Prefixation in context: What does it mean if you change the norm?

In this paper we provide experimental data that puts to test the predictions of various approaches to Russian prefixation. Three hypotheses are being considered:

1. *Lexical hypothesis*: prefixes are highly polysemous and verb-prefix combinations have fixed interpretations as identified in the dictionary; the interpretation of the prefixx is related to its syntactic position;

2. *Semantic hypothesis*: prefixes are polysemous, but unified representations are possible for many usages; the interpretation of a complex verb is compositionally acquired from the contributions of the verb and the prefix;

3. *Pragmatic hypothesis*: there is only a small amount of polysemy in the prefixation system, intepretation of a given prefix-verb combination depends on the prefix, the verb, contextual information, world knowledge, and available alternative prefixed verbs.

Consider three verbs (*žarit'* 'to fry', *gret'* 'to heat', *kormit'* 'to feed') and three prefixes (*pere-*, *po-*, *na-*). According to the first view, the interpretations of the prefixed verb are distributed as shown in the table (based on Ušakov 1940; Efremova 2000): *požarit'*, *nagret'*, *nakormit'*, and *pokormit'* are used as perfective correlates of base verbs (the prefixes are consider lexical, see Tatevosov 2009 at least for the first three verbs, *pokormit'* can be also classified as carrying a delimitative *po-* if it is interpreted as 'feed for some time'), while *nažarit'* is interpreted cumulatively (relatively large quantity) and *pogret'* – delimitatively (the prefixes are considered superlexical).

base verb	translation	excess	"paired" verb	other competing verbs
žarit'	'to fry'	*perežarit'*	*požarit'*	*nažarit'* 'to fry some quantity of'
gret'	'to heat'	*peregret'*	*nagret'*	*pogret'* 'to heat for some time'
kormit'	'to feed'	*perekormit'*	*nakormit'*	*pokormit'* 'to feed'

Under the second view (Filip, 2000; Kagan, 2015), the prefix *pere-* is assigned "exceed the standard" semantics ($d > d_c$), *na-* – "exceed or meet the standard" semantics ($d \geq d_c$), and *po-* – "meet or be below the standard" semantics ($d \leq d_c$). Such an analysis allows for variation in the interpretation of prefixed verbs and requires specifying further (possibly pragmatic) mechanisms in order to derive the final interpretation in a given context.

As for the third view, Zinova (2017) proposes even more underspecified semantics of prefixes (e.g., the contribution of the prefix *pere-* is extended to $d \geq d_c$ and there is not specified relation between d and d_c for the prefix *po-*). The resulting interpretation of a complex verb can then be determined only after an additional step of pragmatic computation (e.g. as proposed in Zinova pear), during which various prefixed verbs, formed from the same derivational base, compete with each other.

In order to test different approaches, we have conducted a study using an online platform Yandex Toloka. Participants had to rate an answers to a question (1-5 Likert scale), given the preceeding general scenario and a situation. For example, one type of scenario was that of feeding fish by a friend while the owner is absent. In Scenario A the prior probability of a normal feeding was set up very high, whereas in Scenario B it was stated that the friend almost always gives the fish too much food which causes the water to loose its transparency. After the scenario, participants read the description of the last observation (the owner came back and saw

that the water is either transparent or not): in a TOOMUCH case the fish were given too much food and in the situation NORM food quantity was normal. Last, the question ("What happened while the owner was absent?") and an answer (including one of the prefixed verbs) to it were presented and participants had to rate the provided answer. Every scenario-situation-sentence triple was rated 20 times. Each participant saw only one triple and the verbs to be tested never occurred in the preceding text. No results were excluded.
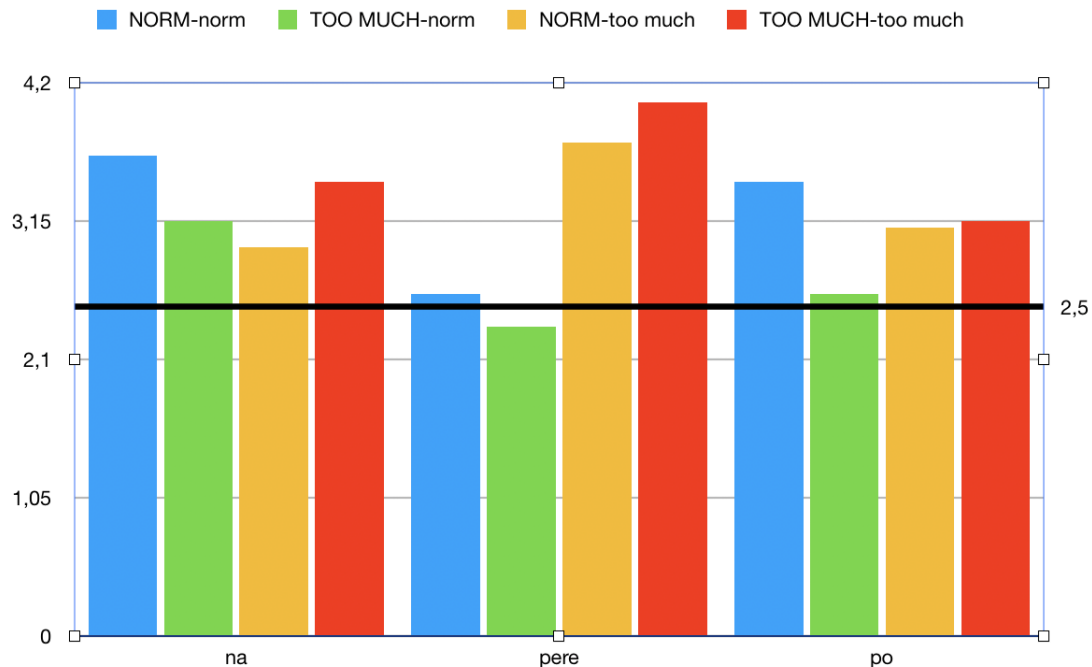
The histogram above shows the mean ratings for answers containing *na-*, *pere-*, and *po-*prefixed verb *kormit'* 'to feed' within the scenario described above. The blue bar stays for Scenario A and NORM situation, the green bar – Scenario B and NORM situation, The yellow bar – Scenario A and TOOMUCH situation, and the red bar – Scenario B and TOOMUCH situation. The results indicate that prior expectations about event probabilities highly impact the acceptability judgements of the tested verbs.

Let us inspect the crossing effect within the data for the prefix *na-*. In Scenario A, the verb *nakormit'* is rated lower in the TOOMUCH situation (2,95) than in the NORM situation (3,65). This conforms with an intuition that *nakormit'* 'to feed' serves as a neutral perfective for *kormit'* 'to feed' and naturally refers to a situation of a normal feeding. As overfeeding is, in a sense, more than a normal feeding, the same verb is also acceptable in the TOOMUCH situation with a lower rating. This can be explained by the availability of the alternative verb *perekormit'* 'to overfeed' and compatible with any of the hypotheses introduced above. In Scenario B, however, the ratings change significantly: the verb *nakormit'* receives a higher rating in the TOOMUCH situation (3,45) than in the NORM situation (3,15).

This is unexpected given the *lexical hypothesis*, as there is no obvious reason why the rating for the *norm* situation would drop. Both *semantic hypothesis* and *pragmatic hypothesis* are compatible with the observed effect, as the provided semantics allows more flexibility within the interpretation (but note that it needs to be spelled out how the exact interpretation is acquired). Other scenarios support the observations in the "feeding the fish" scenario: in the warming up scenario (verbs from the second line of the table above, see the second histogram below) the same effect is observed whereas in the frying scenario (verbs from the first line of the table, where *perežarit'* targets the quality and *nažarit'* – the quantity scale) the ratings are almost constant (4-4,1) for all the four combinations of neutral/big quantity scenario/situation.

What appears to be problematic for the *semantic hypothesis* are the ratings of the *po*-prefixed verb in the situation of overfeeding. As under this hypothesis *po*- is assigned the meaning "meet or be below the standard" ($d \leq d_c$), the rating of a *po*-prefixed verb would be expected to be similar to that of a *pere*-prefixed in the situation of a normal feeding. The data does not confirm this hypothesis.

This said, we are left so far with the *pragmatic hypothesis*. What remains unexplained in this case, however, is the drop to a rating of 2,6 in case of uttering the verb *pokormit'* in Scenario B to refer to the TOOMUCH situation. This indicates that the pure connection between d and d_c in not enough to explain the behaviour of the prefix *po*-. Under the analysis proposed by Zinova (pear), *pokormit'* should be acceptable in such a scenario/situation pair.

Being left with data that is unexpected under any hypothesis listed above, we would like to propose a preliminary version of a new approach to the prefix *po*-. On the basis of the experimental evidence collected for the three triples of verbs in the questionnaire described here it seems plausible that what matters for the prefix *po*- is not an absolute value on the scale brought in by the verb or its argument, but the typicality of the described situation. Changing the scenario in this case leads to a change of typicality, possibly together with provoking a conflict between the general world knowledge and new information provided by the context.

Such an approach to the prefix *po*- is compatible with both the *semantic hypothesis* and the *pragmatic hypothesis*. At the same time it would also explain why certain ranges of possible interpretations of the prefix get fixed in the dictionaries despite the evidence (see Zinova pear) that a broader interpretation is possible in certain contexts. Of course this hypothesis needs to be further tested. An interesting case study we would like to propose in this respect is testing newly invented verbs with semantics set to something outside of the scope of world knowledge, where no typicality information would be a priori available.

In this paper we have explored the variation in acceptability ratings of prefixed verbs when prior expectations about the outcome are changed. In sum, the obtained data indicates that the power of both semantics and pragmatics is needed in order to predict the interpretation of prefixed verbs and at the same time the semantics of the prefix *po*- requires re-thinking. We have put forward a proposal in this respect that needs further testing.

REFERENCES

Efremova, T. F. (2000). *Novyj slovar russkogo jazyka. Tolkovo-slovoobrazovatel'nyj [New dictionary of Russian. Explanatory and interpretational].* Russkij jazyk, Moscow.

Filip, H. (2000). The quantization puzzle. In *Events as Grammatical Objects*, pages 3–60. CSLI Press, Stanford.

Kagan, O. (2015). *Scalarity in the Verbal Domain: The Case of Verbal Prefixation in Russian.* Cambridge University Press.

Tatevosov, S. (2009). Množestvennaja prefiksacija i anatomija russkogo glagola [Multiple prefixation and the anatomy of Russian verb]. In X. Kisseleva, V. Plungian, E. Rakhilina, and S. Tatevosov, editors, *Korpusnye issledovanija po russkoj grammatike [Corpus-based Studies in the Grammar of Russian]*, pages 92–156. Probel, Moscow.

Ušakov, D. N., editor (1935-1940). *Tolkovyj slovar' russkogo jazyka. [Explanatory Dictionary of the Russian Language.].* Izdatel'stvo Akademii Nauk SSSR, Moscow.

Zinova, Y. (2017). *Russian verbal prefixation.* Ph.D. thesis, Heinrich-Heine University, Düsseldorf.

Zinova, Y. (to appear). Explaining meaning: The interplay of syntax, semantics, and pragmatics. In *Proceedings of the Twelfth International Tbilisi Symposium on Logic, Language, and Computation*. Springer. Paper presented at TbiLLC 2013.