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How good is the internal evidence for multiple-level phonological computation?

A view from Russian

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What's in a Word?
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Universitetet i Tromsø/CASTL



Talk outline

1. Context
2. Case studies from Russian
 - ▶ Backness switch
 - ▶ Palatalization
 - ▶ Obstruentization of /v/
3. The value of internal evidence...
4. ...and why it isn't enough
5. Conclusion



Historical context

- ▶ Generative phonology is said to basically start with Russian: Halle (1959)
- ▶ Plenty of classic generative accounts such as Lightner (1972)
- ▶ Also taken up within Lexical Phonology, figures in Kiparsky (1985)
- ▶ Most analyses very abstract, sometimes even more so than Chomsky & Halle (1968)



A typical example

- ▶ From Halle & Matushansky (2002)
- ▶ The following rules are all extrinsically ordered:
 1. Palatalization: [αback] spreads C ← V
 2. Velar mutation: dorsal_[-back] → [coronal –ant +strident]
 3. Iotacism: V_[-high] → [i] / C_[-back]–
 4. Depalatalization: š ž c → [+back]
 5. Velar palatalization: k g x → [-back] / _V_[+high –round]
 6. Hi-switch: [αback] spreads C → V_[+high –round]



Example derivation (I kid you not)

šerstʲɪstʲij 'furry'
↓ by Palatalization
šʲerstʲɪstʲij
↓ by Iotacism
šʲirstʲɪstʲij
↓ by Depalatalization
šʲirstʲɪstʲij
↓ by Hi-switch
šʲirstʲɪstʲij



But now we have OT

- ▶ ...right?
- ▶ Wrong!
- ▶ Significant body of work arguing that Russian (and more broadly Slavic) phonological data conclusively show that some sort of multiple-level serialism is unavoidable
 - ▶ Palatalization: Rubach (2000, 2005, 2007), Plapp (1999), Blumenfeld (2003) (Stratal OT)
 - ☞ Rubach (2000) is excerpted in the McCarthy OT reader: this is apparently some of the best evidence around
 - ▶ Vowel reduction: Rubach (2000); Padgett (2004); Molczanow (2007)
 - ▶ Yers: Molczanow (2008); Gribanova (2009)



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
 - ☞ Argue that an analysis likely to be accepted as within the confines of "standard OT" is possible if one capitalizes on the feed-forward model
- ▶ 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



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
 - ▶ 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)
 - ▶ Manipulation of phonological symbols (“phonology”, “computation”)
 - ▶ Language-specific differences in the realization of various symbols or bundles of symbols (“phonetics–phonology interface”)
 - ▶ Phonetic factors such as speech rate, aerodynamic factors, effects of elasticity of the vocal tract 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 tʲ] [x xʲ] [ʃ ʃʲ] etc.
- ▶ Exceptions: [ts ʂʷ zʷ] (only non-palatalized), [tʃʲ] (only palatalized)
- ▶ Palatalized consonants have a pretty free distribution
 - ▶ But [kʲ gʲ xʲ] 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 [i̟] depending on palatalization of the previous consonants
- ▶ Note this requires [ʂʷi̟] [zʷi̟] [tsi̟] but [tʃʲi̟]
- ▶ Assumption: at least [ʂʷ] and [zʷ] 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 → Cʲ
 - ▶ But the same affixes often trigger [k g x] → [tʃʲ ʂʷ zʷ]

- (1) a. (i) [ˈsvʲet] ‘light’ (n.)
 (ii) [svʲɪˈtʲ] ‘to illuminate’
 b. (i) [ˈmukə] ‘torment’ (n.)
 (ii) [ˈmutʃʲɪtʲ] ‘to torment’

- ▶ Another type where only the velars are affected:

- (2) a. (i) [ˈstoʃ] ‘table’
 (ii) [stɐˈʃʲ] ‘tables’
 b. (i) [ˈkrʲʊk] ‘hook’
 (ii) [krʲʊˈkʲi] ‘hooks’



The palatalizations II

- ▶ Yet another type where everything undergoes surface palatalization

- (3) a. (i) [ˈstoʃ] ‘table’
 (ii) [stɐˈʃʲe] ‘table (loc. sg.)’
 b. (i) [ˈkrʲʊk] ‘hook’
 (ii) [krʲʊˈkʲe] ‘hook (loc. sg.)’

- ▶ Transitive palatalization: [t d s z] → [tʃʲ zʷ ʂʷ zʷ]
- ☞ No relation to the frontness of the following vowel
- ☞ Same output as [i]-palatalization



The traditional approach

- ▶ Palatalization: triggered by [i]
 - ▶ [ti ki] → [tʲi kʲi]
- ▶ The other palatalization: triggered by [i̟] with later fronting following velars; ordering crucial
 - ▶ [ti ki] → [ti ki̟] → [ti kʲi̟]
- ▶ 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.uut.no/a/iosad/cv.html>
- ▶ Redux:
 - ▶ There is no [i̟]
 - ▶ There is very little actual C ← V spreading of [αback]
 - ▶ 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:

(4) a. [pʲiˈsok] 'sand'
 b. [pʲiˈʲanij] '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
- ▶ Spreading of [αback] 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 [ɣ^w z^w] behave like non-palatalized consonants is where they cause [i]
- ▶ But [i] → [i] is not a phonological process: just the interface imposing velarization on non-palatalized consonants



Backness switch and [i] III

- ▶ Therefore [ɣ^w z^w] should in fact be palatalized in the output of phonology (corroborated by vowel reduction)
- ▶ Serialism comes for free from the feed-forward model



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



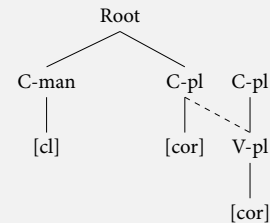
The constraints

- ▶ MAX(V-pl[cor]), or MAXFLT (Wolf 2007): self-explanatory
- ▶ DEPLINK(V-pl[cor]): do not attach a 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...



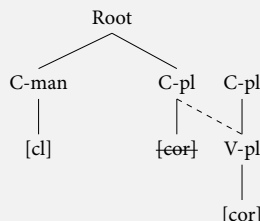
Surface palatalization

- ▶ MAX(V-pl[cor]), MAX(C-pl) ≫ DEPLINK(V-pl[cor])
- ▶ Realize both the consonant's underlying feature and the floating feature



Place-changing palatalization

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



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/ → pʲ bʲ mʲ fʲ vʲ
- ▶ But the ranking is clearly contradictory: how can all these be attested in a single language



Lexical indexation I

- ▶ I suggest that the different palatalizing properties of Russian suffixes can be accommodated 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



The notorious /v/

- ▶ Obstruent-like: undergoes word-final devoicing
 - (5) a. [ˈlʲva] ‘lion (gen. sg.)’
 - b. [ˈlʲf] ‘lion’
- ▶ Sonorant-like: fails to trigger voicing assimilation
 - (6) a. [ˈtvʲordij] ‘hard’
 - b. [ˈdʲvʲerʲ] ‘door’
- ▶ Also, and famously, postlexically
 - (7) [ɛt vrʲɐˈga] ‘from an enemy’



The classic analysis

- ▶ Underlyingly, the [v] is /w/
- ▶ Becomes an obstruent by a later rule
- ▶ Crucially, obstruentization **must** precede voicing assimilation since they stand in a counterfeeding relation
- ▶ But voicing assimilation must be postlexical, since it applies across word boundaries
 - (8) [ɛdˈdomə] ‘from the house’
- ▶ Postlexical ordering is an issue...



Representational solution

- ▶ In a privative feature theory, what is the actual evidence of /v/ having the feature [voice]?
- ▶ Final devoicing (if it is in fact phonological)
- ▶ But can we model it without reference to the feature [voice]?
- ▶ Let's assume /f/ is just {C-place[lab]} (cf. Morén 2006 for Serbian)
- ▶ Then /v/ can be {C-place[lab], C-manner[open]} and still be distinct from /f/
- ▶ Separate constraint to enforce final devoicing of [v] by deletion of the manner feature
- ▶ Loss of generality
- ▶ But empirically adequate
- ▶ And gets around the voicing assimilation problem: if /v/ does not have [voice], we do not expect it anyway.



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?
- ▶ I don't know



Phonology ignoring syntax

- ▶ I have hopefully shown that (Russian) phonological data supporting multiple-level derivations are not quite as compelling
- ▶ In terms of OT, the analysis is quite orthodox
- ▶ Yet it uses at least two devices which on general grounds could be questionable:
 - ▶ Local conjunction: questions of restrictiveness, learnability (also ability to express generalizations: Potts et al. 2010)
 - ▶ Lexical indexation: indirect reference? Cf. recent work by Scheer
- ▶ Can we really make architectural claims like these without reference to syntactic work?
- ▶ You tell me!



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
- ▶ Just showing that a number of reasonable assumptions about phonological computation can help us run with this ball much further than assumed in some of the literature



Quis custodiet ipsos custodiet?

- ▶ Can phonological data alone be used to resolve the number-of-levels debate?
- ▶ I am not so sure
- ▶ Other evidence:
 - ▶ Coherent theory of diachrony (Bermúdez-Otero 2007)
 - ▶ A Theory of Everything? (Vaux 2008)
 - ▶ ?????
 - ▶ Maybe purely phonological evidence **is** enough after all?
- ▶ Future work



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