Bringing it all together

The e ~ ’o alternation in Stratal Phonology

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0.1 Outline

- The basic crux of the alternation
- Russian mid vowels: evidence for phonological classes
- Beyond immediate constituency: Stratal Phonology
- Why Stratal Phonology is right: converging evidence

1 The e ∼ ’o *alternation in Modern Russian*

1.1 The problem

- Classic problem in Russian phonology[1]
- In native vocabulary, surface [e] only follows palatalized consonants and [ʂ ʐ t͡ɕ][2]
- Before a following non-palatalized consonant, *some* stressed [e]’s alternate with [o]

(1) a. [sʲelʲ-skʲ-ij] *сельский* ‘rural’

b. [sʲol-a] *сёла* ‘village-NPL’

- In some morphemes, [e] never alternates:

(2) a. [bʲel-ɨj] *белый* ‘white’

b. [bʲelʲ-inʲkʲ-ij] *беленький* ‘white-DIM’

- Yet in others, [o] after a palatalized consonant never alternates

(3) a. [tʲotʲ-a] *тётя* ‘aunt’

b. [tʲot-uʂk-a] *тётушка* ‘aunt-DIM’

- In some morphological contexts, the shift overapplies

(4) a. [ˈtʲemʲ-enʲ] *темень* ‘darkness’

b. [tʲomʲ-en] *тёмен* ‘dark.PRED.MASC.SG’

[1] Nikolai S. Trubetzkoy. 1934. *Das morphonologische System der russischen Sprache* (Travaux du Cercle linguistique de Prague 5.2). Prague: Jednota československých matematiků a fyziků; Theodore M. Lightner. 1969. On the alternation *e* ∼ *o* in Modern Russian. *Linguistics* 7. 44–69; Anna Konstantinovna Polivanova. 1976. *Morfonologiya russkogo substantivnogo slovoobrazovaniya*. Moscow: Moscow State University dissertation; Il’ya Borisovich Itkin. 1994. Eshche raz o cheredovanii *e* ∼ *’o* v sovremennom russkom yazýke. *Voprosȳ yazȳkoznaniya* 1994/1. 126–133; Il’ya Borisovich Itkin. 2007. *Russkaya morfonologiya*. Moscow: Gnozis.

[2] These consonants are historically palatalized, and pattern with palatalized consonants synchronically in a number of respects

(5) a. [tʲet͡ʃʲ] *течь* ‘leak’
b. [o-ˈtʲok] *омёк* ‘swelling’
c. [o-ˈtʲokʲ-i] *омёки* ‘swelling-PL’

- Even with no alternations, it is tempting to derive [Cʲo] from /Ce/ → /Cʲe/, in line with the drive to derive palatalization from following front vowels[3]
- If accepted, this gives further instances of overapplication

(6) a. [nʲeˈsʲ-o-m] *несём* ‘carry-PRES.1PL’[4]
b. [nʲeˈsʲ-o-tʲe] *несёте* ‘carry-PRES.2PL’

[3] see William S. Hamilton. 1976. Vowel power versus consonant power in Russian morphophonemics. *Russian Linguistics* 3(1). 1–18; Rosemary Kuhn Plapp. 1996. Russian /i/ and /ɨ/ as underlying segments. *Journal of Slavic Linguistics* 4. 76–108.

[4] This suffix is always [o] when stressed

1.2 The historical background

- Non-alternating [e] < Old Russian *ě (written <ѣ>)
- Alternating [e] < Old Russian *e (written <e>), and the yer *ь > *e
- Old Russian *e, but not *ě, > o / Cʲ_C
- Later, [o] spread to a number of items where it is not motivated historically

1.3 Lightner on the alternation

- Lightner[5]
  - Underlying /ě/ and /e/[6]
  - A backing rule in the context ˈCʲ_C[7]
- Overapplication explained by constituent structure
  - [mʲot] ‘honey’: (méd) → (mʲéd) → (mʲód) → ...
  - [(o) mʲode] ‘honey-PREP.SG’: ((méd)e)
    - Innermost constituent: (méd) → ... → (mʲód)
    - Outer constituent: ((mʲód)e) → ((mʲódʲ)e)
- Sometimes constituent structure is not enough:

(7) a. [koˈlʲos-a] *колёса* ‘wheel-NOM.PL’
b. [koˈlʲes-nʲik] *колесник* ‘wheelwright’

(8) a. [tʲeˈnʲot-a] *тенёта* ‘net-NOM.PL’
b. [tʲeˈnʲot-nʲik] *тенётник* ‘spider’

- So: ((kolés-ьn-ik)-ъ) vs. (((tenét)-ьn-ik)-ъ)

[5] Lightner, ‘On the alternation *e* ∼ *o* in Modern Russian’; Theodore M. Lightner. 1972. *Problems in the theory of phonology*. Vol. 1: *Russian phonology and Turkish phonology*. Edmonton: Linguistic Research.

[6] Or, as he calls them, /ē/ and /e/

[7] More precisely ‘not before a palatalized consonant’

1.4 *Where does constituent structure come from?*

- Recurring criticism: *ad hoc* constituent structure, with a circular dependency on the alternation
- Kayne;[8] Hamilton;[9] Polivanova;[10] Itkin[11]

> A solution which abandons consistency in assigning constituent structures for the sake of gaining observationally correct surface forms certainly loses more than it gains: constituent structures then have no meaning, and become merely an ad hoc device supplementing the system of segmental representations.[12]

1.5 *What do we do instead?*

- Proposed solution: the alternation is *morpheme-driven*[13]
  - Non-alternating [C^{j}o] is /C^{j}o/
  - Non-alternating [C^{j}e] is /Ce$_1$/ + yer version
  - Alternating [C^{j}e] ~ [C^{j}o] is /Ce$_2$/ + yer version
- The outcome of /C^{j}e$_2$/ depends on the *next morpheme*
- If the next morpheme palatalizes a preceding consonant, it *also* requires [C^{j}e]

(9) a. [gr^{j}op] *грёб* 'row.PAST.SG.MASC'

b. [gr^{j}eb^{j}in^{j}] *гребень* 'comb'

(10) a. [l^{j}od] *лёд* 'ice'

b. [golo-l^{j}ed^{j}-it͡s-a] *гололедица* 'ice crust'

(11) a. [gr^{j}oza] *грёза* 'dream-NSG'

b. [gr^{j}eʒ-u] *грежу* 'I dream'

c. [gr^{j}ez^{j}-it] *грезит* '(s)he dreams'

- If the next morpheme does not palatalize a preceding consonant, it requires [C^{j}o]

(12) a. [tv^{j}erd^{j}] *твердь* 'firmament'

b. [tv^{j}ord-ij] *твёрдый* 'solid'

(13) a. [po-'s^{j}el^{j}-it] *поселит* '(s)he will settle'

b. [po-'s^{j}ol-ok] *посёлок* 'settlement'

- *However*, some suffixes are 'indifferent' and inherit the *e*/*o* vowel from the base

[8] Richard S. Kayne. 1967. Against a cyclic analysis of Russian segmental phonology. MS., Massachusetts Institute of Techology.

[9] Hamilton, 'Vowel power versus consonant power in Russian morphophonemics'.

[10] Polivanova, 'Morfonologiya russkogo substantivnogo slovoobrazovaniya'.

[11] Itkin, 'Eshche raz o cheredovanii *e* ~ *'o* v sovremennom russkom yazȳke'; Itkin, *Russkaya morfonologiya*.

[12] Hamilton, 'Vowel power versus consonant power in Russian morphophonemics', p. 8.

[13] Itkin, 'Eshche raz o cheredovanii *e* ~ *'o* v sovremennom russkom yazȳke'; Itkin, *Russkaya morfonologiya*; Paul V. Cubberley. 2002. *Russian: A linguistic introduction*. Cambridge: Cambridge University Press.

(14)	a.	[mʲorz-nu-tʲ]	*мёрзнуть*	'be cold.INF'
	b.	[mʲorz-lʲi-i]	*мёрзли*	'be cold.PAST.PL'
(15)	a.	[t͡ʃuzɐ-ˈzʲemʲ-et͡s]	*чужеземец*	'foreigner'
	b.	[t͡ʃuzɐ-ˈzʲem-k-a]	*чужеземка*	'female foreigner'
	c.	[novo-ˈsʲol]	*новосёл*	'new settler'
	d.	[novo-ˈsʲol-k-a]	*новосёлка*	'female new settler'

1.6 Can we improve the solution?

- The /e_1/–/e_2/ distinction is still basically /ѣ/–/e/: can we improve on this?
- Can we formalize the link between the two aspects of suffix behaviour?
  - Consonant palatalization
  - *e* ∼ *'o* alternation
- Luckily, this is the bread and butter of phonological theory

2 Making the alternation phonological

2.1 How do we show the alternation is phonological?

- It targets mid vowels: are they a phonological class?
- It involves some kind of |back| feature: are they |back| counterparts?
- Palatalization seems to involve |back| somehow: does it?

2.2 Are the mid vowels a phonological class?

- They are targeted by vowel reduction
- They are able to alternate with zero
  - Gouskova:[14] in fact this is an effect of the same constraint against mid vowels
- They should share some features
  - Iosad:[15] the feature V-manner[closed]

[14] Maria Gouskova. 2012. Unexceptional segments. *Natural Language & Linguistic Theory* 30(1). 79–133.

[15] Pavel Iosad. 2012. Vowel reduction in Russian: No phonetics in phonology. *Journal of Linguistics* 48(3). 521–571.

2.3 Are the mid vowels |front| correspondents?

- [e] has to share some frontness feature with [i]
  - This is necessary for vowel reduction: /e/ → [i]
- [e] triggers (some kinds of) palatalization
- [o] does not share frontness features with [i]
  - The reduction pattern is /o/ → [a]
- Iosad[16]
  - [e] is V-place[coronal]
  - [o] is not
  - [i] is also V-place[coronal]

[16] Iosad, 'Vowel reduction in Russian'.

2.4 *Does the |front| feature trigger palatalization?*

- ...obviously
- Traditional generative analysis[17]
  - Underlying /i/: palatalizes non-velars; coronalizes velars
  - Underlying /ɨ/: does not affect non-velars; palatalizes velars (after being fronted itself)

(16) Verbal /i/

a.	[krʲik]	*крик*	'shout.NSG'
b.	[kritʃʲ-it]	*кричит*	'to shout-PRES.3SG'
c.	[svʲet]	*свет*	'light.NSG'
d.	[svʲetʲ-it]	*светит*	'to light-PRES.3SG'

(17) Nominative plural /ɨ/

a.	[krʲik]	*крик*	'shout.NSG'
b.	[krikʲ-i]	*крики*	'shout-NPL'
c.	[kʲit]	*кит*	'whale.NSG'
d.	[kʲit-ɨ]	*киты*	'whale-NPL'

- Basically, [i e] are palatalization triggers and are V-place[coronal], palatalization outcomes are V-place[coronal]
  - Cf. Clements & Hume[18] for the framework, Urek[19] on Latvian

2.5 *What triggers palatalization?*

- The traditional analysis is that suffixes trigger palatalization because they begin with front vowels[20]
- This cannot be sustained[21]
- Instead: palatalization is driven by a *floating* V-place[coronal]

(18) Palatalization by back vowels

a.	[vor]	*вор*	'thief'
b.	[vorʲ-uga]	*воръга*	'thief.PEJOR'

[17] e.g. Lightner, *Russian phonology and Turkish phonology*; Donna Marie Farina. 1991. *Palatalization and jers in modern Russian phonology: An underspecification approach*. Champaign: University of Illinois at Urbana-Champaign dissertation; Plapp, 'Russian /i/ and /ɨ/ as underlying segments'; Jerzy Rubach. 2000. Backness switch in Russian. *Phonology* 17(1). 39–64; Morris Halle & Ora Matushansky. 2002. [αback] assimilation in Russian: An overview. In Aniko Csirmaz et al. (eds.), *Phonological answers (and their corresponding questions)* (MIT Working Papers in Linguistics 42), 69–80. Cambridge, MA: MITWPL.

[18] G. Nick Clements & Elizabeth V. Hume. 1995. The internal organization of speech sounds. In John Goldsmith (ed.), *The handbook of phonological theory*, 245–306. Oxford: Blackwell.

[19] Olga Urek. 2016. Consonant-vowel interactions in Modern Standard Latvian: A representational and constraint-based account. *Glossa*: A Journal of General Linguistics 1(1). 22. 1–34.

[20] Hence the need for the /i/ ≠ /ɨ/ contrast

[21] Pavel Iosad & Bruce Morén-Duolljá. 2010. Rethinking palatalization in Russian. MS., University of Tromsø/CASTL; Jaye Padgett. 2011. Russian consonant–vowel interactions and derivational opacity. In Wayles Brown et al. (eds.), *Formal Approaches to Slavic Linguistics 18: The second Cornell meeting, 2009*, 352–381. Ann Arbor, MI: Michigan Slavic Publications.

(19) Palatalization by deleted /'o/

a.	[krʲuk]	*крюк*	'hook.NSG'
b.	[krʲutʃʲ-ok]	*крючок*	'hook-DIM-NSG'
c.	[krʲutʃʲ-k-a]	*крючка*	'hook-DIM-GSG'

(20) Zero palatalizing suffixes

a.	['tʃʲorn-ɨj]	*чёрный*	'black'
b.	['tʃʲernʲ]	*чернь*	'rabble'

(21) Depalatalization

a.	[gusʲ]	*гусь*	'goose' ← /gus-ʲ/
b.	[gusɨnʲa]	*гусыня*	'female goose' ← /gus-inʲ-a/

- This is the 'palatalizing morphophoneme' of Itkin[22] and others, except it is a phonological feature like any other
- Under this analysis /i/ vs. /ɨ/ dissolves into /ʲi/ vs. /i/
  - Prediction: '/ɨ/' can behave as a front vowel in some phonological contexts
  - It does, after velars: /krʲik-i/ 'scream.NPL' → [krʲikʲi]
  - Compare the traditional /kɨ/ → /ki/ → /kʲi/

[22] Itkin, *Russkaya morfonologiya*.

2.6 Summing up

- The mid vowels are a phonological class
- The difference between the mid vowels is the feature V-place[coronal]
- The feature V-place[coronal] is what triggers palatalization
- The *e* ∼ *'o* alternation really looks like phonology
- ...what are we going to do about the constituency though?

3 Stratal Phonology and the lexical syndrome

3.1 Whatever happened to constituents?

- Lightner's assumptions about word-internal constituency, informed by the late 1960s state of the art, are clearly inadequate
- A better theory of morphology-phonology interactions: Lexical Phonology and Morphology[23]
- Recent instantiation: Stratal Phonology[24]

[23] Paul Kiparsky. 1982. Lexical Phonology and Morphology. In In-Seok Yang (ed.), *Linguistics in the morning calm: Selected papers from SICOL-1981*, vol. 1, 3–91. Seoul: Hanshin Publishing Company; Sharon Hargus & Ellen Kaisse (eds.). 1993. *Studies in Lexical Phonology* (Phonetics and Phonology 4). San Diego: Academic Press.

[24] e.g. Ricardo Bermúdez-Otero. 2012. The architecture of grammar and the division of labour in exponence. In Jochen Trommer (ed.), *The phonology and morphology of exponence: The state of the art* (Oxford Studies in Theoretical Linguistics 41), 8–83. Oxford: Oxford University Press; Ricardo Bermúdez-Otero. 2018. Stratal phonology. In S. J. Hannahs & Anna R. K. Bosch (eds.), *The*

3.2 Basic assumptions of Stratal Phonology

- As defined by Bermúdez-Otero,[25] Stratal Phonology
  - respects cyclicity
  - respects stratification
  - builds on parallelist constraint-based theories

3.3 Roots, stems, and words

- Roots are lexical items with no part-of-speech characterization
  - Roots are not cyclic domains
- Stems are lexical items with POS characterization, but not inflectable words
  - Some stems define cyclic domains for *stem-level phonological computation*
  - Stem-level domains can be recursive
- Words are autonomous lexical items with the full set of inflections
  - Words are cyclic domains for *word-level phonological computation*
  - Word-level domains are not recursive
- Utterances are cyclic domains for *phrase-level phonological computation*
  - Phrase-level domains are not recursive

[25] Bermúdez-Otero, 'Stratal Phonology'.

3.4 The lexical syndrome

- In Lexical Phonology and Morphology, 'lexical' rules had a number of properties[26]
  - Cyclic reapplication
  - Non-derived environment blocking
  - Categorical application
  - Exceptionality
  - Structure Preservation
- Although the strong version of these principles is empirically problematic,[27] the overall insights are often sound

[26] Ellen M. Kaisse & April McMahon. 2011. Lexical Phonology and the lexical syndrome. In Marc van Oostendorp et al. (eds.), *The Blackwell companion to phonology*. Oxford: Blackwell Publishing.

[27] Ricardo Bermúdez-Otero. 2013b. The stem-level syndrome. Presentation at the University of Pennsylvania Linguistics Department Speaker Series. http://www.bermudez-otero.com/stemlevel.pdf (16 October, 2018).

3.5 Evidence for stratification

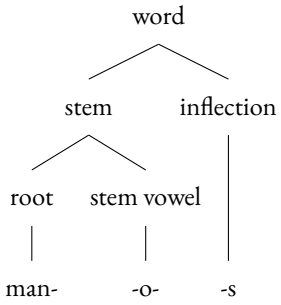
- Some languages provide good evidence for stem-level constituency
- Lexicon stratification: English,[28] Hebrew[29]
- Spanish: morphological constituency[30]

[28] Heinz J. Giegerich. 1999. *Lexical strata in English: Morphological causes, phonological effects* (Cambridge Studies in Linguistics 89). Cambridge: Cambridge University Press.

[29] Irit Meir. 2006. Morphological levels and diachronic change in Modern Hebrew plural formation. *Studies in Language* 30(4). 777–806.

[30] Ricardo Bermúdez-Otero. 2013a. The Spanish lexicon stores stems with stem vowels, not roots with inflectional class features. *Probus* 25(1). 3–103.

(22) Spanish *manos* 'hands'[31]



[31] Warning: not the actual analysis

3.6 Domain structures in Stratal Phonology

- Affixes can be stem-level or word-level
- Stem-level domains
  - Stem-level affixation: $[\sqrt{\text{root}} + \text{SL affix}]_{\mathcal{SL}}$
  - Stem-to-stem derivation: $[[\sqrt{\text{root}} + \text{SL affix}]_{\mathcal{SL}} + \text{SL affix}_{\mathcal{SL}}]$
  - Word-level affix attached to a root:[32] $[\sqrt{\text{root}} + \text{WL affix}]_{\mathcal{SL}}$
- Word-level domains
  - Word-level affixation to stem-level domain: $[[\sqrt{\text{root}} + \text{SL affix}]_{\mathcal{SL}} + \text{WL affix}]_{\mathcal{WL}}$

[32] Giegerich, *Lexical strata in English*.

3.7 Why is Stratal Phonology better?

- Many reasons! But for our purposes:
  - It is still *phonology*
  - Phonological predictions: opacity / overapplication across cycles
  - Morphological expectations:
    - Anything that produces a POS-characterized output is stem-level
    - Inflectional/highly productive affixes tend to be word-level, unless affixed directly to a root
  - Semantic expectations
    - Allosemy happens at the stem level: deradical forms, or stem-to-stem derivations
- The major prediction is that these domain structures are aligned[33]

[33] Ricardo Bermúdez-Otero. 2016. We do not need structuralist morphemes, but we do need constituent structure. In Daniel Siddiqi & Heidi Harley (eds.), *Morphological metatheory* (Linguistik Aktuell 229), 387–430. Amsterdam: John Benjamins.

3.8 Stratal Phonology and Russian

- Stratal analyses of Russian offered previously by Rubach;[34] Blumenfeld;[35] Gribanova[36]
- In many respects, rationalizes earlier analyses with extrinsic ordering by positing strata
- The crucial stratal difference[37]
  - Stem-level /ki/ → [t͡ʃi]

[34] Rubach, 'Backness switch in Russian'.

[35] Lev Blumenfeld. 2003. Russian palatalization and Stratal OT: Morphology and [back]. In Wayles Brown et al. (eds.), *Annual workshop on formal approaches to Slavic linguistics: The Amherst meeting 2002*, 141–158. Ann Arbor, MI: Michigan Slavic Publications.

[36] Vera Gribanova. 2008. Russian prefixes and prepositions in Stratal OT 26. 217–225; Vera Gribanova. 2009. Phonological evidence for a distinction between Russian prepositions and prefixes. In Gerhild Zybatow et al. (eds.), *Studies in formal Slavic phonology, morphology, syntax, semantics and information structure: proceedings of FDSL 7, Leipzig*, 383–396. Frankfurt: Peter Lang.

[37] Blumenfeld, 'Russian palatalization and

  - Word-level (/kɨ/ →) /ki/ → [kʲi]
  - ...and similarly /e/
- Gribanova:[38] stratal distinction in yer behaviour, supported by morphosyntactic evidence

[38] Gribanova, 'Russian prefixes and prepositions in Stratal OT'; Gribanova, 'Phonological evidence for a distinction between Russian prepositions and prefixes'.

4 *The* e ∼ ʼo *alternation in Stratal Phonology*

4.1 *Word-level affixation and opacity*

- The descriptive generalizations are heavily indebted to Itkin[39]
- Basic claim:
  - 'Indifferent' suffixes are word-level suffixes
  - Overapplication of *e* ∼ *ʼo* is entirely normal cyclicity
- Palatalizing suffixes that are compatible with *ʼo*

[39] Itkin, *Russkaya morfonologiya*.

(23) Case suffixes in /ʲe/: inflection

a.	[utʲos]	*ymëc*	'cliff.NSG'
b.	[utʲosʲe]	*ymëce*	'cliff.PREP.SG'

(24) Past tense plural /ʲi/: inflection

a.	[mʲorz-nu-tʲ]	*мёрзнуть*	'be cold.INF'
b.	[mʲorz-l-i]	*мёрзли*	'be cold.PAST.PL'

(25) Diminutive /ʲik/: highly productive

a.	[t͡ʃʲort]	*чёрт*	'devil'
b.	[t͡ʃʲortʲ-ik]	*чёртик*	'wee devil'

(26) Diminutive /ʲet͡s/: highly productive

a.	[rʲeʂot]	*решёт*	'sieve.GEN.PL'
b.	[rʲeʂot-t͡s-e]	*решётце*	'sieve.DIM'

- Crucially, these suffixes trigger *word-level* consonant palatalization: [o-ˈtʲokʲ-e] 'swelling.PREP.SG', *[o-ˈtʲot͡ʃʲe]
- Non-palatalizing suffixes that are compatible with *e*

(27)

a.	[t͡ʃʲuzʲe-ˈzʲem-k-a]	*чужеземка*	'female foreigner'
b.	[novo-ˈsʲol-k-a]	*новосёлка*	'female new settler'

- Itkin[40] notes that *diminutive* /ʲik/ and /ʲe͡ts/ are 'indifferent' (=word-level), but homonymous *non-diminutive* morphemes are not (=stem-level)

[40] Itkin, *Russkaya morfonologiya*, p. 241.

(28) a. [varʲ-on-ij] *варёный* 'boiled'

b. [varʲ-enʲ-ik] *вареник* 'dumpling'

(29) a. [lʲiʂ-on-n-ij] *лишённый* 'deprived'

b. [lʲiʂ-enʲ-e͡ts] *лишенец* 'one deprived of civil rights'

- This is immediately predicted by base-driven stratification
- $[[\sqrt{\text{t͡ʃort}}]_{\mathcal{SL}}\text{-}^{\text{j}}\text{ik}]_{\mathcal{WL}}$
  - Palatalization compatible with word level
  - Cyclic overapplication
  - Compositional semantics
  - Productive morphology
- $[[\sqrt{\text{var}}\text{-}^{\text{j}}\text{en-}^{\text{j}}\text{ik}]_{\mathcal{SL}}]_{\mathcal{WL}}$
  - Palatalization compatible with stem-level
  - Transparent application in the stem-level cycle
  - Idiosyncratic semantics
  - Non-productive morphology

4.2 Analysis: stem allomorphy

- Under this analysis, the *e* ∼ *'o* alternation is a stem-level process
- One current analysis of stem-level phonology is *stem allomorphy*[41]
- Stem-level constructs are not produced online, but are stored and compete for lexical insertion
- This can gives rise to phonological optimization effects[42]
- Basic claim: the *e* ∼ *'o* alternation is *phonologically conditioned allomorphy*
- Floating V-place[coronal] in a suffix within a stem-level domain
  - Causes stem-level palatalization of the final consonant(s): autosegmental docking/spreading
  - Forces the choice of a V-place[coronal] vowel allomorph, *if available*
- The alternation is not a rewrite rule whereby /CʲeC/ → /CʲoC/
- Instead, if a choice between /CʲeC/ and /CʲoC/ is offered by the lexicon, then choosing the /CʲeC/ allomorph improves harmony
  - /e_1/ (i.e. non-alternating /e/, *ѣ) is /CʲeC/: {/bʲel/} 'white'
  - Non-alternating /ʲo/ is /ʲo/: {/tʲot/} 'aunt'
  - /e_2/ is allomorphy: {/lʲod/, /lʲed/} 'ice'
- Desirable consequences:
  - The *e* ∼ *'o* alternation cannot overwrite inputs
    - Lexical specificity comes for free
    - Word-level overapplication comes for free

[41] Ricardo Bermúdez-Otero. 2006. Morphological structure and phonological domains in Spanish denominal derivation. In Fernando Martínez-Gil & Sonia Colina (eds.), *Optimality-theoretic studies in Spanish phonology* (Linguistik Aktuell / Linguistics Today 99), 278–311. Amsterdam: John Benjamins; Bermúdez-Otero, 'The architecture of grammar and the division of labour in exponence'; Bermúdez-Otero, 'The Spanish lexicon stores stems with stem vowels, not roots with inflectional class features'; Pavel Iosad. 2017. Welsh svarabhakti as stem allomorphy. *Transactions of the Philological Society* 115. 141–175.

[42] Andrew Nevins. 2011. Phonologically conditioned allomorph selection. In Marc van Oostendorp et al. (eds.), *The Blackwell companion to phonology*. Oxford: Blackwell Publishing.

- No more underlying /ѣ/
- Link between palatalization and *e* ∼ *'o* is made explicit via V-place[coronal]
- Whatever the ontology of the lexical syndrome, we expect stem-level processes to have exceptions, and they do

5 *Some potential objections*

5.1 *Clusters*

- If the stem vowel gets its V-place[coronal] from the following suffix, we seem to have non-local spreading

(30) a. ['sʲostr-ɨ] *сёстры* 'sister-NPL'

b. ['sʲestrʲ-in-skʲ-ij] *сестринский* 'sisterly'

- Either non-local spreading, or a Duke-of-York derivation with palatalization and depalatalization
- Prima facie unattractive, but...
  - There is no [strʲ] ≠ [sʲtʲrʲ] contrast: this needs an account anyway ⇒ late depalatalization rule
  - Evidence from other processes, e.g. moderate *yakan'ye*
- [sʲist'rʲ-e] 'sister-DSG' not *[sʲastrʲe] ⇒ non-contrastively non-palatalized consonant in the cluster behave like a palatalized consonant
- Contrast [pʲaskʲe] 'sand-LOC.SG' not *[pʲiskʲe] ⇒ contrastively non-palatalized consonant in the cluster behaves like a non-palatalized consonant
- Evidence for /sʲtʲrʲ/ → [strʲ] in the postlexical phonology?

5.2 *Word-level palatalization by diminutives*

- The diminutive suffix /-ʲik/ is diagnosed as being word-level by the *e* ∼ *'o* alternation
- However, it *can* trigger stem-level palatalization of velars, cf. ['bloʐ-ik] 'blog-DIMIN', *[blogʲ-ik]
- The palatalization is likely triggered not by the floating V-place[coronal] but by a (stochastic) dispreference for sequences of velars[43]

5.3 *Summary*

- The *e* ∼ *'o* alternation in Modern Standard Russian behaves just like a stem-level rule should behave
- The evidence it provides for stratification coincides very well with evidence from other sources
- The stem allomorphy framework allows us to dispense with underlying /ѣ/ *and* deal with the lexical syndrome

[43] cf. Vsevolod Kapatsinski. 2010. Velar palatalization in Russian and artificial grammar: Constraints on models of morphophonology. *Laboratory Phonology* 1(2). 361–393; Peter Jurgec. 2016. Velar palatalization in Slovenian: Local and long-distance interactions in a derived environment effect. *Glossa*: A Journal of General Linguistics 1(1). 24. 1–28.

- The stratal approach works in Russian despite a lack of clear morphological evidence for stem structure

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