

## The Paradigm as a Radial Category

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- (1) Suffix shift: Ongoing language change whereby Russian verbs replace the non-productive suffix *-a* by the productive *-aj*. The verb *kapat* ‘drip’ has both *-a* suffixed forms like *kapljut* and innovative *-aj* suffixed forms like *kapajut*.
- (2) *Slezy kapljut odna za drugoj na klaviši.* (Gončarov 1859, with *-a* suffix)<sup>1</sup>  
‘The tears drip one after another onto the keyboard.’
- (3) *Slezy v šči kapajut.* (Bitov 1969, with *-aj* suffix)  
‘The tears drip into the cabbage soup.’
- (4) Forms of *kapat* ‘drip’ with original *-a* suffix and innovative *-aj* suffix

	<i>-a</i> suffix	<i>-aj</i> suffix
Non-Past 1sg	<i>kaplju</i>	<i>kapaju</i>
Non-Past 2sg	<i>kapleš’</i>	<i>kapaeš’</i>
Non-Past 3sg	<i>kaplet</i>	<i>kapaet</i>
Non-Past 1pl	<i>kaplem</i>	<i>kapaem</i>
Non-Past 2pl	<i>kaplete</i>	<i>kapaete</i>
Non-Past 3pl	<i>kapljut</i>	<i>kapajut</i>
Present Active Participle	<i>kapljuščij</i>	<i>kapajuščij</i>
Imperative	<i>kapli(te)</i>	<i>kapaj(te)</i>
Gerund	<i>kaplja</i>	<i>kapaja</i>
Infinitive	<i>kapat’</i>	<i>kapat’</i>
Past masc sg	<i>kapal</i>	<i>kapal</i>
Past fem sg	<i>kapala</i>	<i>kapala</i>
Past neut sg	<i>kapalo</i>	<i>kapalo</i>
Past pl	<i>kapali</i>	<i>kapali</i>

- (5) Suffix shift is well documented in the literature, cf. e.g. Andersen 1980, Gagarina 2003, Gor & Chernigovskaya 2001, 2003a-b and 2005, Graudina et al. 2001, Kiebzak-Mandera 1997, Švedova (red.) 1980, Tkachenko & Chernigovskaya 2006, Zaliznjak 1977. Our starting point is a database comprising about 20,000 examples from The Russian National Corpus.
- (6) Verbs undergoing suffix shift (to different degrees):<sup>2</sup>

Verb	#a	#aj	#Total	%aj
<i>alkat</i> ‘hunger’	123	10	133	8
<i>blistat</i> ‘shine’	249	272	521	52
<i>bryzgat</i> ‘spatter’	222	119	341	35
<i>vnimat</i> ‘perceive’	95	273	368	74
<i>glodat</i> ‘gnaw’	158	6	164	4
<i>dremat</i> ‘slumber’	492	1	493	0.2
<i>dvigat</i> ‘move’	1093	479	1572	30
<i>žadždat</i> ‘thirst’	1239	16	1255	1
<i>kapat</i> ‘drip’	78	106	184	58
<i>klepat</i> ‘slander’	15	15	30	50
<i>klikat</i> ‘call’	184	11	195	6

<sup>1</sup> Examples (2) and (3) are from the Russian National Corpus: [www.ruscorpora.ru](http://www.ruscorpora.ru).

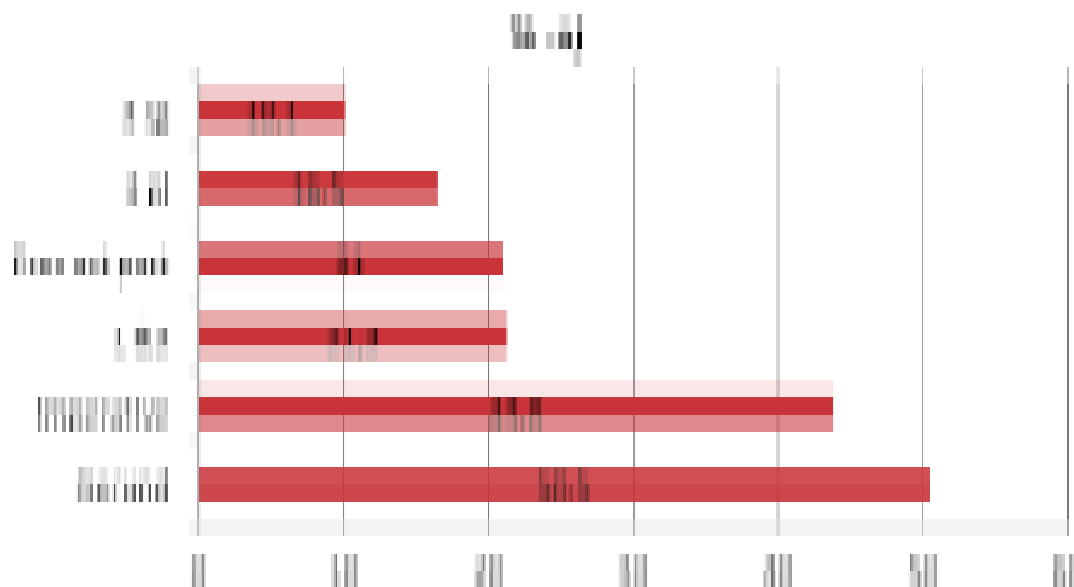
<sup>2</sup> The table includes only simplex verbs (unprefixed verbs without reflexive postfix *-sja*).

<i>kloxtat</i> ‘cluck’	10	1	11	9
<i>kolebat</i> ‘rock’	134	1	135	0.7
<i>kolyxat</i> ‘sway’	79	9	88	10
<i>krapat</i> ‘sprinkle’	1	2	3	67
<i>kudaxtat</i> ‘cackle’	22	19	41	46
<i>kurlykat</i> ‘call (crane)’	15	5	20	25
<i>maxat</i> ‘wave’	930	302	1232	25
<i>metat</i> ‘cast’	185	7	192	4
<i>murlykat</i> ‘purr’	91	61	152	40
<i>mykat</i> ‘moo’	1	11	12	92
<i>paxat</i> ‘plough’	353	2	355	0.6
<i>pleskat</i> ‘splash’	165	18	183	10
<i>poloskat</i> ‘rinse’	80	5	85	6
<i>prjatat</i> ‘hide’	1341	2	1343	0.1
<i>pryskat</i> ‘spray’	11	35	46	76
<i>pyxat</i> ‘blaze’	201	9	210	4
<i>ryskat</i> ‘trot’	114	99	213	46
<i>stonat</i> ‘moan’	698	17	715	2
<i>svistat</i> ‘whistle’	7	1	8	13
<i>tykat</i> ‘poke’	439	119	558	21
<i>xlestat</i> ‘whip’	313	1	314	0.3
<i>xnykat</i> ‘whine’	96	33	129	26
<i>čerpat</i> ‘draw’	4	304	308	99
<i>ščekotat</i> ‘tickle’	267	1	268	0.4
<i>ščepat</i> ‘chip’	0	2	2	100
<i>ščipat</i> ‘pinch’	150	8	158	5
Total	9655	2382	12037	

- (7) Two alternative approaches to paradigms
- Aristotelian category: A paradigm is a list of the inflected forms of a lexeme. The list lacks internal structure– all forms have the same status. Ex: The Word and Paradigm model (Matthews 1972), Optimal paradigms (McCarthy 2005)
  - Radial category (Lakoff 1987): Paradigms have internal structure insofar as asymmetrical relationships hold between prototypical and peripheral forms (cf. Bybee 1985, Wurzel 1984 & 1989)
- (8) Language change: Empirical predictions
- Aristotelian category: If we assume that paradigms lack internal structure, we expect all forms to be equally affected by language change.
  - Radial category: If we assume that paradigms have internal structure, we expect different forms to be affected by language change to different degree. Peripheral forms are expected to be most innovative.
- (9) Method: Statistical analysis by means of Logistic Mixed Effects Modeling, a method that facilitates analysis of the impact of a number of relevant factors.<sup>3</sup>
- (10) Hierarchy: Forms ranked according to prototypicality  
3 sg > 3 pl > 1 & 2 person > imperative > participle/gerund
- (11) Predictions:
- 3 sg is the most conservative form (least affected by suffix shift)
  - Participle and gerund are the most innovative forms (most affected by suffix shift)

<sup>3</sup> We would like to thank R. Harald Baayen for help with the statistical analysis.

(12) Results



(13) Interpretation of results:

- a. Results suggest that the predictions are correct.
- b. However, the participle is a problem, insofar as it behaves like a finite form with regard to suffix shift.

(14) Hypothesis about the active participle:

Relationships of form override prototypicality. The fact that the participle behaves like a finite form is motivated by its formal resemblance of finite forms (the 3 pl). Participles represent a so-called parasitic formation from the 3 pl in the sense that the participle “borrows” the vowel from the 3 pl ending (cf. *čitajut* – *čitajuščij*, *govorjat* – *govorjaščij*)

(15) Frequency – an alternative hypothesis about suffix shift:

The least frequent forms are most prone to undergo suffix shift.

(16) Frequency yields incorrect predictions for the gerund

- a. Prototypicality: 3 sg > 3 pl > 1 & 2 pers > imp > **gerund**
- b. Frequency: 3 sg > 3 pl > **gerund** > 1 & 2 pers > imp

(17) Frequency – written vs. spoken language:

Maybe the high frequency of the gerunds is due to the fact that spoken language is underrepresented in the corpus (and hence in our database)? If gerunds are less frequent in spoken Russian, maybe the frequency hypothesis can be saved?

(18) Gerund frequencies in written and spoken Russian:

	# lemmas	# gerunds	% gerunds
Whole corpus	13581979	501036	3.7
Spoken corpus	135326	1522	1.1

The difference between written and spoken language is statistically significant ( $p < 2.2e-16$ ), but the effect size is less than “small” (Cramer’s  $V = 0.01$ ). This suggests that the frequency difference has minimal impact. It is nevertheless impossible to exclude that frequency is relevant for suffix shift.

- (19) Summing up
- a. Suffix shift is sensitive to morphosyntactic features insofar as different forms are affected to different degrees: 3 sg is the most conservative form, while the gerund is most innovative.
  - b. Paradigm structure: Our results are compatible with the hypothesis that paradigms are radial categories with internal structure.
  - c. Frequency: It is possible, but not very likely that frequency is of decisive importance.

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