Russian Prefixes, Prepositions and Palatalization in Stratal OT

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1. Introduction

Since the work of Zubritskaya (1995) and Matushansky (2002), it has been apparent that prepositions (1a) and prefixes (1b) instantiate a synchronically unified and unique class (henceforth P) in Russian phonology.

(1)   a.   **ot**   komnatɨ
                 from room.GEN
                 'from the room'

        b.   **ot**ložitʲ
                 PFX.lay
                 'to put away'

A less discussed point is that Russian prefixes (PFX) and prepositions (PREP) *cannot* be unified on the basis of their morphosyntactic characteristics. An existing analysis of P (Rubach, 2000) addresses only the phonological facts, implicitly assuming that the two categories are identical morphosyntactically. To resolve the apparent contradiction between the phonological identity and the morphosyntactic nonidentity of PFX and PREP, I propose a Stratal OT account (Kiparsky, 2000) of the palatalization pattern across the boundary between P and the immediately following prosodic host (henceforth, P-COMPLEX) in which PFX and PREP are processed at distinct strata (word and postlexical, respectively). The account takes as its foundation the work of Blumenfeld (2003), and aims to treat the relevant phonological evidence as well as the morphosyntactic mismatch.

After presenting some abbreviated evidence to substantiate the above empirical claims (§2), I summarize a three-tiered Stratal OT account of palatalization across stem-suffix boundaries in Russian (Blumenfeld, 2003) (§3). I then propose an extension of that analysis to treat the palatalization pattern for PREP and PFX (§4). Finally, I discuss the advantages of the proposal over an existing derivational account (Rubach, 2000) (§5).

2. A phonological/morphosyntactic mismatch

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

  [1]In the table below and throughout the paper, many of the PFX-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. I also omit larger PREP (*e.g. okolo, čerez, skvozʲ*), since they can bear stress and appear to be independent words. Additionally, the [ɨ] symbol throughout represents a vowel that is [+high, +back, -round]. [ʲ] marks palatalized consonants, and [ˠ] marks velarized consonants. Jer vowels (which alternate with zero in certain contexts) are capitalized throughout the paper.

prefix	-ložitʲ
otO	otložitʲ 'to put aside'
podO	podložitʲ 'to put under sth.'
vO	vložitʲ 'to invest, insert'
izO	izložitʲ 'to recount'
sO	složitʲ 'to put together'
pro	proložitʲ 'to lay'
preposition	**komnata** 'room'
otO 'from'	ot komnatɨ 'from the room'
podO 'under'	pod komnatoj 'under the room'
vO 'in'	v komnate 'in the room'
izO 'out of'	iz komnatɨ 'from the room'
sO 'with'	s komnatoj 'with the room'
pro 'about'	pro komnatu 'about the room'

Figure 1: Homophonous prefixes and prepositions

prefix	-ložitʲ
razO	razložitʲ 'to place, arrange'
pere	pereložitʲ 'to move sth.'
preposition	**komnata** 'room'
bezO 'without'	bez komnatɨ 'without a room'
kO 'to'	k komnate 'to the room'

Figure 2: Non-overlapping prefixes and prepositions

2.1. *Phonological identity of P*

Broadly, five processes appear to be relevant to demonstrating that PREP and PFX are unified phonologically: palatalization, jer vocalization, word-final devoicing, hiatus resolution, and vowel reduction and pretonic vowel lengthening. For each of these processes, the behavior of P reflects a unique prosodic status: the two classes, PFX and PREP, behave like each other, and like nothing else in Russian phonology. The P-COMPLEX reflects the presence of a prosodic boundary between P and the rest of the complex with respect to certain phenomena, but not others (fig. 3).

Prosodic Boundary	No Prosodic Boundary
Palatalization	Jer vocalization
Vowel Hiatus Resolution	Word-final devoicing
	Pretonic vowel lengthening

Figure 3: Prosodic boundary across the P-COMPLEX?

While the focus of this paper is palatalization, an *a priori* requirement for an adequate analysis is that it be consistent with the observed behavior of P with respect to all these phenomena.

The palatalization pattern across the P-COMPLEX boundary is one of several indications that PFX and PREP belong to the same phonological class. Word-internally and across certain stem-suffix boundaries, consonants palatalize to conform in backness to following high and mid front vowels (as in (2)).[2]

(2)   /obide/ → [obʲidʲe] 'offense.DAT'
       /alʲt + ist/ → [alʲtʲist] 'viola player'

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[2]In 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 §3.

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 (I follow the traditional literature in calling this process *retraction*). This results in a velarized consonant followed by a [+back] vowel (3).

(3)   /ugol ivana/ → [ugolˠɨvana] (*ugolʲivana) 'Ivan's corner'
        /sad iriny/ → [satˠɨriny] (*satʲiriny) 'Irina's garden'[3]

In cases where the word-final consonant is underlyingly palatalized, there is no backness mismatch, so the underlying form matches the surface form (4).

(4)   /ugolʲ ivana/ → [ugolʲ ivana] 'Ivan's coal'
        /gvozdʲ ivana/ → [gvostʲ ivana] 'Ivan's nail'

PFX and PREP follow the patterns in (3) and (4), with retraction being the strategy for backness mismatch resolution.

(5)   /ot + iskatʲ/ → [otˠɨskatʲ] (*otʲiskatʲ) 'find.INF'
        /ob + ide/ → [obˠɨde] (*obʲide) 'about Ida'

Since 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), we might conclude that PREP and PFX behave like words, and are independent phonologically. The discussion in §2.2, however, should demonstrate that only PREP, and not PFX, is independent morphosyntactically.

2.2.   Morphosyntactic nonidentity of P

The goal of this section is to establish that PREP and PFX in Russian are members of two different morphosyntactic categories: PREP are postlexical clitics, while PFX are lexically composed affixes. To ground this claim, I discuss some of the evidence that PREP and PFX exhibit different morphosyntactic behaviors.

The literature on clitics and affixes gives us a number of indications that can help distinguish one from the other. The most prominent collection of such characteristics can be found in Zwicky and Pullum (1983). While it has been pointed out numerous times that these characteristics are not completely absolute, they are still the most reliable that we have to date. I also discuss evidence from ellipsis that helps support the morphosyntactic distinction.

2.2.1.   Criterion A

Zwicky and Pullum's (1983) Criterion A states, "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." PREP in Russian exhibit no lexical restrictions on the following element.[4] Instead, they "lean" indiscriminately on any category of host, whether it be a noun, demonstrative, adjective, or intensifier (6).

(6)   k (etomu)   (krasivomu)   domu
        to this.DAT   beautiful.DAT   house.DAT

        'to (this) (beautiful) house'

By contrast, the element to the immediate right of PFX is always a verb stem.

2.2.2.   Criterion B

Criterion B states, "Arbitrary gaps in the set of combinations are more characteristic of affixed words than of clitic groups" (Zwicky and Pullum, 1983:504). PREP combines with any semantically viable complement. By contrast, there are idiosyncratic lexical gaps in the distribution of PFX.

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[3]Though word-final devoicing has no direct relevance to the discussion here, I include it in the transcriptions.

[4]PREP do — like typical syntactic heads — impose selectional restrictions on the category of their complement.

(7) a. nanesti 'bring over (some amount of)'
     b. nabratʲ 'to collect (some amount of)'
     c. najti 'find'
     d. navestitʲ 'pay a visit'
     e. nastojatʲ 'to insist'

    f. *naiskatʲ 'na-search'
    g. *naterjatʲ 'na-lose'
    h. *naimetʲ 'na-have'
    i. *naljubitʲ 'na-love'
    j. *naspatʲ 'na-sleep'

Such lexical gaps are a hallmark of affix-like behavior, and indicate that PFX are in fact composed lexically.

2.2.3. Stranding/ellipsis

We might expect, given the fact that both PFX and PREP are dependent on the presence of a host, that neither can appear without that host. However, under very particular circumstances, certain PREP can be stranded in gapping (Svenonius, 2004).

(8) 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 examples involving apparent omission of PREP's host.

(9) a. Ne sušʲestvuet svobodɨ   ot   bez   svobodɨ   dlja.
      NEG exist.3.SG. freedom.GEN from without freedom.GEN for
      'There is no such thing as freedom from without freedom for.'

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

    c. Naš   nachalʲnik privɨk   kričatʲ 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 PREP appear without a host. The apparent requirement is that the PREP contain at least one syllable (CV). Monoconsonantal PREP, such as *k*, *s*, and *v*, cannot appear alone, even if we realize the underlying jer to yield a CV sequence (*vo*, *ko*, *so*).[5]

(10) *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.'

Unlike PREP, PFX cannot appear without a host under any circumstances.

(11) *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) PREP can appear with no immediately right-adjacent host, while no PFX can, this should not come as a surprise. If we analyze PFX as lexically composed with their stems, then there should never be a case where they can appear separately from the stem. PREP that are heavier may not have as strict a prosodic requirement for a host. If we analyze PREP as independent syntactic elements, then the fact that heavier PREP can sometimes appear with no host should follow.

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[5]While realizing a jer yields a legitimate CV sequence in the case of mono-consonantal PREP, the prosodic weight requirement for stranding/ellipsis is apparently not the right sort of motivation for jer vocalization. Some speakers can, however, produce something like (10) by inserting an extra-long schwa, but this is non-standard and apparently not a possibility for many speakers.

3. A Stratal approach

To capture the mismatch between phonological unity and the morphosyntactic disunity of P, I propose extending a three-tiered Stratal Optimality Theoretic account originally developed by Blumenfeld (2003) for 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 evaluated 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 OT approach allows for separate strata, constraints at each level may be re-ranked in order to model the varying repair strategies involved.

A few examples of the members of the two distinct suffix classes appear below (fig. 4). Note that there does not appear to be any characteristic that might differentiate Class 1 from Class 2 based on the phonological shape of each suffix.

Class One	Class Two
-itʲ	-ist
-ynʲa	-izm
-ʲb	-i/-ɨ(GEN.SG.)
-ʲsk	-ja
-ju (1.SG.)	

Figure 4: Class 1 and Class 2 suffixes

One example of a phonological process that distinguishes between Class 1 and Class 2 suffixes is Velar Palatalization (VP), which turns velars into post-alveolars. Class 1 triggers VP, while Class 2 does not.

(12)   Class 1: /drug + itʲ/ → [družitʲ] (*drugitʲ) 'be friends.INF'
        Class 2: /tank + ist/ → [tankʲist] (*tančist) 'tank operator'

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 postlexical. 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 underspecified. This assumption plays a significant role, since it is essential in certain cases that consonants be underspecified in the input for the right output candidate to win (e.g. /alʲt-ist/ in fig. 6). The author also chooses to analyze Russian as containing two phonemes, /ɨ/ 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, 1996).

The required constraints are given below.[6]

(13)   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,[7] at the stem level IDENT[BK]V

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[6]Following Blumenfeld (2003), I make no theoretical claim about the presence of both MAX/DEP and IDENT constraints in the system. Though I don't include the revision here, one could rework the tableaux to make use of only the MAX/DEP family.

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

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 /-ɨ/ suffixes at the stem level (fig. 5), while permitting for -i/-ɨ variation at the word level (fig. 6).

/žen-itʲ/ 'marry.INF'	IDENT[BK]V	MAX[BK]C	DEP[BK]C
a.☞ ženʲitʲ			*
b. ženˠitʲ	*!		*
/gusʲ-inʲa/ 'goose.FEM'	IDENT[BK]V	MAX[BK]C	DEP[BK]C
c.☞ gusˠinʲa		*	*
d. gusʲinʲa	*!		

Figure 5: Stem level suffixes

/zemlʲ-ɨ/ 'land.GEN'	MAX[BK]C	DEP[BK]C	IDENT[BK]V
a.☞ zemlʲi			*
b. zemlˠɨ	*!	*	
/stran-ɨ/ 'country.GEN'	MAX[BK]C	DEP[BK]C	IDENT[BK]V
c.☞ stranˠɨ		*	
d. stranʲi		*	*!

Figure 6: 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 the P-COMPLEX by employing the word and postlexical strata.

4.   Extending the account

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

Since words without a P must also be composed at the lexical level, and palatalization is the predominant strategy there, we must assume that the final consonant in P is specified for [+back] in the input (othwerwise, unwanted P-final palatalization would result). I consider this a necessary stipulation and one that is not very costly, considering that P is a closed class.

The necessary constraints are identical to those in (13), with the exception of DEP[BK]C, which is further split into two more specific constraints for reasons that will become apparent:

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

Across the P-COMPLEX boundary, changing the underlying [+back] feature of the P-final consonant would result in the wrong output; thus, faithfulness to input consonant backness outranks faithfulness to vowels at the word level.

/otˠOiskatʲ/ 'to find'	MAX[BK]C	IDENT[BK]V	DEP[-BK]C	DEP[+BK]C
a.☞ otˠiskatʲ		*		
b. otʲiskatʲ	*!		*	

Figure 7: Prefixes at the word level

At the postlexical level, retraction is the repair strategy across the P-COMPLEX boundary and across word boundaries. 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. For this reason, I suggest splitting up the DEP[BK]C constraint, as illustrated in (14). Informally, the intuition we are interested in expressing is that at the postlexical level, for consonants that are left underspecified, it is better to specify them for [+back] and change the backness value of the following vowel (retraction) than it is to insert a [-back] feature and stay faithful to the features of the following vowel (palatalization). This approach avoids having to make any claim about the P-final backness specification for the open class of lexical words.

/sad ivana/ 'Ivan's garden'	MAX[BK]C	DEP[-BK]C	DEP[+BK]C	IDENT[BK]V
a.☞ sadˠ ivana			*	*
b. sadʲ ivana		*!		

/sadˠ ivana/ 'Ivan's garden'	MAX[BK]C	DEP[-BK]C	DEP[+BK]C	IDENT[BK]V
c.☞ sadˠ ivana				*
d. sadʲ ivana	*!	*		

Figure 8: Postlexical level — word boundaries

/otˠO ivana/ 'from Ivan'	MAX[BK]C	DEP[-BK]C	DEP[+BK]C	IDENT[BK]V
a.☞ otˠ ivana				*
b. otʲ ivana	*!	*		

Figure 9: Postlexical level — P-COMPLEX boundaries

The account proposed here leverages the three-tiered Stratal OT system to capture the phonological-morphosyntactic mismatch involving PFX and PREP. The analysis captures the retraction pattern across word boundaries and across the P-COMPLEX boundary, while maintaining consistency with the differing morphosyntactic properties of PFX vs. PREP. This view is also consistent with the analysis of stem-suffix palatalization in Blumenfeld (2003).

5. Justifying a three-tiered approach

Rubach (2000) has proposed a derivational analysis of the palatalization pattern across the P-COMPLEX boundary in Russian. This account makes use of two ordered levels; here, I give three arguments to support a third level of evaluation in a Stratal OT system.

Rubach's account treats PREP and PFX as morphosyntactically identical, so they are both evaluated first at level one (corresponding to word evaluation), and subsequently at level two (corresponding to postlexical evaluation). The constraints responsible for palatalization and jer vocalization apply at level one. At level two, the constraints responsible for retraction take over. The key insight of this proposal is that the final back jer in both PREP and PFX blocks the effect of the constraint responsible for palatalization. Reconstructing Rubach's proposal, a derivation on this proposal might look like fig. 10. 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 constraint responsible for palatalization is rendered irrelevant.

Level 1: palatalization	Level 2: retraction
/podO lEdom/ → /podo lʲdom/ 'under ice.PREP' cf. *ledjanoj* 'icy'	/podo lʲdom/ → [podo lʲdom]
Level 1: palatalization	Level 2: retraction
/otOiskatʲ/ → /otiskatʲ/ 'find.INF'	/otiskatʲ/ → [otˠiskatʲ]

Figure 10: Rubachian derivation — jers and palatalization

The intuition behind this approach is that the backness features of the underlying jer affect preceding consonants. For example, underlyingly plain consonants frequently palatalize before an underlying [-back] jer, even when the jer is not realized in the surface form.

(15) /komsomol/ → [komsomol] 'youth organization of the former Soviet Union'
      /komsomol-Ets/ → [komsomolʲets] 'member of the komsomol.NOM'
      /komsomol-Ets-a/ → [komsomolʲtsa] 'member of the komsomol.GEN'

Despite the existing support for this general intuition, there are three arguments against its implementation in Rubach (2000). First, the derivation as it is sketched in fig. 10 still yields the incorrect result for PFX. The problematic aspect of the derivation is level 1, where the back jer is meant to block the application of the palatalization process. 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 at level one, yielding an incorrect form: /otOiskatʲ/ → *[otʲiskatʲ].

A second problem concerns the hiatus resolution pattern for P. Vowel clusters are normally eliminated within words (16), but not across the P-COMPLEX boundary (17).[8]

(16) /vide + itʲ/ → [viditʲ] (*videitʲ) 'see.3.SG.'
      /palʲto + iško/ → [palʲtiško] (*palʲtoiško) 'little coat'

(17) /po + obedatʲ/ → [poobedatʲ] (*pobedatʲ) 'to have lunch'
      /po + asfalʲtu/ → [poasfalʲtu] (*pasfalʲtu, *posfalʲtu) 'along the asphalt'

It is expected that the forms in (16) will be evaluated at Rubach's Level 1. If this is the case, then P cannot be evaluated at Level 1, since hiatus resolution does not apply across the P-COMPLEX. But according to Rubach's proposal, PFX, as well as PREP, must undergo evaluation at Level 1. In this case, the contrast between (16) and (17) with respect to hiatus resolution remains unaccounted for.

The problem can be resolved if we can make use of a third (stem) level, at which hiatus resolution can apply (thus accommodating (16)). Many examples of vowel deletion in vowel clusters are at stem-suffix boundaries, and the relevant suffixes appear to pattern with Blumenfeld's Class 1.[9] For example, Blumenfeld (2003) has shown *-itʲ* to be a stem-level suffix, and the suffix *-iško* is likely to be evaluated at the stem level as well, since it triggers Velar Palatalization (18).

(18) /pidžak + iško/ → [pidžačiško] 'little jacket'

In order to accommodate the lack of hiatus resolution in the P-COMPLEX, we must posit that whatever constraint is responsible for this process is ranked low at the word and postlexical levels. From this, it follows that word level (Class 2) suffixes should not trigger vowel hiatus resolution; the evidence appears to support this (19).

(19) /Mande + ism/ → [Mandeizm] (*Mandizm, *Mandezm) 'Mandeism'

A third objection is more theoretical. Blumenfeld's account shows we need at least two levels — stem and word — to account for disparate palatalization patterns at the stem-suffix boundary. Given the morphosyntactic evidence described in §2.2, we can't fit PREP and PFX into stem and word level evaluation – we need an extra level for postlexical evaluation.

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[8]Note 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.

[9]Thanks to Lev Blumenfeld for discussion on this point.

6.   Conclusion

The analysis presented here reconciles two sets of facts about PREP and PFX: first, that they are identical phonologically, and second, that they differ morphosyntactically. Using a three-tiered Stratal OT approach allows for the modeling of the (non)identity of P via composition at different strata: PFX at the word level, and PREP at the postlexical level. This claim, in combination with Stratal OT's ability to re-rank constraints at each stratum, straightfowardly accounts for the palatalization facts.

The proposal also aims to capture the palatalization/retraction pattern for P-COMPLEX 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 P, so long as we assume that the P-final consonant is [+back] in the input. This strategy also allows for underspecified word-final consonants in the input to surface as [+back], which models the correct pattern (retraction) across word boundaries.

This work reflects the beginnings of an approach that is projected to be extendable to phenomena not analyzed here, like hiatus resolution, word-final devoicing, pretonic vowel lengthening, and so on. What remains is 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 by the facts presented here.

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