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Paradigm leveling in non-standard Russian: consonant alternations in comparatives and nouns
This paper analyzes a paradigm leveling process currently taking place in Russian that affects consonant alternations. In standard Russian, these alternations are present in some verb forms (*ljubit'* 'to love' – *ljublju* 'I love'), in comparatives (*suxoj* 'dry' / *suxo* 'dryly' – *suše* 'drier, more dryly') and before certain derivational suffixes (*noga* 'leg' – *nožka* 'small leg, furniture leg'). However, many non-standard forms lack these alternations or have 'incorrect' variants unattested in standard Russian. Slioussar and Kholodilova (2013) demonstrated that although leveling simultaneously goes in two opposite directions, underapplication of consonant alternations is more widespread than overapplication in verb forms. Here, we continue their work studying comparatives and nouns. Our search for non-standard comparatives and noun forms in different corpora produced almost no results. Therefore we searched the Internet and elicited forms in an experiment.

Web search: methods and tools. Estimating relative frequencies of different forms found on the Internet is a challenge mainly because the counts provided by search engines are extremely imprecise (we used the Yandex search engine, which is very popular in Russia, but this is also true for Google etc.). To circumvent this problem, we used the method suggested by Slioussar and Kholodilova (2013). Namely, we first established what variants are attested searching for all theoretically possible forms and then put all attested forms in a single query, i.e. asked the search engine to look for them simultaneously. Then we sorted the results by date, counted relative frequencies of different variants (in the first one thousand results, if more were found) and did the relevant statistical tests.

To facilitate preparing queries and processing of the massive amount of results, we developed a collection of Perl scripts called *Lingui-Pingui*. This program can automatically form queries from the list of given morphs, send them to the search engine, download the results, sort them according to specified criteria and do various counts.

Web search: results for comparatives. In standard Russian, ten adjectives with the stems ending in *-d*, *-t* and more than one hundred adjectives with the stems ending in *-g*, *-k*, *-x* (all such adjectives) have synthetic comparatives with consonant alternations; both groups are not productive. Two types of adjectives were selected for our study: (1) 9 adjectives with stem-final dental plosives and 24 adjectives with stem-final velars that have normative synthetic comparatives with alternations; (2) 19 adjectives with stem-final velars that do not have normative synthetic comparatives, but native speakers still tend to generate such forms.

Group 1. We found that if a standard form exists, the process of alternation loss is more sporadic than in the case of verbs: usually about 1-2% forms lack alternations, although some adjectives like *ubogij* 'poky' or *uprugij* 'resilient' have up to 30% of comparatives without alternations. Unlike with verbs, no significant correlation with lemma frequency or the last consonant of the stem was found.

Group 2. This group consisted primarily of compound adjectives. Analogous simplex adjectives have synthetic comparatives with alternations, while these adjectives have only analytic standard forms. When speakers nevertheless try to form synthetic comparatives, these forms lack alternations significantly more often than in the first group. The most important factor is whether the second part of the compound is used as an independent adjective. If it is (e.g. *zorkij* 'sharp-sighted' for *dal'nozorkij* 'long-sighted'), most comparatives have alternations. If it is not (e.g. *dlinnorukij* 'long-armed', *dlinnonogij* 'long-legged'), the majority of comparatives lack alternations. This is noteworthy because the relevant stems with alternations can be found in many highly frequent words, e.g. *ručka* 'small hand, handle', *nožka* 'small leg, furniture leg'.

So it seems to be crucial whether a particular form is listed in the mental lexicon, not whether a model or even a particular version of the stem is available. This is similar to Slioussar and Kholodilova's results with the verbs: in the I class, the model is productive, but it plays the most important role whether a standard form with alternations from a particular verb is stored in the lexicon.

Experiment: results for comparatives. All tendencies observed for comparatives on the Internet were replicated in an experiment where participants (27 speakers of Russian, age 14-56)[1] were asked to produce comparatives from various real and nonce adjectives. The forms were embedded in short standardized sentences they were asked to complete. Notably, there were no restrictions on using ana-

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[1] We also performed the same experiment on nine teenagers and ten subjects older than 50. No difference by age was found. We are grateful to Tatiana Matiushkina and Ekaterina Tskhoverbieva for collecting these data.

lytic comparatives (for several reasons, they were not included in Internet searches).

We took the same types of adjectives that were searched for on the web and added a group of adjectives with stem-final dental fricatives (/z/, /s/). Fricative alternations are extremely rare in adjectives (*vysokij* 'tall' - *vyše*, *nizkij* 'short' - *niže* are probably the only ones) and occur only together with the suffix *-(o)k-* dropping. However, in verb forms and derived nouns these alternations occur fairly often (e.g. *nosit'* 'to carry' - *nošu*, *ukrasit'* 'to decorate' - *ukrašenie* 'decoration').

Overall, experimental results replicated the web-study results described above. But several new correlations appeared. In particular, frequency and stem-final consonant played a significant role. For less frequent adjectives, subjects used analytic forms or synthetic forms without alternation more often ($p < 0.01$, Pearson's correlation coefficient). In case of real adjectives with stem-final dental plosives (/d/, /t/), 100% of the comparatives formed by subjects were synthetic ones with alternations. For adjectives with stem-final velars (/g/, /k/, /x/), subjects produced only 60% synthetic forms with alternations, 34% analytic forms and 8% synthetic forms without alternations (i.e. using an analytic form is another way to avoid alternations – something we could not show in the web-search part of the study). Notably, the picture was the opposite for nonce adjectives: significantly more comparatives without alternations were formed from adjectives with stem final dental plosives (14% synthetic forms with alternations in case of stem-final /d/ or /t/ vs. 30% in case of stem final /g/, /k/, /x/).

Thus, a small group of highly frequent dental plosive adjectives that have synthetic comparatives with alternations is very stable, but speakers remember them one by one and fail to use the relevant model in nonce words, expectedly preferring a different productive model (like e.g. in *veselyj* 'merry' - *veselee*). In case of velar adjectives, the model with alternations is the only one available in standard Russian. Due to the tendency to get rid of alternations and to the unproductiveness of the model, speakers also have problems using it, but much less so than with nonce words with stem-final dental plosives. There were also several comparatives with alternations produced from nonce words with *-z* and *-s* stems, which is interesting, because they are extremely rare in standard Russian and can hardly be found on the Internet.

Web search: results for nouns. Many nominal derivational suffixes trigger alternations of a stem-final velar or dental fricative consonant in standard Russian. We started studying noun forms with diminutive suffixes. We selected two groups of nouns: new loanwords like *bag* 'bug' or *tėg* 'tag' and native words that are rarely used in diminutive form like *strax* 'fear'. We found that only few forms lack alternations (i.e. the tendency is weaker than in comparatives and much weaker than in verbs, probably because we deal with derivation rather than inflection). An interesting side finding was that the distribution of suffixes is different from what is predicted by the prescriptive grammar.

Discussion. Many competing approaches to paradigm leveling exist. But we are cautious to interpret our results in favor of any theory. For example, the fact that underapplication of alternations is preferred to overapplication is problematic for McCarthy's (2005) framework, being more readily compatible with accounts like (Albright 2002, 2010). However, these and other theories were primarily designed to work with different data, explaining why some groups of words developed particular established forms rather than predicting different frequencies of various non-standard innovations. We can gain access to such data only now, with the development of Internet communication. We strongly believe that the general principles underlying these data should be the same in both cases, but some adaptation is still needed. To give another example, alternations that are rarely attested in standard Russian can be taken as evidence that speakers, at least in some cases, rely on conditions on outputs (form X should contain consonant A) rather than on input-output relations (stem-final consonant B becomes A in form X) (e.g. Bybee 1995). However, this does not readily predict the vast diversity of such alternations, as well as their very low frequency compared not only to "standard" alternations, but also to the cases where alternations are missing.

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