The Paradigm as a Radial Category

Tore Nesset and Laura A. Janda, University of Tromsø
CLEAR group: Cognitive Linguistics – Empirical Approaches to Russian

(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) [1]
      '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

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

(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):[2]

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

---

[1] Examples (2) and (3) are from the Russian National Corpus: www.ruscorpora.ru.
[2] The table includes only simplex verbs (unprefixed verbs without reflexive postfix *–sja*).

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

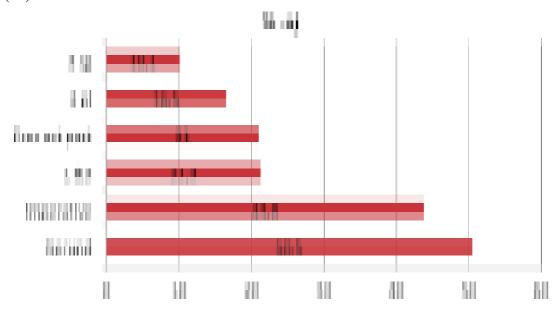(7) Two alternative approaches to paradigms
  a. Aristotelian category: A paradigm is a list of the inflected forms of a lexeme. The list lacks internal structure– all forms have the same status. Ex: The Word and Paradigm model (Matthews 1972), Optimal paradigms (Mc Carthy 2005)
  b. Radial category (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
  a. Aristotelian category: If we assume that paradigms lack internal structure, we expect all forms to be equally affected by language change.
  b. 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.[3]

(10) Hierarchy: Forms ranked according to prototypicality
    3 sg > 3 pl > 1 & 2 person > imperative > participle/gerund

(11) Predictions:
  a. 3 sg is the most conservative form (least affected by suffix shift)
  c. Participle and gerund are the most innovative forms (most affected by suffix shift)

---

[3] 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.

Bibliography

Andersen, Henning. 1973. Abductive and deductive change. *Language* 49. 765-793.

Andersen, Henning. 1980. Russian conjugation: Acquisition and evolutive change. In Elizabeth C. Traugott et al. (eds.), *Papers from the 4th international conference on historical linguistics*, 285-301. Amsterdam: John Benjamins.

Andersen, Henning. 1989. Markedness theory -- the first 150 years. In Olga M. Tomic (ed.), *Markedness in synchrony and diachrony*, 11-47. Berlin: Mouton de Gruyter.

Andersen, Henning. 2001. Markedness and the theory of linguistic change. In Henning Andersen (ed.), *Actualization: Linguistic Change in Progress,* 21-58. Amsterdam and Philadelphia: John Benjamins.

Bybee, Joan. 1985. *Morphology*. Amsterdam/Philadelphia: John Benjamins.

Gagarina, Natalija. 2003. The early verb development and demarcation of stages in three Russian-speaking children. In Dagmar Bittner, Wolfgang U. Dressler & Marianne Kilani-Schoch (eds.), *Development of verb inflection in first language acquisition: A cross-linguistic perspective*, 131-170. Mouton de Gruyter: Berlin - New York.

Gor, Kira & Tatiana Chernigovskaya. 2001. Rules in the processing of Russian verbal morphology. In Gerhild Zybatow, Uwe Junghanns, Grit Melhorn & Luka Szucsich (eds.), *Current issues in formal Slavic linguistics*, 528-536. Frankfurt am Main: Peter Lang.

Gor, Kira & Tatiana Chernigovskaya. 2003a. Mental lexicon structure in L1 and L2 acquisition: Russian evidence. *GLOSSOS* 4. 1-31.

Gor, Kira & Tatiana Chernigovskaya. 2003b. Generation of complex verbal morphology in first and second language acquisition: Evidence from Russian. *Nordlyd* 31(6). 819-833.

Gor, Kira & Tatiana Chernigovskaya. 2005. Formal instruction and the acquisition of verbal morphology. In Alex Housen & Michel Pierrard (eds.), *Current issues in instructed second language learning*, 103-136. Berlin and New York: Mouton de Gruyter.

Graudina, Ludmila K., Viktor A. Ickovič & Lija P. Katlinskaja. 2001. *Grammatičeskaja pravil'nost' russkoj reči. Stilističeskij slovar' variantov*. [Grammatical correctness in spoken Russian: Stylistic dictionary of variants.] Moscow: Nauka.

Halle, Morris and Alec Marantz. 1993. Distributed morphology and the pieces of inflection. In Kenneth Hale and Samuel J. Keyser (eds.), *The view from building 20*, 111-176. Cambridge, MA: MIT Press.

Hockett, Charles F. 1958. Two models of grammatical description. In Martin Joos (ed.), *Readings in Linguistics*, 386-399. Chicago: University of Chicago Press.

Janda, Laura A. 1995. Unpacking markedness. In Eugene Casad (ed.), *Linguistics in the redwoods: The expansion of a new paradigmin linguistics*, 207-233. Berlin: Mouton de Gruyter.

Janda, Laura A., Tore Nesset & R. Harald Baayen. (2010). Capturing correlational structure in Russian paradigms: A case study in logistic mixed-effects modeling. *Cognitive Linguistics and Linguistic Theory* 6(1). 29-48.

Joseph, Brian. 1983. *The synchrony and diachrony of the Balkan infinitive*. Cambridge: Cambridge University Press.

Karlsson, Fred. 1985. Paradigms and word forms. *Studia gramatyczne* VII. Ossolineum. 135-154.

Karlsson, Fred. 1986. Frequency considerations in morphology. *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung* 39. 19-28.

Kiebzak-Mandera, Dorota, Magdalena Smoczynska & Ekaterina Protassova. 1997. Acquisition of Russian verb morphology: the early stages. In Wolfgang U. Dressler (ed.), *Studies in pre- and protomorphology*, 101-114. Wien: Verlag der österreichischen Akademie der Wissenschaften.

Krysin, Leonid P. (ed.). 1974. *Russkij jazyk po dannym massovogo obsledovanija* [The Russian language according to data from empirical investigation]. Moscow: Nauka.

Lakoff, George. 1987. *Women, Fire, and Dangerous Things*. Chicago: University of Chicago Press.

Mańczak, Witold. 1980. Laws of analogy. In Jacek Fisiak (ed.), *Historical morphology*, 283-288. The Hague, Paris and New York: Mouton Publishers.

Matthews, Peter H. 1972. *Inflectional morphology. A theoretical study based on aspects of Latin verb conjugation*. Cambridge: Cambridge University Press.

Matthews, Peter H. 1991. *Morphology*. 2nd ed. Cambridge: Cambridge University Press.

McCreight, Katherine & Catherine V. Chvany. 1991. Geometric representation of paradigms in a modular theory of grammar. In Frans Plank (ed.), *Paradigms. The economy of inflection*, 91-111. Berlin and New York: Mouton de Gruyter.

McCarthy, John J. 2005. Optimal paradigms. In Laura J. Downing, T. Alan Hall & Renate Raffelsiefen (eds.), *Paradigms in phonological theory*, 170-210. Oxford: Oxford University Press.

Nesset, Tore. 1998. *Russian conjugation revisited: A cognitive approach to aspects of Russian verb inflection*. Oslo: Novus Press.

Nesset, Tore. 2008. Ob"jasnenie togo, čto ne imelo mesto: Blokirovka suffiksal'nogo sdviga v russkix glagolax. *Voprosy jazykoznanija* 6. 35-48.

Nesset, Tore. 2010. Suffix shift in Russian verbs: a case for markedness? *Russian Linguistics* 34.2. 123-138.

Nesset, Tore and Laura A. Janda. 2010. Paradigm structure: Evidence from Russian suffix shift. *Cognitive Linguistics* 21-4. 691-717.

Plank, Frans. 1990a. Of abundance and scantiness in inflection: a typological prelude. In Frans Plank (ed.), *Paradigms. The economy of inflection*, 1-39. Berlin and New York: Mouton de Gruyter.

Švedova, Natalija Ju. (ed.). 1980. *Russkaja grammatika* [Russian grammar] (vol. 1). Moscow: Nauka.

Tkachenko, Elena & Tatiana Chernigovskaya. 2006. Focus on form in the acquisition of inflectional morphology by L2 learners: Evidence from Norwegian and Russian. Paper presented at The Second Biennial Conference on Cogntive Science, St. Petersburg, June 9-13 2006.

Wurzel, Wolfgang U. 1984. *Flexionsmorphologie und Natürlichkeit*. Berlin: Akademie-Verlag.

Wurzel, Wolfgang U. 1989. *Inflectional morphology and naturalness*. Dordrecht, Boston and London: Kluwer Academic Publishers.

Zaliznjak, Andrej A. 1977. *Grammatičeskij slovar' russkogo jazyka* [Grammatical dictionary of Russian]. Moscow: Izdatel'stvo Russkij Jazyk.