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Russian palatalization: the true(r) story

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Plan for talk

1. Surface inventory

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2. Redux on traditions within the generative approach

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3. Evidence against following assumptions:

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   - Six contrastive vowels

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4. Present our approach

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5. Evidence for substance-free phonology
6. Evidence against multiple-level derivations
7. Some implications

Outline

1. Data
   - Inventories
   - Distributions
   - Palatalization and depalatalization
2. Approaches and problems
   - Generative approaches
   - Challenging the assumptions
3. The proposal
   - Assumptions
   - Analysis
   - Further issues

Consonant inventory

Manner	Labial		Dental		Postalveolar		Palatal	Dorsal	
Plain stop	p	b	t	d				k	g
Palatalized stop	p^j	b^j	t^j	d^j				k^j	g^j
Plain fricative	f	[v]	s	z	$ʂ^w$	$ʐ^w$	[j̟]	x	
Palatalized fricative	f^j	$[v^j]$	s^j	z^j	$ʃ^j$ː	$(ʒ^j$ː$)$		x^j	
Plain affricate			t͡s						
Palatalized affricate				t͡ʃʲ					
Plain nasal	m		n						
Palatalized nasal	m^j		n^j						
Plain lateral				ɫ					
Palatalized lateral				l^j					
Plain trill/flap				r/ɾ					
Palatalized trill/flap				$r^j/ɾ^j$					
Approximant		[ʋ̟]					[j]		
Palatalized approximant		$[ʋ̟^j]$							

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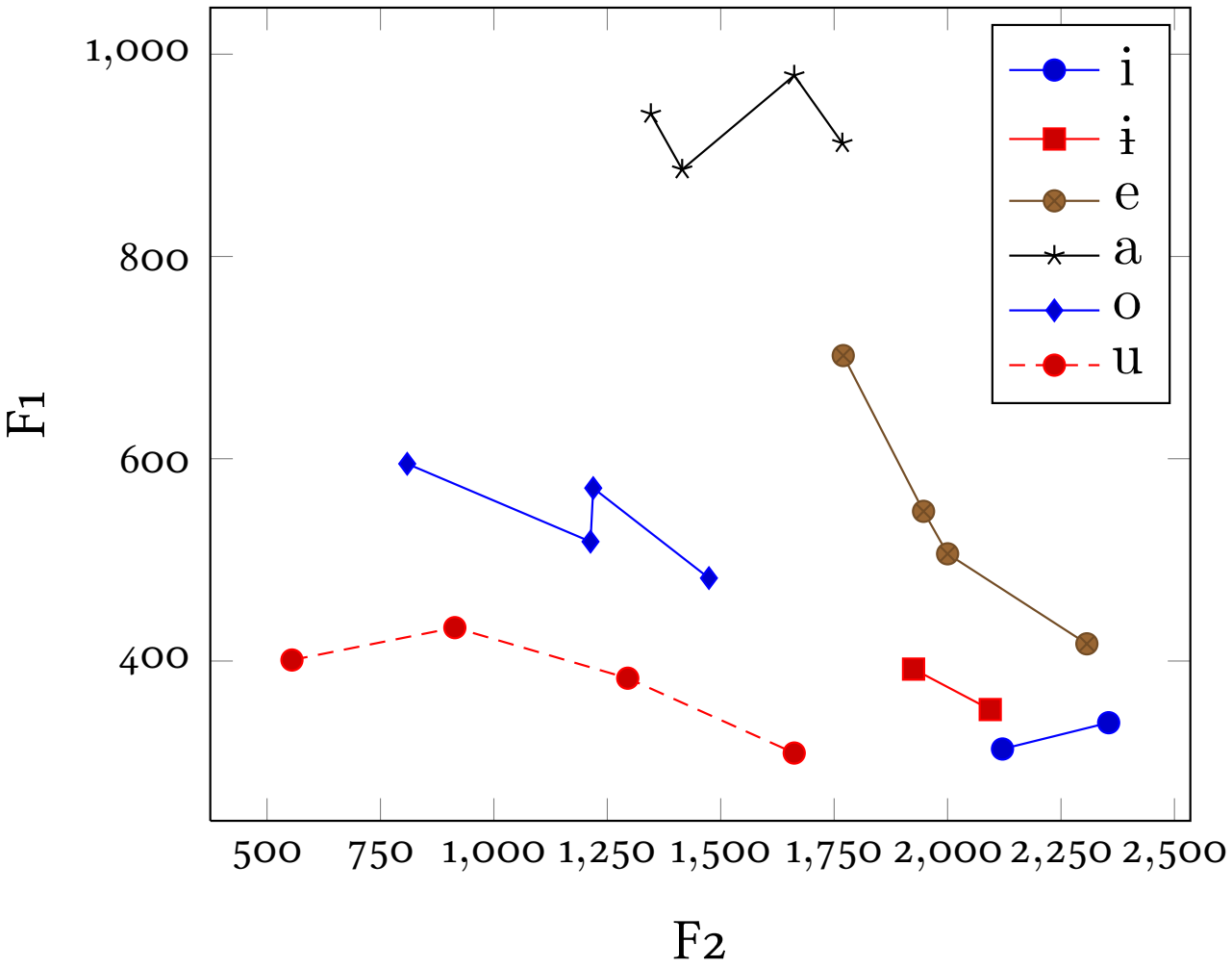
Plain fricative	f	[v]	s	z	$ʂ^w$	$ʐ^w$	[j̟]	x	
Palatalized fricative	f^j	$[v^j]$	s^j	z^j	$ʃ^jː$	$(ʒ^jː)$		x^j	
Plain affricate			$t͡s$						
Palatalized affricate				$t͡ʃ^j$					
Plain nasal	m		n						
Palatalized nasal	m^j		n^j						
Plain lateral				ɫ					
Palatalized lateral				l^j					
Plain trill/flap				r/ɾ					
Palatalized trill/flap				$r^j/ɾ^j$					
Approximant		[ʋ̟]					[j]		
Palatalized approximant		$[ʋ̟^j]$							

Vowel inventory: stressed syllables



Vowel inventory: stressed syllables

- Five or six vowels
- Strong coarticulation effects with palatalized consonants
- [i] and [ɨ] in complementary distribution:
  - [i] following palatalized consonants and syllable-initially
  - [ɨ] following non-palatalized consonants (and some extremely marginal syllable-initial examples)
- Otherwise syllable-initial vowels are realized as if preceded by a non-palatalized consonant

Distribution of palatalization: non-dorsals

- Labials and coronals contrast for palatalization across all positions
- Before non-front vowels:

(1) a. [ˈmaɫ] ‘small’
b. [ˈmʲaɫ] ‘crumbled, kneaded (pa. t.)’

(2) a. [ˈtok] ‘flow (n.)’
b. [ˈtʲok] ‘flowed (pa. t.)’

- Before front vowels

(3) Before [i]/[ɨ]: what is the underlying contrast?
a. [ˈpɨɫ] ‘eagerness’
b. [ˈpʲiɫ] ‘(he) drank’

(4) Before /e/: [Cɛ] are borrowings, albeit well-nativized
a. [ˈtɛstɐ] ‘test (gen. sg.)’
b. [ˈtʲestɐ] ‘dough’

Distribution of palatalization: non-dorsals

- Word-finally there is a contrast for both labials and coronals:

(5) a. [ˈmʲeɬ] ‘chalk’
b. [ˈmʲelʲ] ‘shoal’

(6) a. [praf] ‘right’
b. [prafʲ] ‘rule!’

- So far it all seems unremarkable…

Distribution of palatalization: dorsals

- Not with dorsals, though
- No contrast word-finally:

(7) a. [ˈmak] ‘poppy’
b. *[makʲ] ‘???’

- Palatalized velars before non-front vowels: almost exclusively borrowings

(8) a. [ˈgʲujs] ‘naval jack’
b. [pənʲɪˈkʲor] ‘panic-monger’

- Plus (in Standard Russian) one verb with a morphologically conditioned [k]∼[kʲ] alternation (Flier, 1982):

(9) a. [tkatʲ] ‘to weave’
b. [tkʲot] ‘(s)he weaves’

- More in dialects

Distribution of palatalization: dorsals

- Velars before front vowels
- If the vowel is /e/, velars are not palatalized only in a very few borrowings
- For [i]/[ɨ]:
  - Normally, velars are palatalized

(10) a. [ˈkʲinʊtʲ] ‘throw’
b. *[kɨnutʲ] ‘???’

  - Only extremely few borrowings (mostly from Turkic) with [kɨ gɨ xɨ], normally have variants with [kʲi gʲi xʲi]

(11) a. [kɨrˈgɨs] ‘Kyrgyz’
b. [kʲirˈgʲis] ‘id.’, more frequent

Distribution of palatalization: dorsals

- Complication for [i]/[ɨ]: [kɨ gɨ xɨ] are allowed across word boundaries, cf.

(12)

a.	[ˈkʲirʲɪ]	‘to Kira’
b.	[ˈirɐ]	‘Ira’
c.	[ˈkɨrʲɪ]	‘to Ira’

- Overall, these facts are normally used to support the claim that palatalization on dorsals is always derived
- How does this square with the unremarkable status of palatalization on non-dorsals?

Palatalizaton types

- At morpheme edges, we encounter various palatalization-related phenomena
- We concentrate on four types:
  - Surface palatalization
  - Retraction
  - Velar palatalization
  - Transitive palatalization

Surface palatalization

- Non-dorsals turn into their palatalized correspondents, normally before suffixes starting with [i] and [e]

(13)	a.	[ˈxvost]	‘tail’
	b.	[ˈxvosʲtʲɪk]	‘small tail’
(14)	a.	[mɐsˈkva]	‘Moscow’
	b.	[v mɐsˈkvʲe]	‘in Moscow’

- We come back to dorsals later

Retraction

- Across prefix–stem and preposition–word boundaries (at least), stem- resp. word-initial [i] is realized as [ɨ] and does not palatalize a preceding non-palatalized consonant

(15)	a.	[ɪˈgratʲ]	‘play (imperfective)’
	b.	[sɨˈgratʲ]	‘play (perfective)’
(16)	a.	[ɪˈgra]	‘game’
	b.	[v ɨˈgrʲe]	‘in the game’

- Uncanny similarity to the [kɨ gɨ xɨ] context

Velar palatalization

- /k ɡ x/ → /t͡ʃʲ ʐʷ ʂʷ/
- Mostly before suffixes starting with /i/ or /ɨ/ and /e/ or /o/
- Long story on the /e/ → /o/ shift omitted here

(17) a. [ˈmox] ‘moss’
b. [ˈmʂʷɨstɨj] ‘mossy’

(18) a. [sɐˈbakɐ] ‘dog’
b. [səbɐˈt͡ʃʲonkɐ] ‘small dog’

Transitive palatalization

- /t d s z/ → /t͡ʃʲ ʐʷ ʂʷ ʐʷ/
- “Many disparate changes”; “extremely opaque process” (Rubach, 2000)
- Caused by all sorts of miscellaneous suffixes (which historically contain a lost *j)

(19)

a.	[gərɐˈda]	‘cities’
b.	[gərɐˈʐʷanʲɪn]	‘city-dweller’

- Rubach (2000): “best treated as instances of allomorphy”, and cf. Rubach & Booij (2001) for Polish

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The historical legacy

- Halle (1959) is of course the original generative treatment of Russian
- Just like Chomsky & Halle (1968) (or is it the other way around?), relies rather heavily on restating history through rules
- Russian generative phonology a sprouting industry: Lightner (1972) is just one example
- Should we expect newer literature to ditch those assumptions and turn to the surface?
- Hasn't happened. In fact, what we may call the Iowa–Warsaw school (Rubach, 2000, 2007; Plapp, 1999; Mołczanow, 2007) argues rather forcefully that Russian is a prime example against parallel OT

The big question

- How do we treat lexical and morphological palatalization?
- Is it just front vowels spreading [−back] to consonants?
- Especially available in a theory which has all sorts of absolute neutralization (Halle, 1959; Lightner, 1972)
- "Vowel power" versus "consonant power" (Hamilton, 1976)
- This has essentially boiled down to the [i]/[ɨ] question
- Plapp (1999): the two-vowel account is superior to the one-vowel account conceptually. Empirically both work equally well (?), but two vowels is more economic, because it does not need stipulative specification and reduces the number of contrasts/segments

The two-vowel account

- Two underlying vowels: /i/ and /ɨ/, one is [−back], the other [∅back] or [+back]
-

Rule	/gotov-itʲ/	/gotov-ɨj/
Surface palatalization	/gotovʲ-itʲ/	
Output	[gɐˈtovʲitʲ] ‘prepare’	[gɐˈtovɨj] ‘ready’

The two-vowel account

- In the case of velars, there is a counterfeeding order between velar palatalization and /ɨ/-fronting

Rule	/nos-ɨ/	/losʲ-ɨ/	/muk-ɨ/	/muk-itʲ/
Velar pal.				/mut͡ʃʲitʲ/
Fronting		/losʲ-i/		
/ɨ/-fronting			/muk-i/	
Surface pal.			/mukʲ-i/	
Output	[nɐˈsɨ] ‘noses’	[ˈlosʲɪ] ‘moose (pl.)’	[ˈmukʲɪ] ‘torments’	[ˈmut͡ʃʲitʲ] ‘to torment’

The two-vowel account

- The two-vowel account needs three types of consonant-vowel interaction:
  - [−back] spreads R → L: surface palatalization
  - [−back] spreads L → R: complementary distribution of [i] and [ɨ]
  - [+back] spreads L → R: retraction
- Of course this will only work with a complicated computation: rule ordering (Halle & Matushansky, 2002), Lexical Phonology (Plapp, 1999), multi-level OT of one type (Rubach, 2000) or another (Blumenfeld, 2003)
- But how warranted is this complicated system?
- I take issue with three assumptions here:
  - That it is meaningful to talk of the segment [ɨ]
  - That [kʲ gʲ xʲ] can only be derived before /ɨ/
  - That [i]/[ɨ] is a unique pair in Modern Russian

The phonetics of [ɨ]

- It has been known to Russian phoneticians since at least Tomson (1905) that there is no [ɨ], which is in fact a diphthong, something like [ɯ^{i}]
- Since at least Padgett (2001) this has (should have) been known to Western scholars too
- Phonetic data provide evidence that the distinction between [ɨ] and [i] is phonetic and purely contingent on the (lack of) palatalization of the preceding consonant (via enhancement?)
- Though this is not the interpretation provided by Padgett (2001)
- So if "[ɨ]" is not a phonetic segment, what is it phonologically?
- Leaving the velars aside momentarily, it just seems that there is a difference between [i] which causes surface palatalization and [i] which does not

Palatalization of velars

- It is claimed that palatalized velars before non-front vowels are "marginal" to Russian phonology and in general palatalization in velars is non-distinctive
- Borrowings like *g'ujs* 'naval jack' and *K'ol'n* 'Cologne' are well nativized
- Contrast with the absence of [kɨ gɨ xɨ] which is a genuine gap: the two or three words that do exist usually have [kʲi gʲi xʲi] variants as with *kyrgyz*/*kirgiz*

Palatalization of velars

- Integration of surface palatalization of velars into the morphology
- There is the ‘weave’ verb: only one in MSR, as a result of dialect mixing; Southern Russian dialects have a lot more verbs of this sort
- Then there is a diminutive suffix which causes velar palatalization in the native lexicon but can cause surface palatalization in novel words:

(20)	a.	[ˈvolk]	‘wolf’
	b.	[vɐlˈt͡ʃʲonək]	‘wolf cub’
(21)	a.	[mɐˈkakɐ]	‘macaque’
	b.	[məkɐˈkʲonək]	‘small macaque’
		([məkɐˈt͡ʃʲonək] possible but rare)	

Palatalization of velars

- Then there is the gerundive suffix /-a/ which causes velar palatalization in the standard but surface palatalization colloquially

(22)

a.	[ʐʷgu]	'I burn (tr.)'
b.	[ʐʐʷa]	'burning' (standard)
c.	[ʐʷgʲa]	'burning' (colloquial)

- Is there a reasonable way to do this if [kʲ gʲ xʲ] can only appear before /ɨ/?

Palatalization of velars

- More general point: can morphophonology recycle a representation that is not phonological?
- Made separately by Flier (1982) and Kasatkin (1999)
- Kasatkin (1999): verbal paradigms of the [ˈtkʲot] type appear (though not exclusively) in those dialects where /kʲ gʲ xʲ/ arise independently due to progressive palatalization assimilation

(23) a. [dʲenʲˈgʲam] ‘money (dat. pl.)’
b. [marskʲoj] ‘naval’, from *morsʲkoj

- Also: gerunds of the [zˌʷgʲa] type are a characteristic feature of North-West Old Russian (Zaliznyak, 2004), where /kʲ gʲ xʲ/ were always present
- Mophophonology makes free use of palatalized velars, so maybe we can get them from sources other than “/ɨ/”

Palatalization of velars

- An overlooked aspect of the palatalization of velars concerns unstressed /-e/ suffixes which are realized as [-ɪ] but do not cause velar palatalization

(24) a. [ruˈkʲe] ‘hand (dat. sg.)’
b. [ˈmukʲɪ] ‘torment (dat. sg.)’

- Similar facts for imperative /-i/
- One solution is Lexical Phonology via exclusion of velar palatalization from the word level (Plapp, 1996; Blumenfeld, 2003)
- At best, even if palatalized velars are always derived, their distribution is not a compelling argument for /ɨ/
- ☞ Palatalized velars are contrastive segments on a par with other palatalized consonants
- Same conclusion by Padgett (2003) though from different premises

Front vowels galore

- The /i ɨ/ theory predicts the following categories:
  - /ki ti/ → /t͡ʃʲi tʲi/
  - /kɨ tɨ/ → /kʲi tɨ/
  - Additional assumptions: /ki ti/ → /kʲi tʲi/
- Here's an example:

(25)	a.	[kɐˈrovɐ]	'cow'
	b.	[kərɐˈvʲonkɐ]	'small cow'
(26)	a.	[sɐˈbakɐ]	'dog'
	b.	[səbɐˈt͡ʃʲonkɐ]	'small dog'

- In terms of palatalization, this looks quite like /i/
- Is there an /ø/ in Russian?

Front vowels galore

- Now consider these examples:

(27)	a.	[dubɐ]	‘oak (gen. sg.)’
	b.	[duˈbok]	‘small oak’
(28)	a.	[krʲʊˈka]	‘hook (gen. sg.)’
	b.	[krʲʊˈt͡ʃʲok]	‘small hook’

- Quite apart from the fact that /o/ triggers velar palatalization…
- …the system is set up in such a way that if a segment triggers velar palatalization, this implies that it triggers surface palatalization of non-velars

Front vowels galore

	Velars and [t͡s]		
Other consonants	None	Surface	Velar
None	✓		✓
Surface	✓	✓	✓
Transitive			✓

- ✓ = existence of a suffix which imposes the relevant alternations
- Shaded cells indicate possible types of suffixes under a charitable interpretation of the theory where palatalization is due to [−back] spreading from the vowel itself
- The theory undergenerates

Front vowels galore

	Suffix-initial vowel				
Palatalization effect	/i/	/e/	/a/	/o/	/u/
None			✓	✓	✓
VP only				✓	
Surface velars only	✓			✓	
Surface all consonants	✓	✓	(✓)		
Surface non-velars & VP	✓	✓	✓	✓	✓
VP & TP	✓	✓	✓	✓	✓

- Some generalizations can be made on the relation of vowel quality and palatalization
- But certainly not the neat one
- Highlighted row: all vowels can be /i/!

Conclusion (kind of)

- A theory where the palatalization effects of vowels derive from their featural content is inadequate for two reasons:
  - In its simplest form, it fails to derive all the facts even for the front vowels and needs a lot of computation-related tweaking (e. g. multiple levels), and it is not obvious it can be done even then
  - Even so, the ability of [+back] vowels to trigger palatalization is quite unexpected
- Do we have a front/back pairing for all vowels in Russian, plus the extra computation?
- This has actually been tried! See DeArmond (1979); Kharytonava (2009)
- But is there a better way?

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Argument

- Squarely a "consonant power" (Hamilton, 1976) approach
- Palatalization on consonants is independent of the quality of the following vowel
- Front vowels (or indeed any vowels) do not spread their features onto consonants (with one exception)
- Morpheme-edge palatalization is due to a floating feature
  - Cf. Bidwell (1962) for Russian and Gussmann (1992) for Polish
- Surface palatalization is the addition of a V-place[coronal] feature
- Velar/transitive palatalization is displacement of underlying place with the V-place[coronal] feature
- The choice of palatalization is regulated by the ranking

Place specifications

- Using the Parallel Structures Model of feature geometry (Morén, 2003)
- Partial specification, ignoring manner and laryngeal features

	C-place			V-place
Consonants	[lab]	[cor]	[dor]	[cor]
/p/	✓			
/p^{j}/	✓			✓
/t/		✓		
/t^{j}/		✓		✓
/k/			✓	
/k^{j}/			✓	✓
/t͡ʃ^{j}/				✓
/t͡s/				

Constraints

- MAX[F]: "keep tokens of features present in the underlying representations"
- DEPLINK[F]: "do not attach features to segments to which they are not attached underlyingly"
- *[F]: "do not have feature [F] on the surface"
- *DEPLINK[F_1]&*[F_2]: "do not attach [F_1] to a segment containing [F_2]"
- (Alternatively, use a more elaborate schema for DEPLINK à la Morén, 2001, i. e. DEPLINK[F_2]([F_1]))
- SPREAD: whatever constraint favours the spreading of underlying V-place[coronal], e. g. domain binarity
- Morphological indexation: if a constraint is indexed for a set of morphemes, it is vacuously satisfied by morphemes with a different index (Pater, 2009)

Easy case: no floating features

- Note: we are using /i/ as the vowel for expositionary purposes. we assume that it consists just of the feature V-place[coronal]

ti	DepLink(V-pl[cor])&*C-pl[cor]	Max(V-pl[cor])	Spread
a. ☞ tɨ			*
b. tʲi	*!		

tʲi	DepLink(V-pl[cor])&*C-pl[cor]	Max(V-pl[cor])	Spread
a. tɨ		*!	*
b. ☞ tʲi			*

No [kɨ gɨ xɨ]

- We propose that the lack of word-internal [kɨ gɨ xɨ] is phonological and arises from SPREAD dominating DEPLINK(V-pl[cor])&*C-pl[dor]

ki	SPREAD	DEPLINK(V-pl[cor])&*C-pl[dor]
a. ☞ kʲi		*
b. kɨ	*!	

- But spreading is blocked by the left boundary of the stem/word
- This gives "retraction" for free: it is just lack of spreading, with the non-palatalized consonants being velarized and giving the [ɨ] impression

Surface palatalization

- Surface palatalization is the addition of floating V-pl[cor]
- To save space, DepLink is forthwith understood as conjoined with the relevant markedness constraint

t ʲi	Max(V-pl[cor])	Max(C-pl[cor])	DepLink(V-pl[cor])
a. tɨ	*!		
b. ☞ tʲi			*
c. t͡ʃʲi		*!	

- This works identically for dorsals and non-dorsals

Velar palatalization

- For velar palatalization, DepLink is ranked higher than Max(C-place) but Max(V-pl[cor]) is still unviolated, so the C-place feature is deleted to ensure satisfaction of the conjoined constraint
- Normally this would be a ranking conflict, but that's why we need morphological indexation

	t ʲi$_\alpha$	Max(V-pl[cor])	DepLink(V-pl[cor])&*C-pl[cor]$_\alpha$	Max(C-pl[cor])
a.	tɨ$_\alpha$	*!		
b.	tʲi$_\alpha$		*!	
c. ☞	t͡ʃʲi$_\alpha$			*

Labial epenthesis

- Labials are not deleted in transitive palatalization contexts, but instead a [lʲ] is epenthesized
- This means tha MAX(C-pl[lab]), MAX(V-pl[cor]) and DEPLINK are all unviolated, but DEP ("do not epenthesize") is
- Morén (2006) proposes for Serbian that [ʎ] is epenthesized to comply with sonority sequencing

	pʲi	MAX(C-pl[lab])	MAX(V-pl[cor])	DEPLINK	"SONSEQ"	DEP
a.	pʲi			*!		
b.	pt͡ʃʲi				*!	*
c. ☞	plʲi					*

- SONSEQ is a cover constraint here
- TETU: best possible epenthetic segment given the conditions

Overgeneration is good!

- Quite obviously, this system is very powerful:
  - A suffix starting with any vowel can cause any palatalization for any consonant
  - A single suffix can cause different palatalization effects for different consonants
- But this is good
- Because that's how modern Russian works

Implications

- Various palatalization phenomena in Russian are amenable to a fully parallel account
- Caveat:
  - The blocking of V-place[cor] spreading across left edges might be a cyclic effect
- The morphological generalizations of Blumenfeld (2003) (VP only at stem level) can be restated in terms of indices
- No stance on whether serialist OT is necessary in general, e. g. for architectural reasons
- But Russian does not provide compelling evidence for it

More implications

- Note that [ʂʷ] and [ʐʷ], which are not palatalized on the surface, bear a V-place[coronal] feature
- For authors such as Rubach (2000); Mołczanow (2007) this is a further argument for serialism
- But this is because for them the distinction between [i] and [ɨ] is phonological
- In fact, we have seen this is phonetics
- The relevant segments also behave like they are palatalized in vowel reduction
- So there is no stipulative serialism, just the modular phonology-phonetics interface

Conclusions and outlook

- Palatalized velars are normal segments
- There is very little consonant-vowel interaction in the "normal" sense
- Palatalizations are caused by a floating feature and parallel computation
- More powerful theory of palatalization, but also empirically better

Further outlook

- Solve residual issues (especially the $[\widehat{\text{ts}}]$–velars parallelism)
- Work up full feature specification
- Dovetail with account of reduction (ask) and assimilation