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 role 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

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

\[ \text{šerst}ˈ\text{Istij} \quad \text{‘furry’} \]

\[ \downarrow \quad \text{by Palatalization} \]

\[ \text{š}ˈ\text{erst}ˈ\text{Istij} \]

\[ \downarrow \quad \text{by Iotacism} \]

\[ \text{š}ˈ\text{irst}ˈ\text{Istij} \]

\[ \downarrow \quad \text{by Depalatalization} \]

\[ \text{š}ˈ\text{irst}ˈ\text{Istij} \]

\[ \downarrow \quad \text{by Hi-switch} \]

\[ \text{š}ˈ\text{irst}ˈ\text{Istij} \]

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); Molczanow (2007)
  - Yers: Molczanow (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”.

What is at stake?

- 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?

Goals of this talk

- The analysis of Russian
  - Discuss some specific alternatives to a serialism-based analysis
- The issue of intermediate levels
  - Show that given a narrow (essentially Trubetzkoyan) understanding of phonology and serious modularity, the case for serialism appears overstated
- The value of phonology-internal evidence
  - Discuss how the validity of the phonological analysis hinges on interface considerations which are rarely explored or even explicitly discussed (again cf. Scheer 2010 *passim*)
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. (“phonetics”)

- 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] [ɾ x ɾ] [ɾ ɾ] etc.
- Exceptions: [ts ʂʷ ʐʷ] (only non-palatalized), [ʃʃ] (only palatalized)
- Palatalized consonants have a pretty free distribution
  - But [ɾ ɾ ɾ] 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 ɡ 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 [ʃʃi]
- Assumption: at least [ʂʷ] and [ʐʷ] are underlyingly 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 → C
  ▶ But the same affixes often trigger [k g x] → [ʧ ʲ ʂʷ ʐʷ]

(1) a. (i) ['svʲet] 'light' (n.)
    (ii) ['svʲɪˌtʲɪtʲ] ‘to illuminate’
 b. (i) ['muka] ‘torment’ (n.)
    (ii) ['muʃʲɪtʲ] ‘to torment’

▶ Another type where only the velars are affected:

(2) a. (i) ['stoɫ] ‘table’
    (ii) [stɐˈɫʲɪ] ‘table (loc. sg.)’
 b. (i) ['krʲuk] ‘hook’
    (ii) [krʲʊˈkʲɪ] ‘hook (loc. sg.)’

Transitive palatalization:
[ t d s z] → [ʧ ʲ ʐʷ ʂʷ]
No relation to the frontness of the following vowel
Same output as [i]-palatalization

The traditional approach

▶ Palatalization: triggered by [i]
  ▶ [ti kʲ] → [tʲi ʧi]
▶ The other palatalization: triggered by [i] with later fronting following velars; ordering crucial
  ▶ [ti kɨ] → [tɨ kʲi]
▶ 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 ← V spreading of [ɑback]
  ▶ 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
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:
  1. \([pʲɪˈsok]\) ‘sand’
  2. \([pʲɪˈʃːʲanɨj]\) ‘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 gi xi] is in fact a robust surface-true generalization (modulo boundary effects)
- Spreading of [aɪ̯ɪ̯] 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 [i]

Backness switch and [i] III

- But [i] → [i] is not a phonological process: just the interface imposing velarization on non-palatalized consonants
- Therefore [ʂʷ ʐʷ] should in fact be palatalized in the output of phonology (corroborated by vowel reduction)
- Serialism involving non-contrastive features comes for free from the modular architecture
- Backness switch à la Rubach (2000) is unnecessary
- Promising general line of attack on much of “postlexical phonology”

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 typology for floating feature
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

![Surface palatalization diagram](diagram.png)

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):**

![Place-changing palatalization diagram](diagram.png)

No-docking scenarios

- The feature may fail to surface at all ⇒ non-palatalizing suffixes, such as the /i/
- It may also force the epenthesis of some material to attach to
- Attested as labial epenthesis: /p b m f v/ → /plʲ blʲ mlʲ flʲ vlʲ/
- 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 suff...

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

Discussion

▶ The importance of modularity

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 categorical 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); Przedziecki (2005); Barnes (2006); Bermúdez-Otero (2010)

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
- What about the other side?

The morphosyntax interface

- Can we bite the bullet and accept enormous duplication?
- This means another rethink of the balance between storage and computation (Booij 2002; Embick 2010)
- If parochial phonology is out, morphology (e.g. lexical insertion) eats another big chunk of phonology: cf. Green (2006, 2007)
- “Frankly boring” (p. c.)
- But should we accept it, just as with phonetics?

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

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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. \( [tʲɪˈtʃ ot] \) ‘it flows’

  \[(6)\]
  a. \( [ˈtku] \) ‘I weave’
  b. \( [ˈt kʲ ot] \) ‘(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

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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

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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 V


References VI


References VII


References VIII
