.2) evidence in support of the assertion that prefixes and prepositions are (at least superficially) identical phonologically, but distinct morphosyntactically. With this foundation established, two approaches to the Russian data are explored. The first is Rubach’s (2000) account of jer vocalization and palatalization in a derivational OT framework (§2.1); an explication of this account will lead to the conclusion that it does not sufficiently resolve the morphosyntactic-phonological paradox with respect to Russian P-complexes (§2.1.1). The second approach is Blumenfeld’s (2003) analysis of palatalization at stem-suffix boundaries (§2.2), couched in a three-tiered Stratal OT system. I argue that extending this analysis to the P-complex data yields a more satisfying treatment of the phonological/morphosyntactic mismatch, and explore such an approach primarily with respect to palatalization (§3.1) and jer vocalization (§3.2), elaborating less on several of the other relevant phonological processes involved. In §3.2, I provide tentative phonological evidence to support the claim that there is a phonological, *not* just morphosyntactic, reason to suspect that the composition of prefixes and prepositions takes place at different strata. §4 concludes.

1 A Phonological/Morphosyntactic Mismatch

1.1 Phonological Identity of P

The most empirically complete work on the phonological status of Russian prefixes and prepositions is Matushansky 2002, where it is shown that prefixes and prepositions instantiate their own phonological class. In part because of the abundance of evidence discussed in that work, the claim that there is no phonological distinction between prefixes and prepositions is generally uncontroversial. The striking observation is that these two categories behave, with respect to a number of processes, both like independent prosodic categories and like parts of the prosodic word. That is, they are simultaneously subject to certain word-internal phonological processes, while also exhibiting behavior similar to that of independent words. In this section, I review the evidence at issue, drawing on Matushansky 2002.

Many prefixes and prepositions are homophonous, but not all prefixes have a prepositional counterpart, and vice versa. *Fig. (1)* contains a sample listing of prefixes and prepositions, and their approximate meanings (for the prefixes, meanings are given in conjunction with the verbal stem). *Fig. (2)*, contains a list of counterpart-less prefixes and prepositions.²

²In the table below and throughout the paper, many of the prefix-stem combinations have more than one possible gloss. I limit myself to one in each case, since the gloss is not my primary concern here. Additionally, the [i̯] symbol throughout represents a vowel that is [+high, +back, -round]. ^j is a diacritic used for palatalized consonants.

| prefix | -ložit^j |
|-----------------------|---|
| ot(o) | otložit ^j (to put aside) |
| pod(o) | podložit ^j (to put) |
| pri | priložit ^j (to apply) |
| v(o) | vložit ^j (to invest, insert) |
| iz(o) | izložit ^j (to recount) |
| s(o) | složit ^j (to put together) |
| pro | proložit ^j (to lay) |
| do | doložit ^j (to report) |
| preposition | komnata (room) |
| ot(o) (from) | ot komnatì (from the room) |
| pod(o) (under) | pod komnatoj (under the room) |
| pri (by) | pri komnate (by/near the room) |
| v(o) (in) | v komnate (in the room) |
| iz(o) (out of) | iz komnatì (from the room) |
| s(o) (with) | s komnatoj (with the room) |
| pro (about) | pro komnatu (about the room) |
| do (as far as/before) | do komnatì (as far as/before the room) |

Figure 1: Homophonous prefixes and prepositions

| prefix | -ložit^j |
|--------------------|--|
| raz(o) | razložit ^j (to place, arrange) |
| pere | pereložit ^j (to move, place somewhere else) |
| preposition | komnata (room) |
| bez(o) (without) | bez komnatì (without a room) |
| k(o) (to) | k komnate (to the room) |

Figure 2: Non-overlapping prefixes and prepositions

Despite the fact that not all prepositions and prefixes have counterparts, they still behave identically³. Broadly, five processes appear to be relevant to demonstrating that prefixes and prepositions are unified phonologically: jer vocalization, palatalization, hiatus resolution, vowel reduction and pretonic vowel lengthening, and word-final devoicing. I discuss the descriptive generalizations for each of these processes in turn.

³I omit here larger prepositions (*e.g.* *okolo*, *čerez*, *skvoz^j*), since they can bear stress and appear to hold the status of independent words.

1.1.1 Jer vocalization

A jer is a vowel that alternates with zero. Russian has two jers: /O/ and /E/.⁴ These alternations are found throughout the language: in varying categories of words, and in stems, prefixes and suffixes. Most accounts of jer vocalization (including Lightner 1972 Pesetsky 1979, among others) posit that jers are underlying, rather than epenthetic, since it is impossible to state what the environment for insertion would be, or which vowel should be inserted.

Jers play a role in the P-complex data because every prefix and almost every preposition contains a final jer, the realization of which depends on the rest of the P-complex (that is, either the verbal stem or the preposition-adjacent word). (2) gives a short list of some examples with the P *podO*-, in which the jer is vocalized. (3) is a short list of examples in which the jer is not realized.

- (2)
- a. *podobrat*^j ‘to pick up’
 - b. *podogret*^j ‘to heat up’
 - c. *podo mnoj* ‘under me’
 - d. *podo l'dom* ‘under the ice’

- (3)
- a. *podmyt*^j ‘to wash up’
 - b. *podnjat*^j ‘to pick up’
 - c. *pod domom*^j ‘under the house’
 - d. *pod nebom* ‘under the sky’

A generally agreed upon observation, noted in Matushansky (2002), is that jer vocalization does not depend on anything outside the immediate word. Whether a jer is vocalized or not depends only on factors contained within the word, and never on neighboring lexical words. One small piece of independent evidence for this claim arises from the synchronic status of the P-final jer. While it is well known that many lexical words historically contained word-final jers, there is no apparent *synchronic* presence of a jer word-finally. Following the analysis of Yearley 1995, I treat jers as present underlyingly only if they are in fact realized in some morphologically related form of the same word. There are no instances of realized word-final jers; for the purposes of synchronic analysis, therefore, we posit that they are not present underlyingly either. P-final jers, on the other hand, are frequently realized, as the examples in (2a) illustrate. Given that the realization or non-realization of the jer contained in P depends on the rest of the complex, and that jers are present P-finally but not word-finally, it appears that prefixes and prepositions behave as if they are, in some sense, word-internal.

A more specific exploration of the factors that lead to jer realization in the case of both prepositions and prefixes is provided in §3.2. There, it is claimed that while jers in P behave as if they are superficially identical, they are in fact distinct in terms of the factors that trigger their realization

⁴To distinguish jer vowels from ordinary [e] and [o] vowels, I capitalize or parenthesize input jers throughout this paper.

in each group. If this view is correct, then it lends justification to the idea that prefixes and prepositions should be composed at separate levels.⁵

1.1.2 Word-final devoicing

Another process that suggests a word-internal status for the P category is word-final devoicing (henceforth, WFD). Neither prefixes nor prepositions devoice in contexts where WFD would typically apply for voiced obstruents. For example, WFD normally takes place when the first sound of the following word is a vowel or sonorant consonant (4). However, final obstruents in prepositions followed by a vowel-initial word (5) or prefixes followed by a vowel-initial stem (6) remain voiced.

- (4) /otkaz oksani/ → [otkas oksani] ‘Oksana’s refusal’
 /sad jekaterini/ → [sat jekaterini] ‘Ekaterina’s garden’

- (5) /nad oknom/ → [nad oknom] ‘above the window’
 /pod odejalom/ → [pod odejalom] ‘under the blanket’

- (6) /iz-obrazitʲ/ → [izobrazitʲ] ‘to depict’
 /iz-umitʲ/ → [izumitʲ] ‘to amaze’

Since WFD must apply to the final voiced obstruent in a prosodic word domain, and P-final consonants do not undergo WFD, the natural conclusion is that no prosodic word boundary exists between P and the immediately following material.

1.1.3 Vowel Reduction and Pretonic Vowel Lengthening

Within words, those unstressed vowels that are not pretonic reduce to schwa (Avanesov and Orlova, 1964, *inter alia*). Pretonically, however, vowels lengthen instead of reducing to schwa. The vowel /o/, for example, is realized as [a] pretonically, and as [ə] in non-pretonic positions (7).

- (7) /moloko/ → [mələkó] ‘milk’
 (c.f. molóčnij)

The reduction/lengthening pattern is only found within words, and never across word boundaries.

- (8) /krasivo skazano/ → [krasívə skázəno] (*krasíva skázəno) ‘beautifully put (said)’

⁵In the interest of minimizing confusion in the following sections, I ignore the presence of jers in the underlying forms unless their presence is crucially relevant to the point at hand.

The fact that pretonic vowel-lengthening still occurs in P-complexes (9) indicates that P must be included as part of the relevant prosodic category to which this process typically applies.

- (9) /podo l̥dom/ → [pədal̥dóm] ‘under ice.PREP’
 /otobrat̥/ → [ətabrát̥] ‘pick up.INF’

1.1.4 Hiatus Resolution

Unlike WFD, pretonic vowel lengthening, and jer vocalization, hiatus resolution indicates that P must be in some sense external to some prosodic domain. This is because vowel clusters are normally eliminated via deletion within words (10), but not across the P-complex boundary (11).⁶

- (10) /vide + it̥/ → [vidit̥] (*videit̥) ‘see.3.SG.’
 /pal̥to + iško/ → [pal̥t̥iško] (*pal̥toiško) ‘little coat’
- (11) /po + obedat̥/ → [poobedat̥] (*pobedat̥) ‘to have lunch’
 /po + asfal̥tu/ → [po asfal̥tu] (*pasfal̥tu, *posfal̥tu) ‘along the asphalt’

1.1.5 Palatalization

Like hiatus resolution, the palatalization pattern across the P-complex boundary is a strong indicator that a word-like boundary exists between P and the adjacent material. Word-internally and across certain stem-suffix boundaries, consonants palatalize to conform in backness to following high and mid front vowels (as in (12)).⁷

- (12) /obide/ → [ob̥id̥e] (offense.DAT)
 /al̥t + ist/ → [al̥t̥ist] (viola player)

Across word boundaries, however, the strategy for resolving backness mismatches in similar environments changes: instead of palatalizing word-final (underlyingly unpalatalized) consonants, the backness quality of following underlyingly high front vowels is altered (called Retraction in the traditional literature). This results in a velarized consonant⁸ followed by a [+back] vowel (13).

- (13) /ugol ivana/ → [ugol̥^vivana] (*ugol̥ivana) ‘Ivan’s corner’
 /sad iriny/ → [sat̥^viriny] (*sat̥iriny) ‘Irina’s garden’⁹

⁶Note that the vowels at issue here are not jer vowels, but full vowels which are deleted via a separate process not related to jer vocalization.

⁷In fact, the pattern is more complicated than what is described here, in particular with respect to palatalization across stem-suffix boundaries. A more detailed discussion follows in §2.2.

⁸The ^v diacritic is used for velarized consonants.

⁹Since WFD was discussed in a previous section, I include its effect in the output here.

In cases where the word-final consonant is underlyingly palatalized, there is no backness mismatch, so the underlying form matches the surface form (14).

- (14) /ugol^j Ivana/ → [ugol^j ivana] ‘Ivan’s coal’
 /gvozd^j Ivana/ → [gvozd^j ivana] ‘Ivan’s nail’

Prefixes and prepositions follow the patterns in (13) and (14), with retraction being the strategy for backness mismatch resolution.

- (15) /ot + iskat^j/ → [ot^ʲiskat^j], (*ot^jiskat^j) ‘find.INF’
 /ob + ide/ → [ob^ʲide] (*ob^jide) ‘about Ida’

- (16) /skvoz^j igrušku/ → [skvoz^j igrušku] ‘through the toy’

Given that the strategy for resolving backness mismatches across the P-complex boundary is the same as the strategy across word boundaries (i.e., retraction, not palatalization), the conclusion must be that prefixes and prepositions also have the status of independent words.

1.1.6 Summary

Five phonological processes have been explored here with respect to prefixes and prepositions. While it is clear that prefixes and prepositions can be unified under one phonological category, what is not clear is their prosodic status. Below, I summarize the empirical observations made in this section.

- Jer lowering within the P-complex → suggests no boundary.
- Lack of word final devoicing P-finally → suggests no boundary.
- Pretonic vowel lengthening across the P-complex boundary → suggests no boundary.
- Lack of hiatus resolution across the P-complex boundary → suggests a boundary.
- Retraction at the P-complex boundary → suggests a boundary.

The remaining sections of this work are devoted to developing an analysis that is faithful to the above facts, and accommodates the liminal prosodic status of prefixes and prepositions using a Stratal Optimality Theoretic approach. While the primary focus here will be on the palatalization and jer realization facts, the analysis I propose is also compatible with the rest of the evidence laid out above.

1.2 Morphosyntactic Nonidentity of P

The goal of this section is to establish that prepositions and verbal prefixes in Russian are members of two different morphosyntactic categories: prepositions are (postlexical) clitics, while verbal prefixes are lexically composed affixes. In order to ground this claim, I will run through some of the evidence that prepositions and prefixes exhibit sufficiently different morphosyntactic behaviors.

The literature on clitics and affixes gives us a number of diagnostic tests that can help distinguish one from the other. The most prominent collection of diagnostics (or rather, generalizations about each category) can be found in Zwicky and Pullum 1983. While it has been pointed out numerous times that these diagnostics are not full-proof, they are still the most reliable that we have, to date. After running through these, I'll also discuss a coordination diagnostic, developed by Miller (1992), and, lastly, some evidence from ellipsis.

1.2.1 Zwicky and Pullum diagnostics

Here are a few of the factors that are claimed to differentiate clitics from affixes:

- Criterion A: “Clitics exhibit a low degree of selection with respect to their hosts while affixes exhibit a high degree of selection with respect to their stems” (Zwicky and Pullum, 1983, 503).
- Criterion B: “Arbitrary gaps in the set of combinations are more characteristic of affixed words than of clitic groups” (Zwicky and Pullum, 1983, 504).
- Criterion C: “Morphophonological idiosyncrasies are more characteristic of affixed words than of clitic groups” (Zwicky and Pullum, 1983, 504).
- Criterion D: “Semantic idiosyncrasies are more characteristic of affixed words than of clitic groups” (Zwicky and Pullum, 1983, 504).
- Criterion E: “Syntactic rules can affect words, but cannot affect clitic groups” (Zwicky and Pullum, 1983, 504).
- Criterion F: “Clitics can attach to material already containing clitics, but affixes cannot” (Zwicky and Pullum, 1983, 504).

With respect to the particular data at hand, Criteria A, B, and D are probably the most easily testable.¹⁰

¹⁰At first glance, Criterion C appears to be contradicted, since the morphophonological facts are superficially identical for prefixes and prepositions. We'll return to this issue in §3.2, in which I claim that there is tentative evidence to support Criterion C after all. Criteria E and F appear difficult to test, since to my knowledge there are no relevant syntactic operations on clitics groups, and prepositional clitics do not attach to material already containing clitics for presumably syntactic reasons.

Criterion A

Prepositions in Russian exhibit no lexical restrictions on the following element (they do — like typical syntactic heads — impose selectional restrictions on the category of their complement). Instead, prepositions “lean” indiscriminately on any following word, whether it be a noun (17a), demonstrative (17b), adjective (17c), or intensifier (17d).

- (17) a. k domu
to house.PREP
‘to the house’
- b. k etomu domu
to this.PREP house.PREP
‘to this house’
- c. k krasivomu domu
to beautiful.PREP house.PREP
‘to the beautiful house’
- d. k očēn^j krasivomu domu
to very beautiful.PREP house.PREP
‘to the very beautiful house’

By contrast, verbal prefixes exhibit severe lexical restrictions on possible elements for combination: the adjacent element is always a verb stem.

Criteria B and D

Since lexical gaps and semantic idiosyncrasies are in some sense related, we can group these two criteria together. While prepositions exhibit no particular lexical gaps, the set of verb stems that a given prefix can combine with can be heavily restricted. We can easily see that by far not all combinations of prefix (in this case, the cumulative prefix *na-*) and stem are available. Such lexical gaps are a hallmark of affix-like behavior.

- (18) a. nanesti ‘bring over (some amount of)’
b. nabrat^j ‘to collect (some amount of)’
c. najti ‘find’
d. navestit^j ‘pay a visit’
e. napit^jsja ‘get drunk’
f. *na-iskat^j ‘na-search’
g. *na-terjat^j ‘na-lose’
h. *na-imet^j ‘na-have’
i. *na-ljubit^j ‘na-love’
j. *na-spat^j ‘na-sleep’
k. *na-šutit^j ‘na-joke’

From the examples in (18), it is evident that the set of stems that can be attached to the prefix must be lexically restricted in some way. Likewise, from many of these examples it is clear that the meaning of the prefixed verb is idiomatic; that is, the meaning of many prefixed verbs cannot be derived compositionally. One of the examples from (18) demonstrates this quite clearly.

- (19) na-jti
na-go
'find.INF'

While the meaning of some prefix-stem complexes is more straightforwardly predictable, there are enough examples like (19) to suggest that a straightforwardly compositional treatment will not account for all the relevant cases.

1.2.2 The coordination test

Miller 1992 discusses another criterion that distinguishes postlexical clitics from affixes, based on coordination. There are three criteria, but the second two are extensions of Criterion 1, which is the only one I discuss here.

Criterion 1: "An item which cannot have wide scope over a coordination of hosts cannot be a postlexical clitic, and must be an affix" (Miller, 1992, 155).

The idea behind the test is transparent: if an element can take scope over a coordination, it is syntactically autonomous. If not, it is likely to have been composed in the lexicon; as part of a word, it cannot independently take scope over a coordinated structure. Here, prepositions and prefixes contrast. A verbal prefix cannot take scope over two coordinated verb stems (as in the ungrammatical (20)). Instead, a prefix must appear on each coordinated element separately, even if it is the same one (as in (21)).

- (20) *Saša pod[njos i -pisal] dokument.
Saša pod-bring.3.M.SG.PST and write.3.M.SG.PST document.ACC
intended meaning: 'Sasha brought up the document and signed it.'

- (21) Saša podnjos i podpisal dokument.
Saša pod-bring.3.M.SG.PST and pod-write.3.M.SG.PST document.ACC
'Sasha brought up the document and signed it.'

Prepositions, on the other hand, can take scope over coordinated DPs.

- (22) On žil bez [vodi i jedi].
He.NOM live.3.M.SG.PST without food.GEN and water.GEN
'He was living without food and water.'

- (23) Oni guljali pod [nebam i zvezdami].
 They.NOM stroll.3.PL.PST under sky.PREP and stars.PREP
 They strolled under the sky and the stars.

1.2.3 Ellipsis and Stranding

We might expect, given the fact that both prepositions and prefixes are dependent on the presence of a host, that neither can undergo stranding or ellipsis of any sort. There is only one case I know of in which ellipsis is allowed: under very particular circumstances, certain prepositions can be stranded in gapping (Svenonius, 2004a).

- (24) Katja krasila nad oknom, a Vasja pod.
 Katja paint.3.F.SG.PST above window and Vasja under.
 ‘Katja painted above the window, and Vasja under (it).’

The Academy Grammar (Švedova, 1982) cites three more such examples involving prepositions.

- (25) Ne sušestvuet svobodi ot bez svobodi dlja.
 NEG exist.3.SG. freedom.GEN from without freedom.GEN for
 ‘There is no such thing as freedom from without freedom for.’

- (26) Vse rassčitano ot i do.
 everything counted.3.SG from and to
 ‘Everything has been thought through, from (beginning) to (end).’

- (27) Naš nachal'nik privik kričat' po povodu i bez.
 Our.NOM boss.NOM accustomed.3.SG. yell.INF for reason and without
 ‘Our boss is used to yelling at us, with reason and without.’

Not all prepositions can be stranded in this way. The apparent requirement is that the preposition contain at least one syllable (CV). One-consonant prepositions, such as *k*, *s*, and *v*, cannot be stranded, even if we realize the underlying jer to yield a CV sequence (*vo*, *ko*, *so*).¹¹

- (28) *Katja šla iz doma, a Kostja v(o).
 Katja go.3.F.SG.PST out-of house.PREP and Kostja in
intended meaning: ‘Katja was going out of the house, and Kostja in.’

¹¹While realizing a jer yields a legitimate CV sequence in the case of mono-consonantal prepositions, the prosodic weight requirement for stranding is apparently not the right sort of motivation for jer vocalization. Some speakers can, however, produce something like (28) by inserting an extra-long schwa, but this is non-standard and apparently not a possibility for many speakers.

Unlike prepositions, prefixes cannot be stranded under any circumstances.

- (29) *Kostja podošel, a Katja ot(o)-.
 Kostja podo.came and Katja ot-
intended meaning: ‘Kostja came up, and Katja moved away.’

If it is indeed the case that certain (weightier) prepositions can be stranded, while no prefixes can, this should not come as a surprise. If we analyze prefixes as lexically composed with their stems, then there should never be a case where they can appear separately from the stem. Prepositions that are heavier may not have as strict a requirement for a host. If we analyze prepositions as independent syntactic elements, then the fact that heavier prepositions can sometimes be stranded should follow.

2 Stratal Approaches

2.1 Rubach 2000

The two-tiered derivational OT approach proposed in Rubach 2000 relies on the interaction between jer vocalization and palatalization to yield the right empirical result for P-complexes. Prepositions and prefixes have been shown to contain final jers — or vowels that alternate with zero — as in (30), where vowels in bold are jers.

- (30) pod**o**brat^j ‘to pick up’
 pod**o**gret^j ‘to heat up’
 pod**o** mnoj ‘under me’
 pod**o** l’dom ‘under the ice’

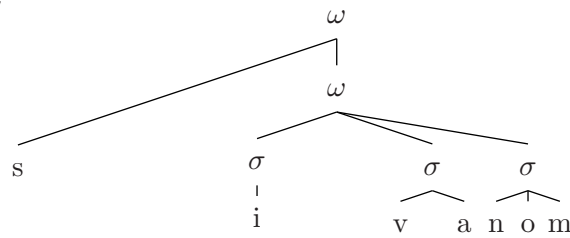
Since P-final jer appears always to be /O/, and is therefore specified [+back], its featural content can be invoked in service of an explanation for the absence of palatalization P-finally.

In OT terms, at the first level of derivation, the constraint responsible for palatalization in the output is highly ranked, but the underlying P-final [+back] jer renders this constraint irrelevant. At the second level of derivation, the jers have already been evaluated, and those that do not surface are deleted. Rubach then makes use of the option of re-ranking constraints, and proposes ranking the constraint responsible for palatalization much lower, achieving retraction, rather than palatalization, at the P-complex boundary in cases of backness mismatch.

Rubach argues against an approach proposed in Zubritskaya 1995, in which it is claimed that the phonologically identical behavior of prepositions and prefixes is due to their identical prosodic structure. The account relies on a structure in which P is an appendix to the prosodic word — roughly as in (31)— and is therefore not syllabified with the rest of the prosodic word. The

palatalization facts fall out from the generalization that palatalization does not take place across syllable boundaries.¹²

(31) /s ivanom/



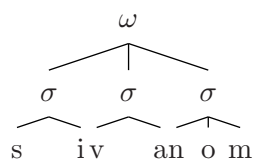
Rubach argues against this structure, citing as part of his argument the fact that jer lowering (what he calls epenthesis) after P is sensitive to syllable structure: the language is claimed to have a highly ranked constraint against geminates in a complex onset. Thus, jer lowering in the words in (32) occurs to avoid yielding geminates in an onset cluster. On the other hand, jer lowering doesn't have to occur in the words in (33), because there is a way to syllabify so that the geminates are not located in the same complex onset.¹³

(32) so.stra.xom (*sstra.xom) 'with fear'
 so.sto.lom (*ss.to.lom) 'with a table'
 vo.vla.sti (*vvla.sti) 'in power'
 vo.vre.mja (*vvre.mja) 'in time'

(33) bez.stra.xa 'without fear'
 bez.sto.la 'without a table'
 iz.stra.xa 'from fear'
 iz.sxi.zmy 'from a schism'

Rubach (2000) argues that in order to get the right generalization, P must be analyzed as being syllabified with the rest of the complex, as in (34).

(34) /s ivanom/ 'with Ivan'



The advantage of (34) over (31), empirically, is that the structure in (34) allows us to consider how the category P syllabifies in conjunction with the rest of the complex. The generalization about permissible syllable onsets cannot be captured if the structure does not allow for prefixes and prepositions to syllabify with the rest of the complex, as (31) implies. There are still disadvantages

¹²In fact, I am far from sure this fact actually holds for Russian.

¹³Here and throughout the paper, I disregard consonant cluster voicing assimilation.

to (34), however. The lack of any boundary between P and the rest of the complex might make accounting for the observed palatalization and hiatus resolution patterns more difficult, since these are the processes that suggest the existence of a prosodic boundary.

Rubach’s account uses a constraint that enforces backness matching between consonants and following high vowels, several constraints on input-output faithfulness and a few markedness constraints.

- (35)
- a. PAL-*i*: A consonant and a following high vowel agree in backness.
 - b. IDENT-C_[+back]: Input [+back] on consonants must be preserved as output [+back] on consonants.
 - c. IDENT-C_[-back]: Input [-back] on consonants must be preserved as output [-back] on consonants.
 - d. IDENT-V_[+back]: Input [+back] on vowels must be preserved as output [+back] on vowels.
 - e. *i: Don’t be a high front unrounded vowel.
 - f. *ɨ: Don’t be a high back unrounded vowel.

The faithfulness constraints employed here penalize unfaithful [+back] and [-back] input-output mappings. For every [-back] consonant in the input, for example, a violation of IDENT-C_[-back] will be assessed if the corresponding output consonant is not also [-back]. Since — contrary to the principle of Richness of the Base — all consonants are specified for backness in the input on this approach, any change in the backness feature will trigger a violation either of IDENT-C_[+back] or IDENT-C_[-back].¹⁴

At the first level, which evaluates words, the ranking ID-C_[-bk], PAL-*i*, ID-V_[+bk], *i ≫ *ɨ, ID-C_[+bk] ensures that backness mismatches are resolved always by changing either the consonant or the vowel to [-back].

| | /tʲ + i/ | PAL- <i>i</i> | ID-C _[-bk] | ID-V _[+bk] | *i | *ɨ | ID-C _[+bk] |
|------|----------|---------------|-----------------------|-----------------------|----|----|-----------------------|
| a. ↵ | tʲi | | | | | * | * |
| b. | tʲɨ | | | | * | | |
| c. | tʲi | *! | | | * | | * |
| d. | tʲɨ | *! | | | | * | |
| | /tʲ + ɨ/ | PAL- <i>i</i> | ID-C _[-bk] | ID-V _[+bk] | *i | *ɨ | ID-C _[+bk] |
| e. ↵ | tʲi | | | * | | * | |
| f. | tʲɨ | | * | | * | | |
| g. | tʲi | *! | | | * | | |
| h. | tʲɨ | *! | * | * | | * | |

Figure 3: Resolving backness mismatch at level 1

¹⁴Rubach actually ranked *i freely with respect to the other constraints in the upper echelon, but as one can see in the tableau, this would result in a tie among the candidates. Indeed, it is likely that many of the constraints require more ranking than is given in the original paper.

At the second level, which evaluates “clitic phrases and other combinations of words” (Rubach, 2000, 48), the re-ranking of ID-C_[+bk] to the higher group of constraints, crucially above *i, achieves the effect of retraction across the word boundary, in the case when the second word begins with a high front vowel.

| | /tʲ i/ | ID-C _[+bk] | PAL- <i>i</i> | ID-C _[-bk] | ID-V _[+bk] | *i | *i |
|------|--------|-----------------------|---------------|-----------------------|-----------------------|----|----|
| a. | tʲi | * | | | | | * |
| b. ☞ | tʲi | | | | | * | |
| c. | tʲi | | * | | | | * |
| d. | tʲi | * | * | | | * | |

Figure 4: Resolving backness mismatch at level 2

In order to model the fact that both prefixes and prepositions behave identically with respect to palatalization, Rubach assumes that both categories are evaluated identically: that is, both prepositions and prefixes are first evaluated at level 1, and then subsequently at level 2.

The part of Rubach’s proposal that is most relevant to the current discussion is that the final back jer in both prefixes and prepositions blocks the effect of PAL-*i* at level one. While Rubach proposes no analysis of jers on the derivational view, he assumes, reasonably, that jers must be evaluated at level one. Therefore, p-final jers block palatalization at level 1. At level 2, if the jer has been deleted, retraction applies. If the jer has not been deleted, there is no backness mismatch, and the PAL-*i* constraint is rendered irrelevant.

While the discussion in Rubach 2000 is not very detailed, it is detailed enough to give us an idea of what a simple derivation might look like.

| Level 1: palatalization resolution strategy | Level 2: retraction resolution strategy |
|---|---|
| /podO lEdom/ → /podo lʲdom/ (ice.PREP) cf. <i>lʲod</i> ‘ice’ | /podo lʲdom/ → [podo lʲdom] |
| Level 1 | Level 2 |
| /otOiskatʲ/ → /otiskatʲ/ (find.INF) | /otiskatʲ/ → [otʲiskatʲ] |

Figure 5: Rubachian derivation — jers and palatalization

A legitimate input at level 1, then, could be something like /otOiskatʲ/ ‘to find’, or /podO lEdom/ ‘under the ice’. Since the output of level one is the input to level two, unrealized jers at level one are no longer part of the input by level two. Using our previous example, the inputs to level 2 would be /otiskatʲ/ or /podo lʲdom/. At level two, then, the jer has either already been realized as a full vowel, in which case the PAL-*i* constraint is irrelevant (as in /podo lʲdom/), or the jer has not been realized and does not participate in the input to level two (as in /otiskatʲ/). In the latter case, retraction, and not palatalization, is the strategy for resolving backness mismatches. The derivation mechanism in such cases yields /otOiskatʲ/ → /otiskatʲ/ → /otʲiskatʲ/ as the output form at level two.

The intuition that the backness features of the underlying jer affect following consonants is strengthened further by the fact that underlyingly plain consonants frequently palatalize before an underlying [-back] jer, even when the jer is not realized in the surface form. A prototypical example of this alternation is given below.

- (36) /komsomol/ → [komsomol] (youth organization of the former Soviet Union)
 /komsomol-Ets/ → [komsomol^jets] (member of the komsomol.NOM)
 /komsomol-Ets-a/ → [komsomol^jtsa] (member of the komsomol.GEN)

In (36), the genitive form (komsomol^jtsa) contains a palatalized [j], even though the jer that triggers this palatalization is not realized.

Most important for our purposes, however, is that this proposal reflects an attempt at accounting for the identical behavior of prefixes and prepositions with respect to palatalization.

2.1.1 A Critique

The proposal put forth in Rubach 2000 is in several ways insightful, but given the evidence presented in §1, the solution is unsatisfying. The primary problem, I will argue, is that two, instead of the necessary three levels are used on the Rubach account.

First, using two levels of derivation gives us no way to account for the lack of hiatus resolution at P-complex boundaries. This is because P-complexes are evaluated first at level one, where the constraint(s) responsible for hiatus resolution must be ranked high enough to have an effect on words (as in §1.1). However, hiatus does not apply at the P-complex boundary. This leads to a contradiction: if P-complexes are evaluated at level 1, they are at once subject and not subject to a high-ranking constraint against vowel hiatus. We will return to this problem in §3, to see if using three levels helps resolve this problem.

Second, the derivation sketched in Rubach 2000 still, as it stands, yields the incorrect form in the case of prefixes. Returning to the sample derivation in *fig. (5)*, one can see that the derivation for prefixes actually yields an output that is not straightforwardly predicted. The problematic aspect of the derivation is level 1, where the back jer is meant to block the application of the palatalization process. On a rule-based approach, one would have to posit that the constraints responsible for jer vocalization apply before the constraints responsible for palatalization. That would yield the right form: /otOiskat^j/ → [ot^ʏOiskat^j] → [ot^ʏiskat^j]. However, Rubach's proposal is crucially *not* a rule-oriented one, though it does rely on levels of derivation. In an OT framework, the constraints responsible for palatalization and jer vocalization apply simultaneously, at level 1. Thus, if the constraints responsible for jer vocalization correctly delete the back jer, palatalization should apply, yielding an incorrect form: /otOiskat^j/ → [*ot^jiskat^j].

A third issue is more theoretical in nature. The approach must assume that both prefixes and prepositions are composed identically in order for the palatalization facts to fall out accurately. It follows from this assumption that prepositions are composed in the lexicon with their complements.

Given the morphosyntactic evidence presented in §1.2, it appears illegitimate to imply that prepositions and prefixes are both evaluated at the word level. While it might be conceivable to treat prefixes as assembled in the lexicon in combination with stems, it is certainly difficult to conceive of prepositions in this way. Prepositions in Russian exhibit all the characteristics of clitics, not affixes. They are syntactically independent (*cf.* the discussion in §1.2), despite the fact that the phonological component treats them very much like prefixes.

Keeping these objections in mind, I will attempt in the following sections to extend the three-tiered account of Blumenfeld (2003) to P-complexes.

2.2 Blumenfeld 2003

The analysis proposed by Blumenfeld (2003) is concerned in part with the varying behaviors of different classes of suffixes in Russian with respect to palatalization. The key empirical insight is that suffixes in Russian belong to two distinct classes, which are composed at stem and word levels. These two classes behave differently with respect to repair strategies for backness mismatches between stem-final consonants and vowel-initial suffixes. Since a Stratal Optimality Theoretic approach allows for separate strata, constraints at each level may be re-ranked in order to model the varying repair strategies involved.

There are four characteristics that distinguish between the two classes of suffixes in Russian: Velar Palatalization (VP), Coronal Palatalization (CP), the presence of floating [-back] features, and the possibility of the alternation ([i]/[i̟]) of suffix-initial vowels in the output.

Velar Palatalization, in which velar consonants undergo a change to post-alveolar (37), is a process that applies only before certain suffixes (e.g. -iš^je, -en^jje, -it).¹⁵

- (37) /drug-iše/ → [družiš^je] ‘friend.AUGM’
 /pek-en^jje/ → [pečen^jje] ‘cookie’
 /kr^jik-it/ → [krič^jit] ‘cry.3.SG.PRS.’

Before other suffixes (e.g. -ist, GEN.SG., adjectival -ij/i̟j), VP systematically fails to apply, and the velars palatalize instead (38).

- (38) /tank-ist/ → [tank^jist] ‘tank crew member’
 /ruk-i/ → [ruk^ji] ‘hand.GEN.SG.’
 /visok-ij/ → [visok^jij] ‘tall.MASC.’

Blumenfeld’s claim is that the suffixes which fail to trigger VP cannot be unified according to any synchronic featural attributes – the unifying feature is that they are composed at the word level, i.e. that they are Class 2 suffixes. He further notes that suffixes that begin with a floating [-back] feature, such as ^jb and ^jsk, always condition VP.

¹⁵All examples in this section come directly from Blumenfeld 2003.

- (39) /volg-^jsk-ij/ → [volžskij] ‘Volga.ADJ’
 /drug-^jb-a/ → [družba] ‘friendship’

Another process sensitive to the difference between Class 1 and 2 suffixes is Coronal Palatalization (CP), in which coronal obstruents turn into post-alveolars before the glide [j]. Class 1 (stem level) suffixes always trigger CP, while Class 2 suffixes (word-level) do not.

- (40) Class 1: triggers CP
 /xodi-ju/ → [xodju] → [xožu] ‘walk.1.SG.’
 /pisa-ju/ → [pisju] → [pišu] ‘write.1.SG.’

- (41) Class 2: does not trigger CP
 /sudi-j-a/ → [sud^jja] ‘judge’
 /brat-ja/ → [brat^jja] ‘brothers’

A fourth piece of evidence comes from alternating [i]/[i̯] suffixes, such as the genitive singular ending *-i/-i̯* and the adjectival suffix *-ij/-ij̯*, which never condition VP, and are therefore considered to be members of Class 2.

- (42) /ruk-i/ → [ruk^ji] (*ruči) ‘hand.GEN.SG’

These four processes divide the group of suffixes into two halves, as shown in the tables below.

| Class 1 | Class 2 |
|---------------------|-----------------------|
| VP | no VP |
| CP | no CP |
| floating [-back] | no floating [-back] |
| no i/i̯ alternation | some i/i̯ alternation |

Figure 6: Class properties

| Class One | Class Two |
|--------------------|----------------|
| -it ^j | -ist |
| -yn ^j a | -izm |
| - ^j b | -i/-i(GEN.SG.) |
| - ^j sk | -ja |
| -ju | |

Figure 7: Class 1 and Class 2 suffixes

The generalization that Class 1 and Class 2 suffixes behave differently is formalized on this account via a Stratal OT system, in which there are three levels: stem, word, and post-lexical. Class 1 suffixes attach to stems to yield stems, and feed stem-level phonology, whereas Class 2 suffixes

attach to stems or words to form words, feeding word-level phonology. The winning candidate at a level is considered the input to the next (higher) level.

A few other assumptions are worth pointing out. First, consonants can be specified in the input for [+back] or [-back], or left unspecified. This assumption plays a significant role, since it is essential in certain cases that consonants be unspecified in the input for the right output candidate to win (e.g. /alʲt-ist/ in *fig. 9*). The author also chooses to analyze Russian as containing two phonemes, /i/ and /i/. While not uncontroversial, this option has a long history of support in both traditional and more recent literature (Zubritskaya, 1995; Lightner, 1972; Matushansky, 2002; Rubach, 2000; Plapp, 1999, 1996).

The required constraints are given below.

- (43) PAL-*i*: Consonants before *i* are [-back].
 MAX[BK]C: Input consonant backness is present in the output.
 DEP[BK]C: Output consonant backness is present in the input.
 IDENT[BK]V: Input and output vowels have identical values for [back].

Blumenfeld posits that the difference between stem and word levels is the ranking of IDENT[BK]V with respect to the other constraints. While PAL-*i* is always ranked high,¹⁶ at the stem level IDENT[BK]V outranks the constraints on consonant faithfulness. At the word level, consonant faithfulness takes priority. This difference in ranking results in, among other things, faithfulness to /-i/ versus /-i/ suffixes at the stem level (*fig. 8*), while permitting for -i/-i variation at the word level (*fig. 9*).

| /žen-itʲ/ ‘marry.INF’ | | IDENT[BK]V | MAX[BK]C | DEP[BK]C |
|-------------------------|----------|------------|----------|----------|
| a. ↵ | ženʲitʲ | | | * |
| b. | ženʲitʲ | *! | | * |
| /gusʲ-inʲa/ ‘goose.FEM’ | | IDENT[BK]V | MAX[BK]C | DEP[BK]C |
| c. ↵ | gusʲinʲa | | * | * |
| d. | gusʲinʲa | *! | | |

Figure 8: Stem level suffixes

¹⁶Consequently, I consider only candidates that satisfy PAL-*i*. Further, as Blumenfeld points out, consonant-vowel combinations like C^ji are not considered, since they will presumably be ruled out either by some high-ranking constraint or by phonotactic restrictions.

| /a ^ɫ t-ist/ ‘viola player’ | | MAX[BK]C | DEP[BK]C | IDENT[BK]V |
|---------------------------------------|-----------------------------------|----------|----------|------------|
| a. ↵ | a ^ɫ t ^ɨ ist | | * | |
| b. | a ^ɫ t ^ɨ ist | | * | * |
| /zeml ^ɨ -i/ ‘land.GEN’ | | MAX[BK]C | DEP[BK]C | IDENT[BK]V |
| c. ↵ | zeml ^ɨ i | | | * |
| d. | zeml ^ɨ i | * | * | |
| /stran-i/ ‘country.GEN’ | | MAX[BK]C | DEP[BK]C | IDENT[BK]V |
| e. ↵ | stran ^ɨ i | | * | |
| f. | stran ^ɨ i | | * | * |

Figure 9: Word level suffixes

The analysis put forth here makes use of two of the three available levels. In the next section, I extend this proposal to P-complexes by employing the word and postlexical strata.

3 Extending the Account

By leveraging the three levels of the Stratal OT model, I aim to accommodate both the phonological and morphological observations that bear on prefixes and prepositions in Russian. Staying faithful to the morphosyntactic evidence — which indicates that prepositions are syntactically autonomous, while prefixes behave as if they are lexically composed — will require positing that prepositions and prefixes are evaluated at different strata. Specifically, prefixes should be composed at the word level, since they attach to verb stems to form words. Since prepositions are clitics, they should be composed at the postlexical level.

While the emphasis here will be on accounting for the palatalization and jer realization patterns described in §1.1.5 and §1.1.1, the analysis should be extendable to the other relevant phenomena as well (and some preliminary thoughts about how those phenomena might be approached will be discussed in §3.3).

3.1 Palatalization and P-complexes

If prefixes are evaluated at the word level, as the evidence suggests, then a natural first step might be to check whether the ranking developed in Blumenfeld 2003 can already account for the retraction pattern for prefixes.¹⁷

¹⁷The input in *fig.* 10 contains a jer, but I don’t entertain output candidates with realized jers because the analysis I pursue here treats the issue of jer vocalization as independent of the palatalization issue.

| /ot ^ʏ O iskat ^j / ‘to find’ | | MAX[BK]C | DEP[BK]C | IDENT[BK]V |
|---|------------------------------------|----------|----------|------------|
| a. ↵ | ot ^ʏ iskat ^j | | | * |
| b. | ot ^j iskat ^j | * | * | |
| /otO iskat ^j / ‘to find’ | | MAX[BK]C | DEP[BK]C | IDENT[BK]V |
| c. ► | ot ^ʏ iskat ^j | | * | * |
| d. ↵ | ot ^j iskat ^j | | * | |

Figure 10: Word level — prefixes

As we can see from candidates (c) and (d) in *fig.* (10), the wrong candidate wins¹⁸ unless the prefix-final consonant is specified for [+back] in the input (as in the input for (a) and (b)). I consider this a necessary stipulation, and one that is not very costly, considering that both prefixes and prepositions are closed classes.

Since the palatalization pattern is identical for prepositions, we might assume that the ranking at the postlexical level is identical to the word level ranking.

| /ot ^ʏ O irini/ ‘from Irina’ | | MAX[BK]C | DEP[BK]C | IDENT[BK]V |
|--|-------------------------------------|----------|----------|------------|
| a. ↵ | ot ^ʏ ir ^j ini | | * | * |
| b. | ot ^j ir ^j ini | * | ** | |

Figure 11: Postlexical level — prepositions

The ranking at the postlexical level must also be capable of modelling concatenations of lexical words. As we can see from the tableau in *fig.* (12), however, the postlexical ranking can only yield the correct outcome if every word-final consonant is specified for [+back] in the input.

| /sad ^ʏ ivana/ ‘Ivan’s garden’ | | MAX[BK]C | DEP[BK]C | IDENT[BK]V |
|--|------------------------|----------|----------|------------|
| a. ↵ | sad ^ʏ ivana | | | * |
| b. | sad ^j ivana | * | * | |
| /sad ivana/ ‘Ivan’s garden’ | | MAX[BK]C | DEP[BK]C | IDENT[BK]V |
| c. ► | sad ^ʏ ivana | | * | * |
| d. ↵ | sad ^j ivana | | * | |

Figure 12: Postlexical level — lexical words

While it might not be much of a sacrifice to assume P-final [+back] specification for consonants in the input, it is certainly not acceptable to make such a claim for the open class of consonant-final lexical words, since this would contradict Richness of the Base. I suggest a slight reformulation of Blumenfeld’s (2003) account, which avoids this complication. Whether or not I continue to assume that P-final consonants are specified for [+back], the account I propose below avoids having to make the same claim for the open class of lexical words.

Informally, the intuition we are interested in expressing is that at the postlexical level, for consonants that are left unspecified, it is better to specify them for [+back] and change the backness value

¹⁸Here and throughout, I use the ► symbol to indicate the intended winner, when the ranking fails to yield the correct result.

of the following vowel (retraction), than it is to insert a [-back] feature and stay faithful to the features of the following vowel (palatalization).¹⁹ Therefore, I propose splitting up the constraint DEP[BK]C, which normally penalizes the insertion of any back feature. Splitting up this constraint into DEP[+BK]C and DEP[-BK]C, and re-ranking these constraints at the different strata, should allow us to model the above intuition accurately.²⁰

- (44) DEP[+BK]C: Output consonant [+back] features are present in the input.
 DEP[-BK]C: Output consonant [-back] features are present in the input.

At the postlexical level, then, the ranking should be as follows: MAX[BK]C \gg DEP[-BK]C \gg IDENT[BK]V, DEP[+BK]C. This ranking penalizes the insertion of a [-back] feature more than it penalizes the insertion of a [+back] feature or the alteration of the vowel quality.

| /sad ivana/ ‘Ivan’s garden’ | | MAX[BK]C | DEP[-BK]C | IDENT[BK]V | DEP[+BK]C |
|---------------------------------------|------------------------|----------|-----------|------------|-----------|
| a. \rightarrow | sad ^v ivana | | | * | * |
| b. | sad ^j ivana | | *! | | |
| /ot ^v O ivana/ ‘from Ivan’ | | MAX[BK]C | DEP[-BK]C | IDENT[BK]V | DEP[+BK]C |
| a. \rightarrow | ot ^v ivana | | | * | |
| b. | ot ^j ivana | * | * | | |

Figure 13: Postlexical level — MAX[BK]C \gg DEP[-BK]C \gg IDENT[BK]V, DEP[+BK]C

Since we split up the DEP[BK]C constraint at the postlexical level, for consistency we will do the same at the word level, diverging from the ranking proposed in Blumenfeld 2003: MAX[BK]C \gg IDENT[BK]V \gg DEP[+BK]C, DEP[-BK]C.

| /al ^j t-ist/ ‘viola player’ | | MAX[BK]C | IDENT[BK]V | DEP[-BK]C | DEP[+BK]C |
|--|------------------------------------|----------|------------|-----------|-----------|
| a. \rightarrow | al ^j t ^j ist | | | * | |
| b. | al ^j t ^v ist | | * | | * |
| /zeml ^j -i/ ‘land.GEN’ | | MAX[BK]C | IDENT[BK]V | DEP[-BK]C | DEP[+BK]C |
| c. \rightarrow | zeml ^j i | | * | | |
| d. | zeml ^v i | * | | | * |
| /stran-i/ ‘country.GEN’ | | MAX[BK]C | IDENT[BK]V | DEP[-BK]C | DEP[+BK]C |
| e. \rightarrow | stran ^v i | | | | * |
| f. | stran ^j i | | * | * | |

Figure 14: Word level suffixes — MAX[BK]C \gg IDENT[BK]V \gg DEP[-BK]C, DEP[+BK]C

The same ranking gives us the right output for prefixal P-complexes, given our assumption about [+back] in the input for P-final consonants.

¹⁹The fact that borrowed words ending in a non-palatalized consonant will follow the retraction repair strategy (e.g., /ipod Ivana/ \rightarrow [ipod^vivana]) further supports this intuition.

²⁰Recall that a similar approach is taken for IDENT constraints in the Rubach (2000) account.

| | /ot ^ʏ Oiskat ^ʃ / ‘to find’ | MAX[BK]C | IDENT[BK]V | DEP[-BK]C | DEP[+BK]C |
|--|--|----------|------------|-----------|-----------|
| a.  | ot ^ʏ iskat ^ʃ | | * | | |
| b. | ot ^ʃ iskat ^ʃ | * | | * | |

Figure 15: Prefixes at the word level

Our final ranking for each level, then, is as follows:

- (45) Word level: MAX[BK]C \gg IDENT[BK]V \gg DEP[-BK]C, DEP[+BK]C
 Postlexical level: MAX[BK]C \gg DEP[-BK]C \gg IDENT[BK]V, DEP[+BK]C

The rankings at each level reflect the progressive strengthening of consonant over vowel faithfulness. The end result is that, while we must assume that P-final consonants are specified for [+back] at both the word and postlexical levels, this assumption is no longer necessary at the postlexical level for lexical words, which is a welcome improvement.

3.2 Jer vocalization

The only existing OT account of jer vocalization and prefixation is that of Yearley (1995); the analysis captures a high percentage of cases by positing constraints on syllable structure and sonority in Russian. While that approach represents significant progress, the section on prefixation leaves many open questions. In trying to revise the account, I will leverage the Stratal OT system’s capacity to model cyclic effects.

A complete analysis of jers in both prefixes and prepositions is beyond the scope of the present work. This is almost trivially true, since a serious Optimality Theoretic account would require much more research than has currently been done on the synchronic status of jers. Keeping this disclaimer in mind, I would like to proceed by pointing out some empirical facts that lead me to believe that the stratal approach pursued here is very much on the right track.

The relevant empirical observation about jers in prefixes and prepositions is that the behavior of the two classes differs subtly, but significantly. If this claim is correct, then it supports the treatment of prefixes and prepositions at two separate strata (word and postlexical, respectively). While I have made the case for this separation by citing the morphosyntactic facts presented in §1.2, I will argue below that facts related to jer realization also support this distinction. If these claims are correct, they provide phonological evidence for the stratal division I have advocated. The evidence presented in the following sections also aligns with Criterion C of Zwicky and Pullum 1983, which states that morphophonological idiosyncrasies are more commonly found in affixed words than in clitic-word combinations.

In motivating the claim that jer realization patterns distinguish prepositions and prefixes, I will explore two broad empirical areas. The first is that of prepositions, which I claim compose postlexically with words that are the output of the word level. Prepositional jers, I claim, are realized only to resolve otherwise unparseable consonant clusters at the word periphery. The second area concerns prefixes, which I claim must be evaluated together with the verb stem at the word level.

The potential presence of both stem-internal and prefixal jers at the same point in the derivation is meant to model the behavior of prefixal jers, which appear to be realized in certain cases not because of an unparsable word-edge consonant cluster, but because of the presence of a stem-internal jer.

As an example, let us take the case of [podžog] and [podožgla], masculine and feminine counterparts of the third-person perfective verb ‘to burn’, combined in each case with the prefix /podO/. Both the stem and the prefix contain a jer at some point in the derivation (the [o] of [žog] provides the necessary evidence for this claim about the verb stem). However, there are no attested cases of prefix-stem complexes in which the stem jer, instead of the prefixal jer, is realized. Consider the four possibilities for our feminine example:

- (46) *podžgla
 *podožogla
 *podžogla
 podožgla

Why is it that only the last form is a possible outcome? In particular, if it appears, for whatever reason, that one jer must be realized, then why is it the prefixal jer (yielding [podožgla]), and not the stem-internal jer (yielding [*podžogla])? Given what we know about Russian sonority and syllable structure, [*podžogla] could easily be a well-formed candidate. The traditional answer to this question is contained in Havlik’s Law, which states that the calculation of which jers to delete and which to vocalize proceeds from right to left.

- (47) HAVLIK’S LAW:
 Starting from the last full (non-jer) vowel (or from the end of the word working right to left), vocalize every even jer and reduce every odd jer to zero.

The question remains as to how we might capture this generalization in a constraint-based framework.

3.2.1 A constraint-based approach to jer vocalization: Yearley 1995

Hermans 2002 provides a revised account of the Yearley approach, with updated constraints; I will employ those constraints in this section. The account relies crucially on the assumption — first introduced by Rubach (1986) — that jers are moralesse vowels, otherwise fully featurally specified, in the input. Conversely, non-jer vowels are obligatorily attached to a mora in the input on this view. Revising Yearley’s constraints slightly, we can list the following constraint set (48), and a ranking for those constraints (49).

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

ONSET: Assess a violation for every syllable without an onset.

*CO: Assess a violation for every complex onset.

DEP-V: A vowel in the output corresponds to a vowel in the input.

(49) DEP-V \gg *CC \gg ONSET \gg DEP- μ \gg MAX-V, *CO

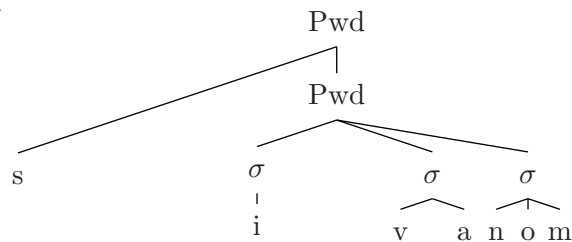
This ranking of constraints covers the vast majority of relatively simple cases of jer-containing words.

| kusOk (piece.nom) | | DEP-V | *CC | ONSET | DEP- μ | MAX-V | *CO |
|--------------------|--------------------|-------|-----|-------|------------|-------|-----|
| a. | kusk | | * | | | * | |
| b. | \leftarrow kusok | | | | * | | |
| kusOka (piece.gen) | | DEP-V | *CC | ONSET | DEP- μ | MAX-V | *CO |
| a. | kusoka | | | | * | | |
| b. | \leftarrow kuska | | | | | * | |

Figure 16: kusok/kuska (piece.NOM/GEN)

The result of the ranking is that jer realization is discouraged unless it is necessary to avoid violation of a higher-ranked constraint on syllable structure, such as *CC or ONSET. For prefixed verb-stems, however, much more needs to be said. First, because Yearley is assuming a traditional OT system in which all evaluation occurs in parallel, she must make several assumptions about the prosodic structure of such complexes. Following Zubritskaya 1995, she assumes a structure in which the prefix is an appendix to the prosodic word, in violation of strict layering.

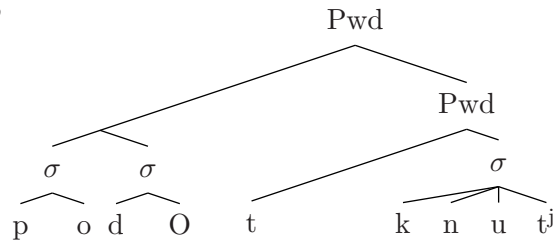
(50) /s ivanom/



As was mentioned in §2.1, this structure implicitly precludes syllabification across the prefix-stem boundary; it is still a matter of debate whether this consequence is desirable. According to Yearley, the structure of jer-containing prefixes and verb-stems is as follows, with left-appendices for complex word-initial clusters. Appendixation is proposed by Rubach and Booij (1990) for Polish, and has been adopted by many analysts, most recently Steriopolo (2007) and Katz (2006) for Russian.²¹

²¹Below and throughout the section, capitalized vowels are meant to symbolize realized jers. Capitalized vowels in brackets are unpronounced (i.e. unrealized jers) in the output.

(51) [podotknuť] ‘tuck up’

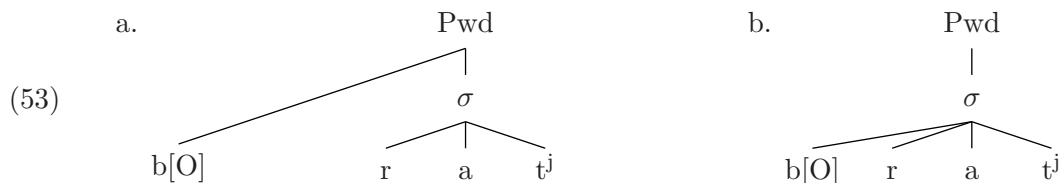


Yearley’s broader claim is that proper Russian word-edges permit no more than one appendix position at the left edge. This helps explain the presence of apparent sonority violations in word-initial clusters in the example set in (52).

(52) vstreča ‘meeting’
 mгла ‘haze’
 vzgljad ‘glance’

If the prosodic structure of such words is, respectively, (v)streča, (m)гла, and (v)zgljad, then sonority is in fact respected, as long as we consider sonority plateau to be in accordance with the relevant sonority constraint.

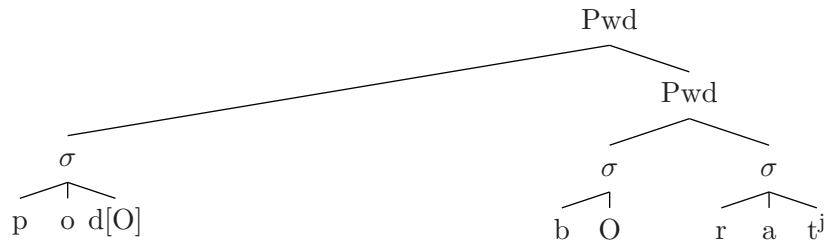
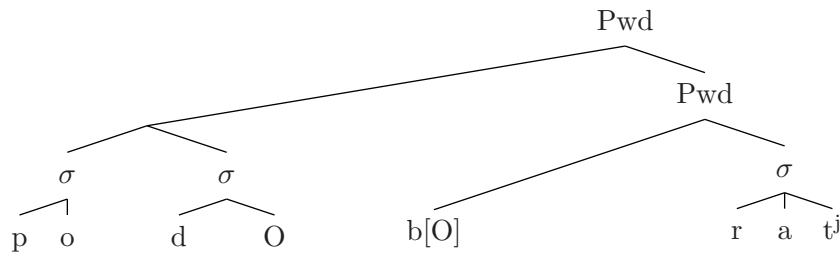
Yearley further asserts that the structure of jer-containing stems like *bratʲ* ‘to take’²² similarly contain appendices, because of *GAP, a constraint that militates against unparsed material in a prosodic category. So, for example, (53a) wins over (53b), which contains an unparsed jer in the syllable.



Notice that, on this view, the unparsed jer is still in some sense in the output; otherwise, there would be nothing for *GAP to evaluate.

In the context of this view, the question we introduced in the previous section — which jer is realized in cases with jers in both the stem and the prefix? — can be asked in a different way. The competing prosodic structures are shown in examples (54) and (55), with the example [podobratʲ], ‘to pick up’.

²²Stems like [bratʲ] are assumed to contain a jer because they have morphological variants like [biratʲ] (imperfective) and [razbor]. I know of no satisfactory explanation for the presence of [i] as the realized vowel in the first form, instead of [e] or [o].

(54) [**podborat^j*](55) [*podobrat^j*]

To get the right output (i.e. (55)) to win, Yearley’s account must invoke a gradient alignment constraint, $\text{ALIGN}(\sigma, L, \text{Pwd}, L)$. This constraint requires that the left edge of each syllable be aligned with the left edge of a prosodic word. Formally, the constraint counts misaligned moras: for a syllable to count as not aligned to the left edge of the prosodic word, it must be separated from that edge by a mora. A violation is not assessed if the syllable happens to be separated from the left edge by non-moraic segmental material. Thus, the stem containing an unparsed, appended jer, rather than a jer that is realized as part of a syllable (and therefore a mora), will always win, because the stem in examples like (55) counts as left-aligned with the prosodic word (i.e. no mora intervenes between the stem syllable and the edge).

Minimally, two broad objections can be raised to such an approach. First, the account was formulated in terms of early OT (containment theory). For this reason, any candidates in which jers are not realized in the output still “contain” the jer. The jer is not pronounced, but is still evaluated by constraints like $*\text{GAP}$, which expresses a preference for the unrealized jer not to be dominated by a prosodic category. More recent instantiations of OT have veered away from containment theory, favoring instead the correspondence theoretic approach to faithfulness (McCarthy and Prince, 1995).

Second, in view of the arguments against gradient constraints contained in McCarthy 2003, using the $\text{ALIGN}(\sigma, L, \text{Pwd}, L)$ constraint appears disadvantageous.

3.2.2 Reconsidering the facts

In this section I discuss two pieces of evidence to substantiate the claim that jer vocalization is *not* identical for prefixes and prepositions. The first piece of evidence regards variation in the realization of the prepositional jer. While prefixed verbs do not display any variation with respect to whether the jer is realized or not, the realization of prepositional jers is not as consistent. To the extent that

Google searches can be viewed as an accurate representation of what is permissible,²³ the statistics for prepositional jer realization show a larger amount of variation than do the statistics for prefixal jer realization.²⁴

| PREPOSITIONS | VARIATION | PREFIXES | VARIATION |
|---|------------|--|-----------------|
| s vzroslim (with grown-up) so vzroslim | 17% 83% | sobrat ^j (to collect) sbrat ^j | 99.98% 0.02% |
| s mnogimi (with many) so mnogimi | 16% 84% | sožgla (burned.3.F.PF) sžgla | 99.99% 0.01% |
| s množestvom (with a large quantity) so množestvom | 53% 47% | sžeg (burned.3.M.PF) sožeg | 99.85% 0.15% |

Figure 17: Jer realization variability in prepositions *vs.* prefixes

Certainly, much more serious research must first be conducted before we can be sure of such patterns. Given this preliminary evidence, we can observe that the variability rate of prepositional jers is significantly higher than that of prefixal jers.

Recall that under the Stratal approach, the winning candidate at a level is the input to the next level. Since prepositional P-complexes are composed of a preposition and a word, the word must be the output of the word level. Any jers contained in that word were either vocalized or deleted at the word level. Thus, a derivation for a prepositional P-complex should look like the following:

| Word level | Postlexical level |
|---|-------------------------|
| /lEdom/ → [l̥dom] (ice.PREP) cf. <i>l̥od</i> ‘ice’ | /sO l̥dom/ → [so l̥dom] |

Figure 18: *so l̥dom* — Stratal derivation

The view that prepositions are composed with words at the post-lexical level sheds light on the pattern of variation that we find in *fig.* (17). If jer realization in the case of prepositions depends exclusively on the properties of the new word edge (these properties are outlined below in more detail), then the source of variability can legitimately be attributed — at least in part — to different speakers’ particular restrictions on the form of the word-initial cluster formed by the composition of the preposition with a word at the postlexical level. 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.

Further evidence on variability supports the suggestion that it is conditions on the sonority of the word-edge that vary from speaker to speaker, and not properties specific to prepositional jers.

²³There are multiple problems with considering Google searches an accurate reflection of the spoken language: typos, multiple repetitions of the same phrase on different websites counting as different hits, etc. While these numbers should be considered with serious skepticism and an awareness of the issues that might come into play, there are statistically significant patterns here. This indicates a direction that one might pursue in searching through real spoken corpora.

²⁴Searches were performed on *www.google.ru*, using a cyrillic font.

In *fig.* (17), the listed prepositions are the monoconsonantal ones (*s*, *k*, *v*), because it is the monoconsonantal ones that form a complex cluster when combined with the beginning of the word in the absence of jer realization. Prepositions with more segmental material, like *ot* and *pod*, are predicted to behave differently on the view pursued here. To take the concrete examples *pod* and *ot*, the addition of a VC or CVC sequence to a word with a consonant cluster at the left edge should not cause the same sonority violations. This pattern is indeed borne out. Consider *fig.* (19), in which Google searches are executed for the same words, but with different prepositions.

| PODO | VARIATION |
|---|-----------|
| pod vzroslim (under grown-up) | 99.55% |
| podo vzroslim | 0.45% |
| pod mnogimi (under many) | 99.75% |
| podo mnogimi | 0.25% |
| pod množestvom (under a large quantity) | 99.99% |
| podo množestvom | 0.01% |
| OTO | VARIATION |
| ot vzroslogo (from grown-up) | 100% |
| oto vzroslogo | 0% |
| ot mnogix (from many) | 99.96% |
| oto mnogix | 0.04% |
| ot množestva (from a large quantity) | 99.99% |
| oto množestva | 0.01% |

Figure 19: Jer realization variability in non-monoconsonantal prepositions

The statistics for non-monoconsonantal prepositions are markedly less variable; if realization of prepositional jers is governed by the phonotactics of the resulting cluster, then it is predicted that monoconsonantal prepositions, which form a consonant cluster at the edge of the word, would be more trouble for speakers. The resulting confusion about whether or not to realize the prepositional jer in the monoconsonantal cases is, I claim, due to variability among speakers as to how to treat unparsable clusters at the word edge.

A second set of facts has to do with the nature of prefixal jer realization patterns. The empirical generalization made in Yearley 1995 is that jers in prefixes are realized for one of two (very different) motivations:

1. Realize a jer to resolve an otherwise unparsable word-initial cluster (this follows the pattern observed for prepositions).
2. Realize a jer when the verbal stem contains a jer.

We are interested particularly in the second motivation here, as it distinguishes the prefixal pattern from the prepositional pattern. We can tell that there is no other reason for jer realization in certain prefixal cases by considering near-minimal pairs. For example, consider the near-minimal pair [podprignut^j] ‘to jump up’, and [podopru] ‘support.1.S.FUT’. The pair is near-minimal in the relevant sense because the left edge cluster (before the addition of the prefix) is almost identical

(-pri/-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 ungrammatical, no constraint comes to mind 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 [podprignut^j]. There are some more near-minimal pairs in *fig.* (20).

| JER-CONTAINING STEMS | STEMS WITHOUT JERS |
|--|---|
| razogret ^j ‘heat up.INF’ (c.f. gOret ^j ‘burn.INF’) | razgrebat ^j ‘shovel.INF’ |
| razobrat ^j ‘sort through.INF’ (c.f. razbOr ‘dissection, analysis’) | razbrosat ^j ‘throw around.INF’ |
| razodrat ^j ‘tear apart.INF’ (c.f. dEret ^j ‘tear.INF’) | razdrobit ^j ‘shatter.INF’ |

Figure 20: Jer containing stems *vs.* stems with no jer

Assuming that this pattern holds, and that it is truly the stem-internal jer that is the causal factor for jer realization in the prefix, we have an indirect phonological argument for analyzing prepositions and prefixes at distinct levels. At the word level, jer vocalization is likely to occur simultaneously; that is, both the stem-internal jer and the prefixal jer are analyzed at the word level. This view relies crucially on the assumption that the constraints affecting jer vocalization are not relevant at the stem-level. Assuming that both the stem-internal jer and the prefixal jer are evaluated simultaneously is also consistent with the empirical observation first made in Yearley 1995 and reformulated just above: prefixal jer realization is apparently triggered by the stem-internal jer in some yet unexplained way.

At the postlexical level, all jers that were once present in the word have either been deleted or have become real vowels; therefore, the only causal factor for jer realization in prepositions is an unparsable consonant cluster at the word-edge. Constraints at the postlexical level must then be ranked in such a way as to militate against particular types of clusters at the word-edge, allowing for jer realization as a type of repair for such violations. I explore an implementation of such an approach to prepositional jer realization in the next section.

3.2.3 Prepositional jers

Without using the *GAP constraint or the alignment constraint introduced in the previous section, we can now evaluate the prepositional jer at the postlexical level, as well as evaluating the word-internal jer at the word level. In terms of constraints, we require only the primitive jer-related constraints introduced in the previous section, in combination with a few constraints on prosodic word structure and sonority.

First, it has been frequently observed that the jer in P is frequently realized to resolve potentially problematic sonority sequences (Katz, 2006; Matushansky, 2002; Steriopolu, 2007; Rubach, 2000, *inter alia*). Two sub-patterns are worth noting here. The first is that, as we saw in §2.1, Russian has

an apparent prohibition against word-initial fricative geminates that are not immediately followed by a vowel.

- (56) so.stra.xom (*sstra.xom) ‘with fear’
 so.sto.lom (*ss.to.lom) ‘with a table’
 vo.vla.sti (*vvla.sti) ‘in power’
 vo.vre.mja (*vvre.mja) ‘in time’

To capture this generalization, I employ a constraint that forbids geminate fricative-fricative sequences at the left word periphery: *_[ω]FFC. This constraint will be ranked high enough to make jer realization necessary to avoid such configurations.

A second subpattern appears to be a more general sonority requirement, which I capture here using Katz’ (2006) constraint, SSC.

- (57) Sonority Sequencing Constraint: Every syllable must have one and only one sonority peak.

Again following Katz 2006, I rank this constraint high, since apparent word-initial sonority violations can be re-analyzed as left-appendixation of the offending segments (e.g. (m)gla ‘haze’). Katz describes the hierarchy as follows (58).

- (58) Sonority hierarchy:
 vowels \gg glides/liquids \gg nasals, /v/ \gg obstruents

Second, I follow Yearley and many others in assuming that left appendices are a possible repair to avoid sonority violations. Tentatively, I propose that jer realization is a last-resort strategy for saving an unparseable cluster. Thus, the constraint that penalizes the realization of jers (DEP- μ) should be ranked about Parse-seg- σ , which penalizes any material that is not parsed into a syllable. Further, the jer realization pattern for prepositions indicates that maximally one appendix at the word edge is permitted. Consider the table below, in which permissible word-initial clusters (with prepositions) and illegal ones are compared.²⁵ The illegal clusters here are ones in which a jer is realized in the attested (analogous, but with the jer vocalized) form.

²⁵Given the significant variation to be found at the word edge, I use only examples which betray little variation.

| LEGAL CLUSTERS | ILLEGAL CLUSTERS |
|--|--|
| sdnjem (with the day) | * svzgljadom (with a glance) |
| spticoj (with a bird) | * svzdoxom (with a sigh) |
| sčteniem (with reading) | * svspleskom (with a splash) |
| kstrane (to the country) | * smstiteljom (with an avenger) |
| kstrofe (to the (poetic) line) | * svšivim (with a flea-ridden (person)) |
| smračnostju (with gloom) | * sljdom (with ice) |
| smladshim (with the youngest) | * klbu (to the forehead) |
| knravstvennosti (toward morality) | * vmgle (in the haze) |
| svnešnim (with the outside) | * svzroslim (with an adult) |
| smladšim (with the youngest) | * vmgnovenie (in an instant) |

Figure 21: Legal vs. illegal clusters

It may be useful to note that unlike the prefixal cases, whether or not there was once a jer in the word itself does not seem to have any consequence for prepositional jer vocalization. This property of prepositional jers is explained if a stratal effect is involved for preposition-word complexes, but not for prefix-stem complexes.

Assuming that there is a strict prohibition against more than one appendix position in Russian allows us to distinguish the legal word-initial clusters from the illegal ones.²⁶ If only one appendix position is allowed, using this repair strategy for the clusters in the left-hand column will repair sonority sequencing violations, to yield a well-formed cluster. In the clusters in the right-hand column, however, there would still be a sonority sequencing violation, even if we use the same strategy. To make sense of the pattern in *fig.* (21), we must assume that there is a separate constraint against more than one appendix position word-initially.²⁷

*_{[ω}COMPLEXAPPENDIX (*CA): Penalize complex word-initial appendices.

This constraint must be ranked above both DEP- μ and Parse-seg- σ , so that only one segment can ever appear as an appendix. Combining these observations with the original ranking proposed in Yearley’s account, we get something like the following:

$$(59) \quad *_{[\omega}\text{FFC, SSC, *CC, *CA} \gg \text{DEP-}\mu \gg \text{Parse-seg-}\sigma, \text{MAX-V}$$

This ranking allows us to predict the non-controversial cases of jer (non)realization for prepositions.

²⁶This contradicts Steriopol’s (2007) proposal, in which the maximal onset is CC, with all other word-initial segments in appendices. The contradiction appears necessary, however, if we wish to account for the patterns in *fig.* (21).

²⁷In the following text and throughout, I mark appendices by parenthesizing the relevant segment.

| sO dnem ‘with day.PREP’ | | SSC | *CC | *CA | DEP- μ | Parse-seg- σ | MAX-V |
|---------------------------------|--------------------------|-----|-----|-----|------------|---------------------|-------|
| a. \leftarrow | (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 |
| e. \leftarrow | (s)mladšim | | | | | * | * |
| f. | somladšim | | | | * | | |
| g. | (s)(m)ladšim | | | * | | ** | * |
| h. | smladšim | * | | | | | * |
| sO lbom ‘with forehead.PREP’ | | SSC | *CC | *CA | DEP- μ | Parse-seg- σ | MAX-V |
| i. \leftarrow | solbom | | | | * | | |
| j. | (s)lbom | * | | | | * | |
| k. | (s)(l)bom | | | * | | ** | * |
| l. | slbom | * | | | | | * |
| podO l̥dom ‘under ice.PREP’ | | SSC | *CC | *CA | DEP- μ | Parse-seg- σ | MAX-V |
| m. \leftarrow | po.do ^{l̥} .dom | | | | * | | |
| n. | pod.l̥dom | * | | | | | * |
| o. | pod ^{l̥} .dom | | * | | | | * |

Figure 22: Jer vocalization at the postlexical level

The ranking above 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 *fig.* (17). 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 above ranking. 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. Words such as *mnoj* (me.PREP), *mnogimi* (many.PREP), and *množestvom* (multitude.PREP). The presence of two consecutive nasals does not predict that there will be a sonority sequencing violation, if sonority plateau are assumed not to violate SSC; therefore, we expect that *mn* combinations will not trigger jer vocalization. However, in cases such as *so mnoj* (with me.PREP), the jer is uncontroversially required. The other two cases mentioned here are listed in *fig.* (17) 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.

- (60) /sO vskritiem/ → [s(o)vskritiem] ‘with opening.PREP’
/sO vstrečej/ → [s(o)vstrečej] ‘with meeting.PREP’
/sO vkladom/ → [s(o)vkladom] ‘with input.PREP’

Without a better understanding of what exactly leads to the variation in (60), I am hard-pressed to propose an analysis of such cases. The ranking proposed in (59) should give us the correct output candidate for the majority of cases. Even so, the approach proposed here is vastly incomplete. The most salient and most valuable contribution is meant to be an empirical one: we predict that while the realization of prefixal jers can be in some way connected with the presence of a stem-internal jer (which is where morphophonological idiosyncrasies of Criterion C might be most apparent), prepositional jers will show no sensitivity to whether the word they ‘lean’ on contained a jer. Preliminary evidence appears to confirm this prediction: consider [sdnem] ‘with the day.PREP’ (*c.f.* den^j (day)), for which a Havlik’s Law-based approach would incorrectly predict that since the jer in the word was not realized, the prepositional jer should be been realized (yielding *[sodnem]). Instead, the lack of prepositional jer lowering in this case is straightforwardly predicted by the Stratal OT approach proposed in this section.

3.3 Remaining Issues

In the previous section, I proposed an account of the palatalization and jer vocalization patterns for Russian prefixes and prepositions. According to §1.1, there are three more processes that are just as relevant to this same material. I will not propose a full analysis for any of them here, but I will discuss some preliminary thoughts about each phenomenon.

3.3.1 Hiatus Resolution

In the case of hiatus resolution, the three-tiered stratal system gives us a convenient way to represent the difference between the P-complexes and other words. Recall the pattern: within words, vowels in vowel clusters are deleted (61). Across the P-complex boundary, vowels are not deleted (62).

- (61) /vide + it/ → [vidit^j] (*videit^j) ‘see.3.SG.’
 /pa^lto + iško/ → [pa^ltiško] (*paltoiško) ‘little coat’

- (62) /po + obedat^j/ → [poobedat^j] (*pobedat^j) ‘to have lunch’
 /po + asfal^ltu/ → [po asfal^ltu] (*pasfal^ltu, *posfal^ltu) ‘along the asphalt’

It so happens that the known examples of vowel deletion in vowel clusters are at stem-suffix boundaries, and the relevant suffixes appear to pattern with the stem-level suffixes.²⁸ We already know from the work of Blumenfeld (2003) that the verbal inflection *-it^j* is evaluated at the stem level. Similarly, it can be shown that the suffix *-iško* is stem level. For example, like other stem level suffixes, it triggers Velar Palatalization (63), and Coronal Palatalization (64).

- (63) /pidžak + iško/ → [pidžačiško] ‘little jacket’

²⁸Thanks to Lev Blumenfeld for suggesting the explanation that follows.

(64) /serdce + iško/ → [serdčiško] ‘little heart’

In order to accommodate the lack of hiatus resolution in P-complexes, we must posit that whatever constraint is responsible for this process is ranked low at the word and postlexical levels. From this, it should follow that word level suffixes should also not trigger vowel hiatus resolution, and the evidence appears to support this (65).

(65) /Mande + ism/ → [Mandeism] (*Mandism, *Mandesm) ‘Mandeism’

3.3.2 Word-final devoicing

The account developed here can be straightforwardly extended to account for the fact that WFD does not apply at the end of prepositions or prefixes. Recall that both prefixes and prepositions are never actually evaluated individually, on the account developed here; in each case, they are evaluated along with either a verb stem or an adjacent word. In the case of prefixes, they are first evaluated at the word level, in combination with a verb stem. In the case of prepositions, they are first evaluated at the postlexical level, in combination with the following word.

If we view the category P as never actually being evaluated independently of following material at any level, then the constraint responsible for WFD should never apply to P-final obstruents, since they are never word-final at any point in a derivation.

3.3.3 Vowel reduction and pretonic lengthening

To explain the vowel reduction and pretonic lengthening pattern for P, we can once again leverage the Stratal OT system: since prepositions and prefixes are not ever evaluated independently, but only as part of a larger prosodic complex (probably a prosodic word), the constraints responsible for this process must apply always to that prosodic unit. This means that, when a preposition or prefix is present, it participates in pretonic vowel lengthening as part of the prosodic word.

4 Remarks

The proposal put forth here attempts to reconcile two sets of facts about prepositions and prefixes: first, that with the exception of jer realization, they are identical phonologically, and second, that they differ morphosyntactically. To accommodate both sets of facts, a Stratal OT system is employed. The key assumption is that to model the (non)identity of prefixes and prepositions, the two can be composed at different levels: prefixes at the word level, and prepositions at the postlexical level. This claim, in combination with Stratal OT’s ability to re-rank constraints at the separate strata, can straightforwardly account for the relevant phonological facts.

One focus here has been on capturing the palatalization/retraction pattern for P-complexes in a manner that is consistent with Blumenfeld’s (2003) proposal for palatalization across stem-suffix boundaries. The main change to Blumenfeld’s approach is the separation of the DEP[BK]C constraint into two constraints (DEP[+BK]C and DEP[-BK]C), each of which penalizes an unfaithful insertion of a [+back] or [-back] feature. Re-ranking these constraints between the word and postlexical strata allows us to model the retraction pattern for both prefixes and prepositions, so long as we assume that the P-final consonant is [+back] in the input. This strategy also allows for unspecified word-final consonants in the input to surface as [+back], which models the correct pattern (retraction) across word boundaries.

A second part of the exploration of P has focused on the subtle difference in jer realization patterns between prepositions and prefixes. If the observations made in §3.2 are correct, they provide new phonological evidence for a distinction between compositional levels for prefixes versus prepositions. In that case, the Stratal OT account pursued here is in an ideal position to accommodate such evidence.

§3.3 makes clear that there is still a great deal of work to be completed, given that there are at least three processes outside of palatalization and jer vocalization that are relevant to the P-complex issue. This work, then, reflects the beginnings of an approach that is projected to be extendable to phenomena not analyzed here, like hiatus resolution, word-final devoicing, and so on. It remains to develop fuller analyses of these processes as they apply to the P-complex, and to develop a fuller picture of the interface between the phonological and morphosyntactic components, as they are reflected in the facts presented here.

References

- Avanesov, R.I., and V.G. Orlova. 1964. *Russkaja Dialektologija*. Moscow: Nauka.
- Avanesov, Ruben I. 1954. O slogorazdele i stroenii sloga v russkom jazyke. *Voprosy Jazykoznanija* 6:88–101.
- Avanesov, Ruben I. 1972. *Russkoe Literaturnoe Proiznošenie*. Prosvesčenie.
- Blumenfeld, Lev. 2003. Russian palatalization in Stratal OT: morphology and [back]. In W. Browne, J.-Y. Kim, B. H. Partee, and R. Rothstein (Eds.), *Proceedings of the Annual Workshop on Formal Approaches to Slavic Linguistics 11*, 141–158, University of Massachusetts, Amherst. Michigan Slavic Publications.
- Bondarko, L.V. 1998. *Fonetika Sovremennogo Russkogo Jazyka*. Izdatel’stvo S. Peterburgskogo Universiteta.
- Crosswhite, Katherine. 1999. A unified optimality theoretic account of ‘dissimilative’ and non-dissimilative russian vowel reduction. Unpublished ms., Available at <http://www.ling.rochester.edu/people/cross/dissimilative.pdf>.
- Farina, Donna Marie. 1991. *Palatalization and Jers in Modern Russian Phonology: An Underspecification Approach*. PhD thesis, University of Illinois at Urbana-Champaign.
- Fowler, George. 1994. Verbal prefixes as functional heads. *Studies in the Linguistic Sciences* 24(1).

- Green, Antony. 2003. Extrasyllabic consonants and onset well-formedness. In C. Fery and R. van de Vijver (Eds.), *The Syllable in Optimality Theory*, 7–40. Cambridge: Cambridge University Press.
- Gussmann, Edmund. 1978. *Explorations in Abstract Phonology*. Lublin: Uniwersytet Marii Curie-Skłodowskiej.
- Halle, Morris. 1959. *The Sound Pattern of Russian*. The Hague: Mouton de Gruyter.
- Hamilton, William S. 1980. *Introduction to Russian Phonology and Word Structure*. Columbus, Ohio: Slavica Publishers.
- Hermans, Benjamin. 2002. Overapplication of yer vocalization in Russian. In H. Broekhuis and P. Fikkert (Eds.), *Linguistics in the Netherlands*. Amsterdam: John Benjamins.
- Inkelas, Sharon. 2000. Phonotactic blocking through structural immunity. In B. Stiebels and D. Wunderlich (Eds.), *Lexicon in Focus*, 7–40. Berlin: Akademie Verlag.
- Isačenko, Aleksandr V. 1970. East Slavic morphophonemics and the treatment of the jers in Russian: A revision of Havlik's Law. *International Journal of Slavic Linguistics and Poetics* 13:73–124.
- Kalenčuk, Marija Leonidovna, and Rozalija Francevna Kasatkina. 1999. Features of the phonetic shape of Russian prefixes. *Russian Linguistics* 23:1–9.
- Katz, Jonah. 2006. Russian consonant clusters. Unpublished ms., MIT.
- Kiparsky, Paul. 2000. Opacity and cyclicity. *The Linguistic Review* 17:1–15.
- Lightner, Theodore. 1972. *Problems in the Theory of Phonology: Russian Phonology and Turkish Phonology*. Edmonton, Alberta: Linguistic Research.
- Matushansky, Ora. 2002. On formal identity of Russian prefixes and prepositions. *MIT Working Papers in Linguistics* 42:217–253.
- McCarthy, John, and Alan Prince. 1995. Faithfulness and reduplicative identity. In J. N. Beckman, L. W. Dickey, and S. Urbanczyk (Eds.), *Papers in Optimality Theory*, 249–384. University of Massachusetts, Amherst: GLSA.
- McCarthy, John J. 2003. OT constraints are categorical. *Phonology* 20:75–138.
- Meillet, Antoine. 1934. *Le Slave Commun*. Paris: Champion.
- Miller, Philip H. 1992. *Clitics and Constituents in Phrase Structure Grammar*. New York: Garland Publishing, Inc. published version of PhD thesis (University of Utrecht, the Netherlands).
- Padgett, Jaye. 2001. Contrast dispersion and Russian palatalization. In E. Hume and K. Johnson (Eds.), *The Role of Speech and Perception in Phonology*, 187–218. Academic Press.
- Pesetsky, David. 1979. Russian morphology and Lexical Phonology. Unpublished ms., MIT.
- Plapp, Rosemary Kuhn. 1996. Russian /i/ and /i/ as underlying segments. *Journal of Slavic Linguistics* 4(1):76–108.
- Plapp, Rosemary Kuhn. 1999. *Lexical Phonology and Optimality Theory: Analysis of Russian*. PhD thesis, University of Iowa.

- Rubach, Jerzy. 1986. Abstract vowels in three dimensional phonology: the jers. *The Linguistic Review* 5:247–280.
- Rubach, Jerzy. 2000. Backness switch in Russian. *Phonology* 17(1):39–64.
- Rubach, Jerzy. 2002. An overview of palatalization-*i*. *Studies in Phonetics, Phonology and Morphology* 8(2):169–186.
- Rubach, Jerzy, and Geert E. Booij. 1990. Edge of constituent effects in Polish. *Natural Language and Linguistic Theory* 8:427–463.
- Steriopolo, Olga. 2007. Yer vowels in Russian prepositions. *FASL* 15.
- Švedova, Natalia Ju. (Ed.). 1982. *Russkaja Grammatika*. Moscow: Akademija Nauk.
- Svenonius, Peter. 2004a. Russian prefixes are phrasal. *Formal Descriptions of Slavic Languages* 5.
- Thelin, Nils B. 1971. *On Stress Assignment and Vowel Reduction in Contemporary Standard Russian*. Uppsala: Skriv Service AB.
- Townsend, Charles E. 1986. *Russian Word Formation*. McGraw-Hill Book Company.
- Worth, Dean. 1968. Vowel-zero alternations in Russian derivation. *International Journal of Slavic Linguistics and Poetics* 11:110–123.
- Yearley, Jennifer. 1995. Jer vowels in Russian. In J. N. Beckman, L. W. Dickey, and S. Urbanczyk (Eds.), *Papers in Optimality Theory*, 533–571. University of Massachusetts, Amherst: GLSA.
- Zaliznjak, Andrej Anatolievč. 1980. *Grammatičeskij Slovar' Russkogo Jazyka*. Moscow: Izdatel'stvo Russkij Jazyk.
- Zubritskaya, Ekaterina. 1995. *The categorial and variable phonology of Russian*. PhD thesis, University of Pennsylvania.
- Zwicky, Arnold, and Geoffrey K. Pullum. 1983. Cliticization vs. inflection: English *n't*. *Language* 59:502–513.

Vera Gribanova
 Department of Linguistics
 University of California Santa Cruz
 gribanov@ucsc.edu
<http://people.ucsc.edu/~gribanov>