A bad case of excessive computation: the role of morphology in palatalization-related alternations in Russian

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A bad case of excessive computation
The rôle of morphology in palatalization-related alternations in Russian

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Talk outline

1. Context
2. Two case studies from Russian
   ▶ Backness switch
   ▶ Palatalization
3. The advantages of modularity
4. Incursion of the idiosyncratic
5. Conclusion

Context
Russian in the history of generative phonology

Historical context

▶ Generative phonology is said to basically start with Russian: Halle (1959)
▶ Classic generative accounts such as Lightner (1972); Hayes (1984)
▶ Also taken up within Lexical Phonology, figures in Kiparsky (1985)
▶ Most analyses very abstract, sometimes even more so than Chomsky & Halle (1968)
▶ Of course there is much work on Slavic within GP/DP (e.g. Gussmann 2007), but I am insufficiently familiar with that…

A typical example

▶ From Halle & Matushansky (2002)
▶ The following rules are all extrinsically ordered:

1. Palatalization: \([\text{aback}] \) spreads \(C \leftarrow V\)
2. Velar mutation: dorsal\([-\text{back}]\) \(\rightarrow \) [coronal \(−\) ant +strident]
3. Iotacism: \(V[−\text{high}] \rightarrow [i] / C[−\text{back}]_−\)
4. Depalatalization: \(\hat{s} \hat{\varrho} c \rightarrow [+\text{back}]\)
5. Velar palatalization: \(k g x \rightarrow [−\text{back}] / _{-}V[+\text{high}−\text{round}]\)
6. Hi-switch: \([\text{aback}] \) spreads \(C \rightarrow V[+\text{high}−\text{round}]\)
Example derivation

\[ \text{šerstIstij} \quad \text{‘furry’} \]
|\quad \downarrow \quad \text{by Palatalization} |
|\text{šërstIstij} |
|\quad \downarrow \quad \text{by Iotacism} |
|\text{š]|rstIstij} |
|\quad \downarrow \quad \text{by Depalatalization} |
|\text{š}|rstIstij} |
|\quad \downarrow \quad \text{by Hi-switch} |
|\text{š}|rstIstij} |

The OT era

- Significant body of work arguing that Russian (and more broadly Slavic) data conclusively show that some sort of multiple-level serialism is unavoidable
  - Vowel reduction: Rubach (2000); Padgett (2004); M\`olczanow (2007)
  - Yers: M\`olczanow (2008); Gribanova (2009)
- Mostly occupied with recasting the SPE/LP analyses: well, of course you can't do them in parallel OT!
- Scheer (2010, §6.1.3): “[t]he whole derivational issue hinges on reranking, and on nothing else”.

Goals of this talk

- The analysis of Russian
  - I am not aware of any work specifically refuting the serialism-based analysis of Russian
- The issue of intermediate levels
  - Where do the levels come from?
  - What is the distinction between a multi-level phonology and non-trivial components of a modular theory of grammar?
- The value of phonology-internal evidence
  - Can we say that purely phonological data can have a decisive say on the previous issue?
  - If yes, how overwhelming must the evidence be?
Assumptions I

- Minimalist feature theory (Morén 2003, 2007; Blaho 2008)
  - Only privative features
  - Contrastivist Hypothesis (Dresher 2009; Hall 2007): only contrastive features are active in the phonological computation (see Dresher *passim* on why this is essentially the Trubetzkoyan position)
  - Substance-free I: phonetic representation of a feature not necessarily uniform either across or within a language
  - Substance-free II: assignment of phonological features based on phonological activity within the language at hand
- Consequences:
  - Surface underspecification
  - Non-trivial phonetic component

Assumptions II

- Not every change you can write using IPA is the job of phonology
- Potential sources of variable realization of underlying phonological symbols (“phonetic grammar”)
  - Allomorphy (not phonology: e.g. lexical insertion)
  - Manipulation of phonological symbols (“phonology”, “computation”)
    - General (“phonology” *per se*)
    - Item-specific (“morpheme-specific phonology”)
  - Language-specific differences in the realization of (bundles of) symbols (“phonetics–phonology interface”)
  - Phonetic factors: speech rate, aerodynamics, elasticity effects etc.
- Consequence: even if “phonology” is monostratal, the feed-forward model of grammar still introduces a kind of serialism, but with principled restrictions

The basic facts

- Most consonants have a palatalized counterpart, e.g. [t ɾ] [x ɾ] [ɾ ɾ] etc.
- Exceptions: [ts ʂʷ ʐʷ] (only non-palatalized), [ʃʃʲ] (only palatalized)
- Palatalized consonants have a pretty free distribution
  - But [k g x] are impossible word-finally
  - And rare before non-front vowels, though not impossible and even created by the morphophonology (Timberlake 1978; Flier 1982)
- Conversely, [k g x] are impossible (word-internally) before front vowels

The traditional assumptions

- Traditional as in going back to at least Halle (1959) and rarely challenged
- Six vowels, including [i] which is at least [+high +back –round]
- Complementary distribution of [i] and [ɪ] depending on palatalization of the previous consonants
- Note this requires [ʂʷi] [ʐʷi] [tsi] but [ʃʃʲi]
- Assumption: at least [ʂʷ] and [ʐʷ] are underlingly palatalized (we’ll see why in a minute)
- Not available in a contrastivist theory: (non-)palatalization is redundant on the “unpaired” segments
The palatalizations I

- Mostly before front vowels:
  - $C \rightarrow \emptyset$
  - But the same affixes often trigger $[k\ g\ x] \rightarrow [ʧ\ ʐʷ\ ʐʷ]\ (1)$
    a. (i) ['svʲet] 'light' (n.)
       (ii) ['svʲɪˈtʲɪtʲ] 'to illuminate'
    b. (i) ['muka] 'torment' (n.)
       (ii) ['muʃʲɪˈtʲɪ] 'to torment'

- Another type where only the velars are affected:
  - $[t\ d\ s\ z] \rightarrow [ʧ\ ʒʷ\ ʒʷ]\ (2)$
    a. (i) ['stoɫ] 'table'
       (ii) ['stɐˈlʲe] 'table (loc. sg.)'
    b. (i) ['krʲuk] 'hook'
       (ii) ['krʲʊˈkʲɪ] 'hook (loc. sg.)'

The palatalizations II

- Yet another type where everything undergoes surface palatalization
  - $[t\ d\ s\ z] \rightarrow [ʧ\ ʒʷ\ ʒʷ]\ (3)$
    a. (i) ['stoɫ] 'table'
       (ii) ['stɐˈlʲe] 'table (loc. sg.)'
    b. (i) ['krʲuk] 'hook'
       (ii) ['krʲʊˈkʲɪ] 'hook (loc. sg.)'

- Transitive palatalization:
  - No relation to the frontness of the following vowel
  - Same output as [i]-palatalization

The traditional approach

- Palatalization: triggered by $[i]$
  - $[t\ i\ k] \rightarrow [tʲi\ tɨ]$
- The other palatalization: triggered by $[i]$ with later fronting following velars; ordering crucial
  - $[t\ i\ k] \rightarrow [t\ i\ k] \rightarrow [t\ i\ k]$\n- Across-the-board surface palatalization: word-level (Blumenfeld 2003) or some boundaries reproducing this effect (Plapp 1996); multiple levels crucial for counterfeeding of $[i]$-palatalization
- Transitive palatalization: often ignored or relegated to morphology despite the clear affinity to $[i]$-palatalization

Reanalysis

- Joint work with Bruce Morén-Duolljá
- Email for details of analysis or see http://www.hum.uit.no/a/iosad/cv.html
- Redux:
  - There is no $[i]$
  - There is very little actual $C \leftrightarrow V$ spreading of $[ə\back]$}
  - The various outcomes of palatalization are ascribed to a floating feature
  - Lexical indexation allows Russian to realize a fair bit of the factorial typology for this floating feature
Case studies
Palatalization and backness switch

Backness switch and [i] I

- There is no /i/ in Russian
  - Phonetically it is a sort of diphthong: textbook knowledge in Russia, also Padgett (2001)
  - Basically the target is [i]
  - Phonologically it is not necessary
- The relationship between frontness and palatalization properties is complex
- Some non-front vowels trigger palatalization:
  (4)
  a. [pʲɪˈsok] 'sand'
  b. [pʲɪˈʃːʲanɨj] 'sandy'
- Vice versa: slightly complicated
- All /e/’s do trigger palatalization (historical accident)

Backness switch and [i] II

- If all /i/’s are /i/’s, they are an example of front vowels failing to trigger palatalization
- Exception: /ki/ still comes out as [kʲi]
- It is in fact the only C ← V spreading process that does not fail
- The ban against [ki ɡi xi] is in fact a robust surface-true generalization (modulo boundary effects)
- Spreading of [aback] to [dorsal] but not other places can be achieved by local conjunction
- Obviates the frankly weird rule fronting /i/ following non-palatalized dorsals only in order to front them afterwards
- Also solves the problem of the postalveolars
- The only part of the phonology where [ʂʷ ʐʷ] behave like non-palatalized consonants is where they cause [i] to appear instead of [ɨ]

Case studies
Morphophonological palatalization

Representational assumptions

- Based on a holistic approach to Russian phonology
- V-place[coronal]
  - Palatalization in consonants with a C-place (à la Clements)
  - The only place feature for the postalveolars
  - On its own: /i/
- Floating V-place[coronal] (unattached to a Root node) must attach to something to surface
- Factorial typography for floating feature
Case studies

Morphophonological palatalization

**The constraints**

- **MAX(V-pl[cor]), or MAXFLT (Wolf 2007):** self-explanatory
- **DepLink(V-pl[cor]):** do not create a new attachment for V-pl[cor]
- **C-pl[lab]/[cor]/[lab]:** self-explanatory
- **Conjunction of *C-pl and DepLink:** “do not attach V-pl[cor] to this type of consonant”
  - Can be undominated ⇒ no docking
  - Can be repaired by undoing the violation of DepLink ⇒ no docking
  - Can be repaired by undoing the violation of *C-pl ⇒ deletion of C-pl and attachment of V-pl[cor] = postalveolars
  - Can be dominated ⇒ docking of V-pl[cor] leads to surface palatalization
- Ignoring additional complications which don’t change the picture...

**Surface palatalization**

- **MAX(V-pl[cor]), MAX(C-pl) ⇒ DepLink(V-pl[cor])**
- Realize both the consonant’s underlying feature and the floating feature

```
Root
  C-man  C-pl  C-pl
    |     |     |
  [cl]  [cor] V-pl
    |     |     |
  [cor]
```

**Place-changing palatalization**

- Unified name for velar and transitive palatalization: same output, would be good to have a unified representation
- **MAX(V-pl[cor]), *C-pl & DepLink(V-pl[cor]) ⇒ MAX(C-pl)**

```
Root
  C-man  C-pl  C-pl
    |     |     |
  [cl]  [cor] V-pl
    |     |     |
  [cor]
```

**No-docking scenarios**

- The feature may fail to surface at all ⇒ non-palatalizing suffixes, such as the /ɨ/
- It may also force the epenthesis of some material to attach to
- Attested as labial epenthesis: /p b m f v/ → /pš bš mš fš vš/
- But the ranking is clearly contradictory: how can all these be attested in a single language?
**Lexical indexation I**

- For the sake of the argument, I propose accommodating the different palatalizing properties of Russian suffixes via lexical indexation (Pater 2009)
- So each class of suffixes has a corresponding ranking of the relevant constraints
- Contrast this with the Stratal OT approach of Blumenfeld (2003):
  - SOT: velar palatalization happens at the stem level, surface palatalization happens at the stem level, differences accommodated via stratum-specific ranking
  - Proposed approach: differences in the outcome of palatalization are due to arbitrary lexical indexes
  - Loss of generalization relative to SOT, even though the insight can still be expressed ("such-and-such indexes are associated with word-level suffixes")

**Lexical indexation II**

- Better empirical adequacy
  - Unified expression of place-changing palatalization
  - Correctly expresses the lack of a principled relationship between vowel frontness and palatalizing properties (other than diachronically)
  - Correctly expresses the types of palatalizing processes possible in Russian
- Give me empirical adequacy over loss of generalization any day

**Marrying OT and modularity**

- Scheer (2010): the “strict parallelism” rhetoric of OT tends to take (some of) its practitioners too far down the non-modular path
- One way of reconciling OT with modularity: letting go of many of the alternations commonly assumed to fall within the purview of phonology
  - Phonology = categorical operations on distinctive features
  - Operations on non-distinctive elements of the signal: phonetics–phonology interface, phonetics
  - Operations with non-phonological conditioning: allomorphy galore?
- Presumption of guilt: not phonological unless proved otherwise

**The phonetics–phonology interface I**

- Massive pile of “data”: until the rise of Laboratory Phonology, the working assumption is “if you can write it in IPA, it’s phonology”, appealing to Jakobson et al. (1951); Chomsky & Halle (1968) and the idea of a “universal phonetics”, where all differences among the sound grammars of different languages are phonological by definition; also Hale & Reiss (2008)
- In much of LabPhon and its ilk, the pendulum swings the other way: there is no separate module catering for categorial phonology, it is at best emergent (too many references to do justice to)
The phonetics–phonology interface II

- Other options (a selection):
  - Phonetics and phonology are orthogonal but simultaneously present: ‘sound phenomena can be classified on several dimensions, most of them continuous, which all together make the phenomenon relatively phonetic or relatively phonological’ (Tucker & Warner 2010)
  - Phonetics and phonology are in principle separate but difficult if at all possible to disentangle (Cohn 2006)
  - Phonetics and phonology are strictly separate:
    - No universal phonetics: phonetics (or the interface) is non-trivial, e.g. Kingston & Diehl (1994); Kingston (2007)
    - Phonetics–phonology duplication is not a problem but an empirical fact, and the two can be disentangled: Myers (2000); Przedzieceki (2005); Barnes (2006); Bermúdez-Otero (2010)

The phonetics–phonology interface III

- Some corollaries of a modular architecture
  - The interfaces must be non-trivial, and consequently they can do (some of) the job of an expansionist phonology
  - There are also clear consequences: we cannot cure opacity just by shunting the lateish processes to the interface: evidence required (Myers 2000)
  - We have to live with a lot of duplication such as Bermúdez-Otero’s (2010) “rule scattering”
    - But it’s OK if it gives better empirical adequacy

How good is phonological evidence?

- It is not my purpose here to argue for this specific analysis
- But it does seem that many of the facts previously argued to absolutely require serial derivation in phonology could in principle be reanalyzed
- What would the compelling evidence look like?
  - Demonstrably phonological
  - Crucially ordered processes
  - Operating categorically on contrastive symbols
  - Not amenable to a representational analysis (e.g. preservation of subsegmental elements as opposed to spreading-and-deletion)
- Place to look for: languages with really long derivations: Sanskrit? Sámi? Finnish?
Battling the idiosyncratic I

- Going back to Russian palatalization, it is arbitrary in at least two ways:
  - Despite repeated attempts to analyze it as driven by the surface phonology, these analyses appear to be around ten centuries late: the mere triggering of palatalization is not a surface-phonological fact.
  - The distribution of palatalization types among triggering morphemes is quite arbitrary.
- The second point means that I am not enough of a syntactician to convince myself one way or another whether the different palatalization-related rankings have some principled morphosyntactic rationale.

Discussion

Is there any phonological evidence?

Battling the idiosyncratic II

- But I suspect it's a very tough nut to crack, especially considering the fact that allomorphs of the same morpheme can have differing palatalization properties.

(5)

a. [tʲɪˈku]  
   ‘I flow’

b. [tʲɪˈtʃɔt]  
   ‘it flows’

(6)

a. [ˈtku]  
   ‘I weave’

b. [ˈtkʲɔt]  
   ‘(s)he weaves’

- The empirical advantages are not as clear as in the case of phonetics.
- In the case of phonetics, some manipulation is still there, just of a different kind.
- If morphologically conditioned phonology is morphology, this would seem to be selection, not computation.
- I wash my hands here.

Summary

- Analysis of a number of phenomena in Russian which have traditionally been argued to support multiple-level derivations.
- Claim: analysis more empirically adequate in terms of the phonological phenomena.
- Loss of generality in terms of stating the conditioning, but arguably preferable over an elegant but insufficient analysis.
- I am not really arguing for fully parallel OT, or even for OT as such.
- My points regarding the proper domain of phonology hopefully apply to any theory of phonological computation, not just to OT.
- Just showing that a number of reasonable assumptions in a modular theory phonological computation can help us run with this ball much further.

Quis custodiet ipsos custodies?

- Can phonological data alone be used to resolve (e.g.) the number-of-levels debate?
- Answer: firm no.
- "Empirical" arguments for or against this or that specific theory of phonological computation have little value outside of a fully fledged architectural theory.
- My contribution in this is hopefully to raise the questions regarding the proper domain of phonological computation in a modular theory.
References I


Bermúdez-Otero, Ricardo. 2010. Currently available data on English t/d-deletion fail to refute the classical feedforward modular architecture of phonology. Presentation at the 18th Manchester Phonology Meeting.


References III


References IV


References V


References VI


References VII


References VIII
