

“Russian ‘purely aspectual’ prefixes: Not so ‘empty’ after all?”

Abstract

Nearly two thousand perfective verbs in Russian are formed via the addition of so-called “empty prefixes” (*čistovidovye pristavki*) to imperfective base verbs. The traditional assumption that prefixes are semantically “empty” when used to form aspectual pairs is problematic because the same prefixes are clearly “non-empty” when combined with other base verbs. Though some scholars have suspected that the prefixes are not empty but instead have meanings that overlap with the meanings of the base verbs, proof of this hypothesis has eluded researchers. With the advent of corpora and electronic resources it is possible to explore this question on the basis of large quantities of data. This article presents a new methodology, called “Radial category profiling”, in which the semantic network of a prefix is established on the basis of its “non-empty” uses and then compared, node by node, with the semantic network of base verbs that use the same prefix as an “empty” perfectivizing morpheme. This methodology facilitates a comprehensive analysis of ten prefixes, comparing their meanings in “non-empty” and “empty” uses and showing precisely how in the latter case overlap produces the illusion of emptiness. We are able to fully specify the semantic network of each prefix, and discover that for some prefixes there is overlap throughout the network, while for others overlap is restricted to a contiguous subsection of the network. We investigate the dynamic interactions among prefixes, and identify what meanings are incompatible with the “purely aspectual” function of the so-called “empty” prefixes.

Keywords: Russian, aspect, prefixes, verbs, radial category

1.0 Introduction

A major feature of the Russian aspectual system is the formation of aspectual pairs via prefixation of imperfective base verbs, as in *pisat'* (imperfective) > *napisat'* (perfective), both of which mean ‘write’. Since the lexical meanings of the base verb and its prefixed partner are identical, one can assume that the prefix makes no semantic contribution to the partner verb beyond marking it as perfective. Received wisdom takes this line of reasoning one step further, declaring the prefixes “empty” (Šaxmatov 1952, Avilova 1959 & 1976, Tichonov 1964 & 1998, Forsyth 1970, Vinogradov 1972, Švedova et al. 1980, Čertkova 1996, Mironova 2004). An alternative is the “Overlap Hypothesis”, according to which the prefix has meaning, but this meaning happens to overlap with the meaning of the verb and therefore only appears to be absent (Vey 1952; van Schooneveld 1958; Isačenko 1960; Timberlake 2004, 410-411). This controversy has persisted due to a lack of substantial evidence to either support or reject the Overlap Hypothesis. Indeed, testing the Overlap Hypothesis is rather difficult

since the meanings of prefixes are abstract and complex, and these meanings are hypothesized to be invisible in the verbs in question.

Rather than engaging in a polemic discussion of the “Empty Prefix” vs. “Overlap” Hypotheses for Russian prefixes, we present a principled novel approach made possible by access to digital resources and tools. Our analysis of ten Russian prefixes, *u-*, *pri-*, *v-*, *raz-*, *ot-*, *vz-/voz-*, *vy-*, *iz-*, *pere-*, and *pod-*, reveals compelling evidence for the Overlap Hypothesis.

“Radial category profiling” (2.2.2, with detailed analyses in section 3), is an innovative methodology for comparing the semantic networks of prefixes and verbs and pinpointing areas of overlap. This methodology makes it possible to investigate inter-prefixal relations and tease apart both the similarities and differences. Relevant problems are how, for example, *u-*, *ot-*, *vy-*, *iz-*, and *raz-* can signal versions of ‘away’; and how verbs of perception, such as *smotret’(sja)* ‘look at’, combine with prefixes like *u-*, *v-*, *raz-*, and *pri-*. Radial category profiling makes it easy to spot meanings where overlap is not attested, and there are clear patterns among meanings that do not participate in “empty” perfectivization, namely meanings involving quantification and comparison (see 3.4).

1.1 An allegory for the “empty” prefixes

The following is an allegory for the “empty” prefix problem. Imagine that you have a new job working in a big building with two thousand rooms. You have a lot of responsibilities and need to be able to open the doors to all of those rooms instantly when necessary. Your new boss hands you a keychain with over a dozen keys on it and says that these keys open the two thousand doors. You also receive a printed inventory of the doors with various kinds of information about each of them, and buried in each entry is a note about which key to use, but the inventory is inconvenient and clumsy. There is no apparent pattern to the pairing of keys to doors -- judging from the list, it is quite random. Trying to memorize all the combinations is a formidable task and will likely lead to errors on the job. What should you do?

In this allegory, the door-opener is a learner of Russian, the two thousand rooms are the imperfective base verbs, and the keys are the prefixes that are needed to form the perfective partner verbs. The inventory is a dictionary in

which the prefix-verb combinations are available, but buried among other entries. If you actually want to use the language fluently you need to just “know” which prefix to use.

The riddle of the door-opener has a fairly simple solution. If the keys and the doors are color-coded, the door-opener can instantly match a colored door to a corresponding colored key. Can this allegorical solution help us to solve the problem of the “empty” prefixes?

Our proposal is that it can. The meanings of prefixes and verbs can be likened to a spectrum of colors. Imperfective base verbs select for their perfective partners the prefixes that match their meaning “color”.

Note that the MEANING IS COLOR metaphor is not so far-fetched, since we speak of *ottenki značeniya* ‘shades of meaning’ in both Russian and English. This metaphor is also relevant for several related problems involving the behavior of verbs and prefixes in Russian. These include the following observations: a) that all the “empty” prefixes also have “non-empty” uses, b) that some imperfective base verbs can combine with more than one “empty” prefix, and c) that some prefixes have meanings that overlap with each other. Each of these observations is examined in turn in the subsections below.

1.2 “Non-empty” vs. “empty” uses as contrast vs. camouflage

In combination with other imperfective base verbs, all of the prefixes can yield perfectives where the semantic contribution of the prefix is tangible. For example, the prefix *raz-*¹ has meanings that can be characterized as APART, CRUSH, SPREAD, SWELL, as we see in these verbs:

APART: *raz-* + *pilit* ‘saw’ = ‘saw apart’

CRUSH: *raz-* + *toptat* ‘stamp one’s feet’ = ‘trample, crush by stamping’

SPREAD: *raz-* + *katat* ‘roll’ = ‘roll out dough (as in when making a pie)’

SWELL: *raz-* + *dut* ‘blow’ = ‘inflate, swell up by blowing’.

As we will show in more detail below (3.2.1), APART, CRUSH, SPREAD, and SWELL are all related to each other in a semantic network. Metaphorically speaking we could say that they are shades of a single meaning “color”.

¹ Note that due to orthographic representation of voicing assimilation, *raz-* is spelled *ras-* when attached to stems beginning in a voiceless obstruent.

Let us now compare the verbs above with some perfectives formed using the supposedly “empty” *raz-* (these verbs are listed as the perfective partner verbs of the corresponding imperfective base verbs in major dictionaries; see 2.2.1):

APART: *raz-* + *bit'* ‘break’ = ‘break’
 CRUSH: *raz-* + *davit'* ‘crush’ = ‘crush’
 SPREAD: *raz-* + *vetvit'sja* ‘branch out’ = ‘branch out’
 SWELL: *raz-* + *puchnut'* ‘swell’ = ‘swell’.

The shades of meaning of *raz-* are the same for both groups of verbs, but it is the relationship of the verbs to those meanings that is different. In the first group of verbs, there was a contrast between the meanings of the verbs and the meaning of *raz-*. That contrast is missing in the second group of verbs, which share meaning with the prefix. The difference can be likened to contrast vs. camouflage. When *raz-* is juxtaposed with verbs that do not share its meaning, the meaning of *raz-* is clearly visible. When the *raz-* is juxtaposed with verbs that do share its meaning, this meaning seems to disappear because it is camouflaged. One cannot see the meaning of *raz-* against the background of a verb with a shared meaning.

We propose that it is this type of semantic camouflage that creates the illusion of the “empty” prefix. We present in section 3 detailed analyses based on thousands of verbs detailing what the meaning of each prefix is, and to what extent the meanings of the base verbs that form perfective partner verbs overlap with the meanings of the prefixes.

1.3 Verbs with multiple “empty” prefixes: prefix variation

The “Exploring Emptiness” database (see 2.2.1) reveals that a substantial number of imperfective base verbs form perfective partner verbs with more than one prefix. We call this phenomenon “prefix variation” (for a detailed study, see Janda & Lyashevskaya forthcoming). An example is the verb *gruzit'* ‘load’, which has three perfective partner verbs with three different prefixes: *nagruzit'*, *pogruzit'*, and *zagruzit'*. Although there are 1,981 prefixed perfective partner verbs in the database, there are only 1,429 imperfective base verbs because of the fact that many base verbs combine with more than one prefix, and thus form

multiple perfective partner verbs.² While 1,043 base verbs use one and only one prefix to form perfective partners, 386 base verbs (= 27% of all base verbs) use multiple “empty” prefixes. 283 base verbs combine with two prefixes, 75 with three prefixes, 21 with 4 prefixes, 4 with five prefixes, and 3 with six prefixes. These numbers reveal that prefix variation is widespread and robust in the formation of perfective partner verbs, and any viable model of prefixation must be able to account for this phenomenon.

The present study likens meaning to a multi-dimensional spectrum in which fluid transitions and overlap are expected. Thus it is easy to accommodate prefix variation, which can be understood as various kinds of “color” matches between prefixes and verbs according to hue, tint, and brightness. Just as teal can potentially be matched with a range of blues and greens, a base verb might find more than one possible match among the spectrum of prefixal meaning “colors”.

1.4 Overlap among prefixes

The prefixes engage in a complex, dynamic set of semantic relationships with each other. Some of the prefixes have clearly opposed meanings, as in *ujti* ‘leave (on foot)’ vs. *prijti* ‘arrive (on foot)’. However, at least as often we observe that the meanings of prefixes are very close, as in *ujti* ‘leave (on foot)’ and *otojti* ‘walk away from’, or *vybrat*’ and *izbrat*’, both of which can be glossed as ‘choose’. Again the flexibility of the MEANING IS COLOR metaphor is helpful, since it can accommodate semantic proximity and overlap. The detailed analyses below show that each prefix has a unique focal meaning “color”, and we examine both examples of overlap and semantic proximity in prefixal meanings. Note that the lack of absolute semantic boundaries between prefixes does not mean that we cannot perceive differences between them. Langacker (2008, 6-7) exploits the MEANING IS COLOR metaphor in his discussion of semantics, pointing out that the lack of a sharp dividing line between green and blue does not condemn us to seeing only “grue”. Focal green and focal blue are still distinctly different, even

² Note that in addition to using several different prefixes to form several different perfectives, sometimes in Russian it is possible to put multiple prefixes on a single verb, as in *poperepisyvat*’ ‘spend some time rewriting’. This phenomenon is usually referred to as “prefix stacking” and since it does not involve use of “empty” prefixes, it is not included in the scope of our analysis.

though they are connected by a gradation of intermediary colors. Likewise we can show that *u-* vs. *ot-* and even *vy-* vs. *iz-* have unique, if connected, identities.

1.5 From allegory to analysis

Color-coding is an efficient solution to the riddle of the door-opener, and it metaphorically accommodates various kinds of overlap. But is this allegory really appropriate for Russian verbal prefixes? What insights does it yield?

The advent of electronic resources such as the Russian National Corpus (www.ruscorpora.ru, henceforth “RNC”) and computer software such as XL, MySQL and R have greatly enhanced our capacity to address such questions. These tools make it possible for us to collect, manipulate, and analyze large quantities of data. This study is based on the digital aggregation of millions of attestations of Russian verbs in the RNC and reference works. From this we distill data matrices that accurately represent the full range of relevant verbs and their meanings.

The color allegory suggests a specific strategy for discovering the meanings of the prefixes. We should start with the verbs where the meaning of the prefix is clearly “visible”, namely the verbs with “non-empty” prefixes, where the meaning “colors” of the base verb and the prefix contrast. On the basis of the verbs in which the prefix stands out, it should be possible to identify both the focal meaning “color” of the prefix and the entire range of associated “hues” or submeanings. Once a prefix’s meaning “color” range has thus been independently established, it is possible to approach the perfective partner verbs where the same prefix is supposedly “empty”. We can then compare the “color” range of these base verbs with the “color” range of the prefix. If they match, we have strong evidence that the prefix retains its meaning even in its supposedly “empty” uses. This is exactly what we find, as detailed in section 3. Thus the data supports the Overlap Hypothesis and confirms the insights of the allegory.

1.6 Overview

Section 2 develops the strategy of the color allegory, grounding it both in terms of theoretical concepts (2.1) and methodological tools (2.2). Section 3 opens with a guide to the format for analysis standardized across the ten prefixes. The ten

prefixes are then presented in three groups according to the degree of semantic overlap between the prefix and the base verbs that form perfective partners with that prefix, as measured by radial category profiling: complete overlap (3.1), majority overlap (3.2), and partial overlap (3.3). A summary (3.4) addresses issues of overlap among prefixes and prefix variation. Conclusions are offered in section 4.

2.0 Strategy

Before proceeding to the analysis, we need to clarify the relevant theoretical concepts (2.1) and lay out the parameters and tools for the investigation (2.2).

2.1 Theoretical concepts

In terms of concepts, we need a clear means for distinguishing among supposedly “empty” and “non-empty” uses of prefixes in Russian (2.1.1). We also need a model for the way linguistic meaning is structured (2.1.2), as well as an understanding of what semantic overlap is and its role in language (2.1.3).

2.1.1 The cluster model of Russian aspect

The cluster model of Russian aspect (Janda 2007) distinguishes four main types of perfective verbs in Russian:

- Natural Perfectives, where the imperfective partner verb is typically a simplex base verb as in *napisat'* and *pisat'* ‘write’;
- Specialized Perfectives, where the imperfective partner verb is typically secondarily derived, as in *perepisat'* and *perepisyvat'* ‘rewrite’;
- Complex Act Perfectives, which express bounded activities and typically lack imperfective partner verbs, as in *začichat'* ‘start sneezing’ and *počichat'* ‘sneeze for a while’; and
- Single Act Perfectives, which express a single performance from a series, and typically lack imperfective partner verbs, as in *čichnut'* ‘sneeze once’.

The last type, the Single Act Perfective, is not relevant to the present study and will not be discussed further.³

The Natural Perfectives formed by prefixation have the same meaning as their imperfective base verbs and thus correspond to the verbs with the so-called “empty” prefixes. Though Specialized Perfectives and Complex Act Perfectives are also formed via prefixation, they represent “non-empty” use: in both types the meaning contributed by the prefix precludes an aspectual partner relationship with the simplex base verb.

We adopt the cluster model here and the terms Natural Perfective, Specialized Perfective, and Complex Act Perfective, abbreviated as NP, SP, and CAP in Figures 2-11. The analysis of prefixes in section 3 will follow the strategy of first examining the “non-empty” uses of a given prefix in its Specialized Perfectives and Complex Act Perfectives to determine its range of meanings and then comparing those meanings to the meanings of the base verbs that form Natural Perfectives with the same prefix.

2.1.2 The structure of meaning: radial categories

We follow the conventions of cognitive linguistics in modeling linguistic meaning in terms of radial categories (Taylor 2003). This convention grows out of a tradition of linguistic analysis that builds upon findings in psychology (beginning roughly with Rosch 1978) that human categorization is characterized not by boundaries set by necessary and sufficient criteria, but instead by radial categories. Rather than being defined by features and boundaries, radial categories are defined by relationships to a prototype. The prototypical member is the semantic center of gravity for a category and typically is most salient and has more relationships to other members than any other (Geeraerts 1995, 25; Croft & Cruse 2004, 78 & 81; Lewandowska-Tomaszczyk 2007, 155). The prototype is also often the one that is most concrete, and for prefixes this

³ The use of prefixes in Specialized Perfectives is comparable to what Svenonius (2004a-b & 2008) and Ramchand (2004) call “lexical prefixes”, and the same authors refer to prefixes in Complex Act Perfectives as “superlexical prefixes”. Note that Makarova & Janda (2009) have identified an additional type of perfective verb in Russian, but it is a variant of the Single Act Perfective that is not relevant to this analysis.

involves spatial meanings, usually those found in conjunction with determined verbs of motion. However there is no strict requirement that a prototype must have the highest frequency. Note also that radial category structure does not necessarily imply any direction of derivation of meanings; though the peripheral meanings are related to the prototype, they are not necessarily derived via these relationships. If we take the category of *mother* in English, for example, the prototypical mother gives birth to a child, nurtures the child and is married to the child's father. More peripheral members of the category do not necessarily share any characteristics, such as *birth mother* vs. *step mother* (Lakoff 1987, 83-84). Category members can also be motivated by metaphorical extensions, as in *mother node* (in syntax) or *mother board* (in a computer).

The radial category has proven an effective means for modeling the complex networks of meanings associated with polysemous linguistic units. Section 3 presents the prototype and radial category of meanings for each prefix, based on analysis of its Specialized and Complex Act Perfectives. Although the Figures present the meanings as if they were discrete nodes, this is an artifact of graphic representation. The radial category model accommodates gradual transitions and multiple points of category membership. Returning to our MEANING IS COLOR metaphor, the radial category represents a "color space" with focal hues of meaning and the gradients that join them. In principle, it is possible to analyze a given radial category at many different levels of detail. At a macroscopic level a given radial category might be characterized by a single abstract schema (often close in meaning to, but more abstract than, the prototype). At the ultimate microscopic level a given radial category is resolved into its individual members, in this case all the verbs associated with a given prefix. Neither of these extremes gives a descriptive advantage, since the macroscopic level is equivalent to monolithic features, revealing none of the structure of the radial categories, and the microscopic level is no better than a list of verbs. We have analyzed the radial categories in this article at an intermediate level. It is possible to do this analysis at different levels and thus find different numbers of nodes in any given radial category. However, although details could differ, an analysis carried out consistently at a given intermediate level such as the one we have chosen will not change the overall outcome of the

analysis. This analysis does not stand or fall on exact counts of nodes in the radial categories, but rather on the patterns perceived among them.

Note that some verbs are polysemous and thus have multiple “homes” among the nodes of a radial category. An example of this is *pererabotat'*: in its meaning ‘convert’ it belongs to 1. TRANSFER, in its meaning ‘work overtime’ it belongs to 3. OVERDO, and in its meaning ‘remake’ it belongs to 4. REDO (see Figure 10).

Prefixes usually signal a relationship between something that “moves” (physically or metaphorically) and another point of reference. Following established convention (Janda 1986, Langacker 2008), the “moving” item is referred to as the “trajector” and the reference point is referred to as the “landmark”. Thus in expressions like *ujti s raboty* ‘quit a job’, *prijti na urok* ‘come to class’, *vyjti iz doma* ‘walk out of a house’, and *perejti ulicu* ‘cross a street’ the trajector is the person who is moving, while the landmarks are the job, the class, the house, and the street.

2.1.3 Conceptual overlap

There is evidence that semantic overlap is a widespread linguistic phenomenon throughout the range of grammar and lexicon, cf. “Redundancy is not to be disparaged, for in one way or another every language makes extensive use of it” (Langacker 2008, 188). Grammatical agreement is one example of semantic overlap, where the same grammatical meanings are represented on both the head and a modifier. Corpus research shows that most words have specific typical uses that are more or less idiomatic (Stubbs 2001, 57-63; Dąbrowska 2004, Chapter 3). Furthermore, it is typically the case that meaning is dispersed over co-occurring linguistic units, which make overlapping contributions to larger phrasal units of meaning. Common collocations such as *added bonus* and *physical exercise* illustrate such overlap since here the adjectives add nothing new to the default interpretations of the nouns they modify. Contrast is also possible of course, as we see in *intellectual exercise* (Stubbs 2001, 63). Langacker (2008, 187-189) notes that the extent of overlap can vary up to and including complete overlap, and that typically one component provides more schematic

information (like the adjectives above), while the other is more specific (like the nouns).

The combinations of Russian prefixes with verbs are parallel to lexical collocates. The prefixes are more schematic and can either add something not present in the meanings of the verbs (in Specialized and Complex Act Perfectives), or they can overlap with the meanings of the verbs to the point that they become semantically redundant (in Natural Perfectives).

2.2 Methodology

In undertaking this investigation we faced a number of decisions concerning which data to collect, how to organize it, and how to compare the meanings of the prefixes with the meanings of the base verbs in Natural Perfectives. The relevant parameters and methods are described in the following subsections.

The data on Natural Perfectives and their prefixes comes from the “Exploring Emptiness” database, an inventory of Natural Perfectives in Russian, publicly available at: <http://emptyprefixes.uit.no>. This database houses information pertaining to 1,981 Natural Perfectives formed via prefixation, which includes all such perfectives listed in three dictionaries and vetted by a panel of native speakers.⁴ This database contains information on aspectual pairs in which the perfective member is formed via prefixation of a simplex imperfective. For each verb it is possible to query the database for various parameters, including which prefixes it uses, its morphological and semantic class, its frequency in the RNC, its definition, and the dictionaries that list the given Natural Perfectives.

The goal of the database was, of course, to arrive at a comprehensive, authoritative, and definitive list of the Natural Perfectives in Russian. However, in the course of nearly three years of labor on this task, we faced many obstacles and discovered that this goal was naive. Dictionaries differ in the Natural Perfectives they acknowledge, and this reflects variance in the population of Russian speakers. Variance in grammar is a fact of natural language, which is

⁴ The dictionaries are: Evgen’eva 1999, Ožegov & Švedova 2001, and Cubberly 1982. The panel of native speakers are: Olga Lyashevskaya, Julia Kuznetsova, Svetlana Sokolova, and Anastasia Makarova.

better described in terms of statistical tendencies than in terms of absolute rules. In a series of studies, Dąbrowska and Street (Dąbrowska 2008, 2010, Street & Dąbrowska 2010) have shown that there are measurable differences in the grammars of speakers of one and the same language. This is in accordance with the established facts of “inter-subject variance”, a phenomenon that is firmly established in the field of psychology. It is likely that each native speaker of Russian has his/her own list of Natural Perfectives, and while these lists in the vast majority of cases overlap, there is a margin of variation that cannot be eliminated.

A panel of four native speakers who are linguists strove to eliminate problematic examples from the database, and their goal was to use Maslov’s criteria. This resulted in the removal of over 100 Natural Perfectives and in its final form variance in the database has been reduced to about 1%. However, in so doing we also discovered that whereas the Maslov criterion may seem helpful in individual cases, when one starts looking at large quantities of data, and particularly corpus data, the Maslov criterion becomes untenable.⁵ In the end we decided that it was more realistic and honest to admit that variation exists and to make all of our data and its sources public, and we invite readers to visit our site and query the verbs there. While the existence of inter-subject variance means that any given native speaker will be dismayed at a small number of our examples, this does not detract from the overall trends discovered in our study.

2.2.1 Which prefixes and which verbs?

⁵ A comprehensive argument against the Maslov criterion is beyond the scope of this article, and is addressed in Kuznetsova forthcoming. Basically the problem is that either the Maslov criterion can be fulfilled any time an imperfective and a perfective can appear in even one and the same construction, in which case there are many verb “pairs” that no native speaker would accept (cf. *celovat’-perecelovat’* ‘kiss’); or the Maslov criterion can be fulfilled only when both the imperfective and perfective verbs can appear in all of the same constructions, in which case, if you take corpus data into account, there are probably no aspectual pairs in Russian that fulfill this requirement.

There are sixteen prefixes⁶ that form Natural Perfectives in Russian, distributed as shown in Figure 1. The y-axis is the number of Natural Perfectives, and the exact number for each prefix is above each bar. Thus *po-* forms 417 Natural Perfectives, *s-* forms 281 Natural Perfectives, etc.

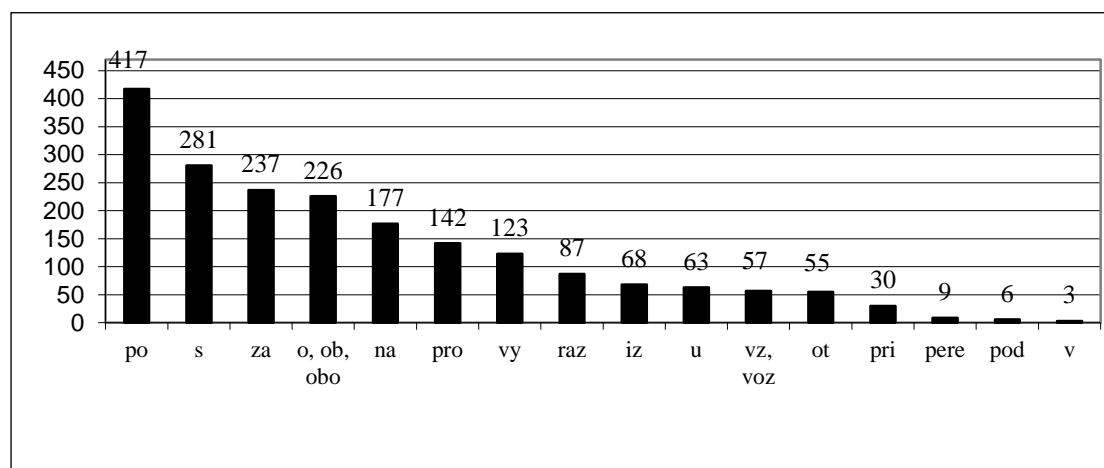


Figure 1: The distribution of Natural Perfectives across perfectivizing prefixes⁷

The distribution is very uneven, with a few prefixes that form more than one hundred Natural Perfectives (the “big” prefixes) and a larger number that form fewer than one hundred Natural Perfectives (the “small” prefixes). This article focuses on the “small” prefixes up through *vy-* (see Figure 1). *Vy-* is included for two reasons: 1) the “small” prefixes include *iz-*, but the history and modern behavior of *iz-* is so closely connected to *vy-* that it makes sense to analyze them together; and b) *vy-* is the smallest of the “big” prefixes. Adding *vy-* gives us the ten prefixes with the smallest numbers of Natural Perfectives: *vy-*, *raz-*, *iz-*, *u-*, *vz-/voz-*, *ot-*, *pri-*, *pere-*, *pod-*, and *v-*.

We have focused this study on the “small” prefixes because the “big” prefixes involve data on a different scale in terms of both quantity and quality and may be better addressed using different means (cf. “semantic profiles” in Janda and Lyashevskaya forthcoming). The “small” prefixes constitute an

⁶ Krongauz (1998) lists nineteen prefixes, but here we collapse *o-*, *ob-*, *obo-* based on an extensive study by Baydimirova (2010a). We likewise collapse *vz-* and *voz-*.

⁷ The numbers in Figure 1 correspond to those found in the “Exploring Emptiness” database described in this section. The numbers of Natural Perfectives for the prefixes analyzed in section 3 are lower because we collapse *-sja* and non-*-sja* verbs that differ only in transitivity in order to avoid redundancy (see 3.0).

objectively defined group (those with less than 125 Natural Perfectives), and since there are ten of them, they should provide ample data to test the Overlap Hypothesis. The conclusions that can be drawn are of course strictly speaking valid only for the “small” prefixes. The question of whether all the “big” prefixes behave similarly is left for future research (but note that a parallel analysis for *o-*, *ob-*, *obo-* is found in Baydimirova 2010a, and a radial category analysis of *po-* is presented in LeBlanc 2010, Dickey 2005 presents a category for *s-*, and Janda 1986 presents a similar analysis for *za-*).

The status of Natural Perfectives as opposed to Specialized and Complex Act Perfectives is very different in terms of both type and token frequency. The number of prefixed Natural Perfectives is bounded by the number of perfectivizable imperfective base verbs. Natural Perfectives are also highly entrenched and dictionaries aim to list them exhaustively. Natural Perfectives thus approximate a closed class with a limited number of items that have typically relatively high frequency. The list of Specialized and Complex Act Perfectives is open-ended and potentially vast, and dictionaries do not represent them exhaustively since they can be formed ad hoc. In other words, Specialized and Complex Act Perfectives are an open class.

These generalizations can be confirmed empirically. Kuznetsova 2010a examined the type and token frequency of prefixed perfectives attested in the RNC, sorted according to prefixes and whether the perfectives were Natural Perfectives or not (Specialized, Complex Act, and Single Act Perfectives). For each prefix, she calculated the percent of perfectives that are Natural Perfectives. This figure ranges from a low of 1% for *v-* to a high of 33% for *s-*, and the average is 14%. In other words, if we look at all of the perfectives with a given prefix, there are usually many times more Specialized and Complex Act Perfectives than Natural Perfectives, and thus the type frequency of Specialized and Complex Act Perfectives is higher. If we look at the token frequencies (number of attestations in the RNC) of the verbs themselves, we see the opposite effect. For every single prefix, the median token frequency of Natural Perfectives far exceeds that of Specialized and Complex Act Perfectives. For example, the median frequency of Natural Perfectives prefixed in *vy-* is 66.5, whereas the median frequency of

Specialized Perfectives for *vy-* is only 8. The average median frequency of Natural Perfectives is 107, while for other prefixed perfectives it is 9.7.

This difference in closed vs. open class status justifies different strategies for data collection to adjust for differences in type and token frequency, as described below.

Since the point of this study is to explore the meanings of prefixes in Natural Perfectives, we included all of them. Whereas all the Natural Perfectives in the “Exploring Emptiness” database are likely to be familiar to native speakers of Russian, some Specialized and Complex Act Perfectives are occasionalisms. We collected all of the Specialized and Complex Act Perfectives containing our ten prefixes that are attested in the Modern Subcorpus of the RNC, which represents texts created in 1950-2007, with a total of over 92 million words. We then eliminated all Specialized and Complex Act Perfectives with fewer than one hundred attestations in the RNC.⁸ This threshold comes very close to the average median frequency of Natural Perfectives, and is thus a good approximate calibration. Additionally by removing low-frequency Specialized and Complex Act Perfectives, we avoided overwhelming the data with marginal verbs. We also removed from the study all verbs that lacked an imperfective base verb.⁹ These two measures yielded databases of Specialized and Complex Act Perfectives that are commensurate in terms of both form and familiarity to the inventory of Natural Perfectives.

⁸ Frequencies were taken from Lyashevskaya & Sharoff 2010, which is based on the Modern Subcorpus of the RNC.

⁹ Though most prefixed perfectives do have imperfective base verbs, other types exist. These include verbs with perfective base forms like *razdat'* ‘distribute’. There are also prefixed verbs that have various kinds of non-verbal bases, such as: nominal in *rassekretit'* ‘reveal’ from *sekret* ‘secret’; adjectival in *utjaželit'* ‘make heavier’ from *tjaželyj* ‘heavy’; pronominal in *prisvoit'* ‘adopt’ from *svoj* ‘one’s own’; and numeral in *udesjaterit'* ‘increase tenfold’ from *desjatero* ‘group of ten’. Furthermore, there are prefixed verbs with no base form at all, such as *razut'sja* ‘take off one’s shoes’. All of these types were eliminated from the database of Specialized and Complex Act Perfectives to align it with the database of Natural Perfectives, all of which of course have an imperfective base verb. Note, however, that we do include examples in which the prefix is attached simultaneously with *-sja*, as in *razojtis'* ‘walk away in different directions’, which is derived from *idti* ‘walk’, since there is no **idtis'*.

2.2.2 Radial category profiling

Radial category profiling (Nesset, Baydimirova, and Janda in press) is a specific type of behavioral profiling. Behavioral profiling is a method used to probe the behavior of linguistic forms. A behavioral profile is established by collecting and tagging corpus data and then analyzing the structure present in the tagged data (Divjak and Gries 2006; Gries and Divjak 2009). In the present study the nodes in the radial categories serve as tags for two types of linguistic forms: 1) the meanings of the prefixes in Specialized and Complex Act Perfectives, and 2) the meanings of the base imperfective verbs in Natural Perfectives. Radial category profiles facilitate comparison across radial categories, making it possible to identify places of overlap and their extent. Figures 2-10 and 12 are visualizations of radial category profiles for the ten prefixes. The analysis in section 3 elaborates the radial category profiling methodology in detail.

3.0 Analysis

The radial category profiles of our ten prefixes and the base verbs that use them to form NPs are presented below according to a standard format. Each heading lists the prefix and its prototypical meaning given in SMALL CAPS. Thus, for example, MOVE AWAY is the prototype for the prefix *u-* analyzed in 3.1.1. Below the heading is a statement of how many total verbs are included in the analysis of the prefix. For *u-* this is “93 SPs + 53 NPs = 146 total”, which means that ninety-three Specialized Perfectives and fifty-three Natural Perfectives were analyzed, for a total of 146 verbs.

This statement is followed by a figure. The actual process of analysis had two steps, establishing: 1) a radial category based on the meanings of the prefix in Specialized and Complex Act Perfectives, followed by 2) a radial category based on the meanings of the base verbs in Natural Perfectives. However these two steps are conflated in the figures and the text. Each figure shows a radial category with meaning nodes represented as boxes. The box representing the prototype has a thicker border and there are lines connecting the boxes to represent relations among the meanings. Each box contains the following information: a numerical code for convenience, the meaning in SMALL CAPS, then the type (Specialized Perfective, Complex Act Perfective, Natural Perfective) and

number of verbs with that meaning, and an example for each verb type with a gloss. Thus, for example, if we look at the prototype for *u-* in Figure 2, we find it has the code 1, the meaning MOVE AWAY, twenty-six Specialized Perfectives like *ubežat* ‘run away’, and four Natural Perfectives like *ukrast* ‘steal’. The accompanying narrative is arranged in subsections headed by the code number and corresponding meaning. Thus the discussion of *u-* begins with a subsection labeled “1. MOVE AWAY”, followed by a subsection labeled “2. MOVE DOWNWARDS”, etc. Each subsection first examines the Specialized Perfectives and Complex Act Perfectives (if there are any). The Natural Perfectives are addressed in a separate paragraph at the close of each subsection. Since the range of Complex Act Perfectives is much narrower than that of Specialized Perfectives, often this means that only Specialized Perfectives are attested. We observe Complex Act Perfectives in association with only three of our ten prefixes, *ot-*, *pri-*, and *pod-*, and only in a single node of each of the relevant radial categories.

Since the study includes over 1,300 verbs, space considerations preclude listing all of them in this article. Full lists are available over the internet at <http://hum.uit.no/lajanda/smallprefs/smallprefs.html>. It is of course sometimes possible to argue that a given verb could be classified differently. Indeed the radial category model of meaning predicts that we will find gradient transitions and multiple associations. However, such minor adjustments would not change the overall outcome of the analysis. Note that when a verb with *-sja* differs from a non-*sja* counterpart only in terms of transitivity, the two verbs are collapsed into one entry on our lists. For example, *umyt'(sja)* ‘wash (one’s face)’ is listed as one verb, and the parentheses indicate that the reflexive postfix does not alter the meaning beyond making the verb intransitive. The data in the figures collapses some metaphorical and non-metaphorical meanings, but this information is disaggregated in the lists on our website.

Evidence in support of the Overlap Hypothesis is visualized in the figures, where shading highlights the overlap between the meanings of the prefixes and the meanings of the base verbs in Natural Perfectives. Shaded boxes show overlap, in other words those meanings where we observe both Specialized Perfectives (or sometimes Complex Act Perfectives) and Natural Perfectives. The analysis is organized according to the degree of overlap across the nodes of the

radial categories. The first subsection presents prefixes that completely overlap with the meanings of Natural Perfective base verbs, which is why all the boxes in Figures 2-4 are shaded. The subsequent subsections present prefixes that overlap in most or only some of their radial categories. All the meanings that are not attested among Natural Perfectives are collectively summarized in 3.4.

3.1 Prefixes where Natural Perfectives show complete semantic overlap

Two of our ten prefixes show 100% overlap in their radial category profiles: *u-* and *v-*. Thus for these prefixes we see that the full range of prefixal meaning established on the basis of Specialized and Natural Perfectives is reflected in the range of meanings of the base verbs that form Natural Perfectives with these prefixes.

3.1.1 *U-* MOVE AWAY

93 SPs + 53 NPs = 146 total

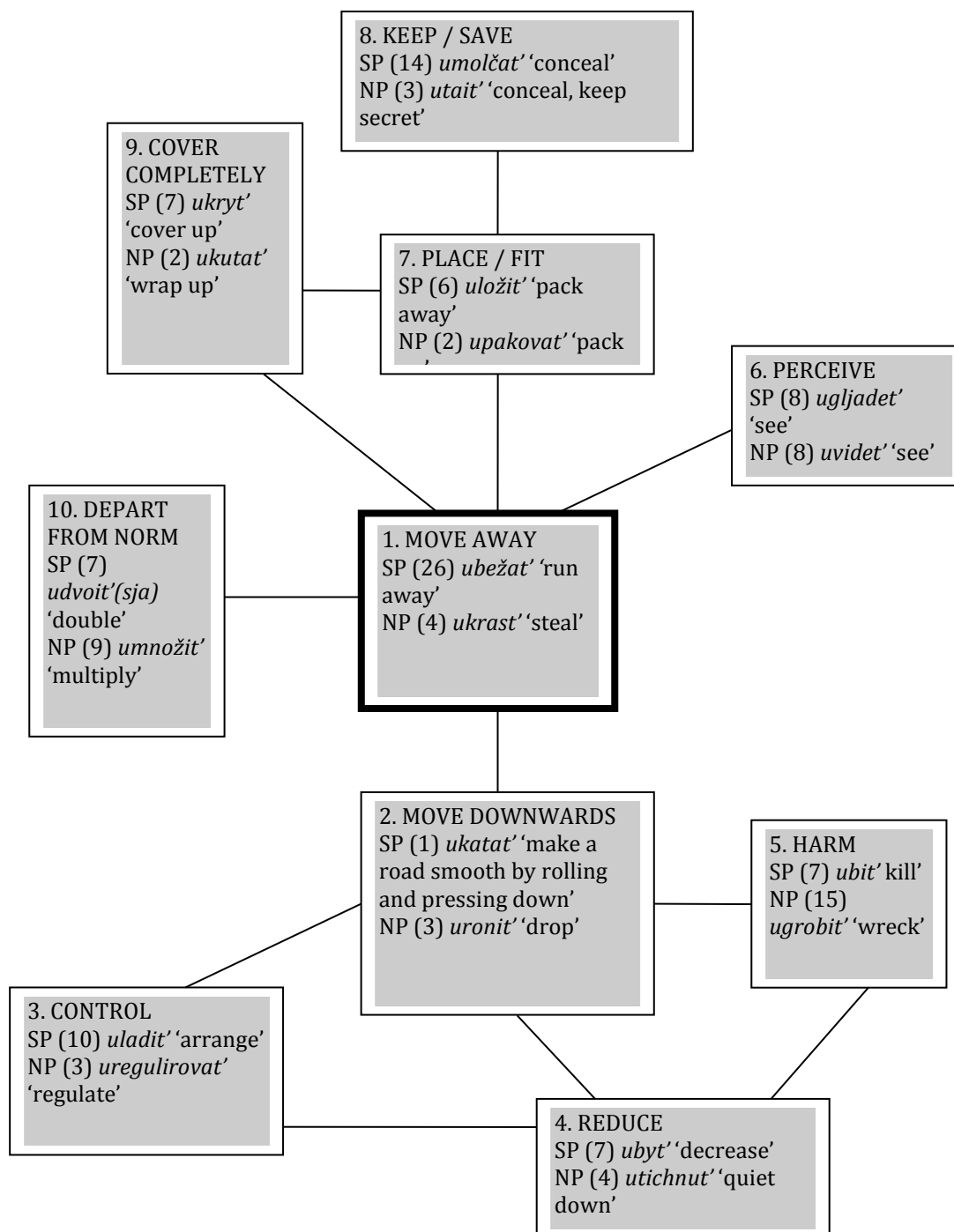


Figure 2: Radial Category for the prefix *u-*

1. MOVE AWAY

The prototypical use of *u-* is dominated by motion verbs that form Specialized Perfectives such as *ubežat'* 'run away', *uletet'* 'fly away', *unesti* 'carry away', though we also find verbs such as *uklonit'sja* 'avoid, turn aside' from *klonit'sja* 'bend'. This prototypical meaning is a productive pattern for marginal occasionalisms such as *uchromat'* 'limp away'. The meaning of the prototype is characterized by Nessel (2011: 678): "movement away from an observer's

domain of accessibility". The notion of loss of accessibility is relevant to several of the other meanings in this network.

Two Specialized Perfectives deserve extra attention. *Ubrat'* can mean 'remove, take away' as expected, but has additional meanings 'tidy up' and 'adorn, arrange nicely' which can overlap to some extent as in 1):

1) *Nikogda ne mog zastat' gorničnuju, uchodil na desjat' minut -- nomer ubran, postel' zastelena!* [Roman Karcev. *Maloj, Suchoj i Pisatel' (2000-2001)*]¹⁰
 'He never managed to run into the maid. If he left for ten minutes, the room was all tidied up/nicely arranged, and the bed was made up!'

The polysemy of *ubrat'* can be explained as a chain of metonymic relationships, in which removing something is part of the process of tidying up, and tidying up is part of the process of adorning something and arranging things nicely.

The relevant Natural Perfectives are formed from base verbs with meanings that entail movement away via taking, losing, or receiving, as in *ukrast'* 'steal', *uterjat'(sja)* 'lose', and *unasledovat'* 'inherit'.

2. MOVE DOWNWARDS

There is a conceptual link between moving away and downward movement because when an object moves away, it sinks below the horizon (Neset 2011). Note that this link is apparent elsewhere in the Russian verb system, for example with verbs prefixed in *s-*, which can signal both 'away' and 'down', as in *sbežat' iz doma/s gory* 'run away from the house/down from the mountain'. The only Specialized Perfective *ukatat'* 'make smooth by rolling' involves compression in the downward movement. This combination is paralleled in the Natural Perfective *utrambovat'* 'press down to make smooth', though the other Natural Perfectives involve downward movement without compression: *upast'* 'fall down' and *uronit'* 'drop'.

The next three meanings (3-5) are related to 2 in that they describe a change of state as a metaphorical downward movement in the domains of control (CONTROL), quantity (REDUCE), and effect (HARM).

3. CONTROL

¹⁰ This and all examples are culled from the RNC.

Lakoff and Johnson (1980: 15) identify the metaphor BEING SUBJECT TO CONTROL IS DOWN, which is motivated by the concrete experience that “[p]hysical size typically correlates with physical strength, and the victor in a fight is typically on top”. Zaliznjak (2006: 344) corroborates this metaphorical interpretation for Russian *u-*: “The main metaphorical meaning is an extension of movement downward, motivated by the idea of the victory of the subject over the object, bringing the latter into a state of subordination to the subject”.¹¹ Specialized Perfectives with this meaning denote ‘persuade’ (*ugovorit’*), ‘calm down’ (*upokoit’*), and ‘regulate, take under control’ (*uladit’*). These verbs share a change in a gradable property that can be conceptualized as involving a vertical dimension, where states such as calm and sleeping are DOWN, whereas anger and wakefulness are UP.

Natural Perfectives are formed from base verbs with parallel meanings as we see in *ubajukat’* ‘lull to sleep’, and *uregulirovat’* ‘regulate, settle’, *udovol’stvovat’sja* ‘be satisfied’.

4. REDUCE

This meaning relates to the MORE IS UP; LESS IS DOWN METAPHOR, motivated by the concrete experience that “[i]f you add more of a substance or of physical objects to a container or pile, the level goes up” (Lakoff and Johnson 1980: 15-16). In addition to *ubyt’* ‘decrease’, Specialized Perfectives often refer to cutting and truncation, as in *urezat’* ‘cut off/down’ and *useč’* ‘cut off, truncate’, as well as processes that lead to reduction as in *usochnut’* ‘dry up’.

Natural Perfectives are formed from base verbs indicating reduction in light (*ugasnut’*) or sound (*umolknut’*). Note there is some overlap between 3. CONTROL and 4. REDUCE in that both can imply calming, which is a reduction of force.

5. HARM

¹¹ The original formulation is: “glavnoe perenosnoe značenie, realizujuščee metaforu dviženija vniz, formiruetsja ideeju pobedy sub”ekta nad ob”ektom, privedenija ego v podčinennoe sub”ektu sostojanie”. The translation is ours.

The relevant metaphor here is GOOD IS UP; BAD IS DOWN (Lakoff and Johnson 1980: 16), and for many verbs this meaning is related to 4. REDUCE via reduction in functionality. Several of the Specialized Perfectives denote killing (*ubit'(sja)*) or dying (*umeret'*); others include exhaustion (*utomit'(sja)*) and reproach (*ukorit'*).

Harm is the meaning that attracts the largest number of Natural Perfectives, with base verbs denoting a range of destructive activities, such as *utonut'* 'drown', *uvjanut'* 'wither', *udušit'* 'strangle'.

6. PERCEIVE

This meaning is connected to the prototype via metaphor according to which percepts or mental activities are directed away to a specific object. This can include various domains of sense perception as in *ugljadet'* 'spot (with eyes)' and *učujat'* 'smell', or can be more general as in *ulovit'* 'detect', or combine perception with conception, as in *uznat'* 'recognize'.

The Natural Perfectives reflect a similar range of perceptual and/or conceptual experiences focused on an object, as in *uvidet'* 'see', *uslyšat'* 'hear', and *urazumet'* 'comprehend'.

7. PLACE/FIT

This meaning involves putting something or someone away, in a container or in a more settled state, where the object is under better control and may also be less accessible. *Uložit'* 'pack away, put to bed' combines all of these characteristics and can refer to both objects and people. Clear parallels are found in *uleč'sja* 'lie down', *usadit'* 'seat', and *ustroit'(sja)* 'arrange, settle down', where the latter also involves organizing and setting things up so that all the needed pieces are in place, as we see in phrases like *ustroit' syna v universitet* 'get one's son into university' and *ustroit'sja na rabotu* 'get a job'. Note that such phrases entail the directional use of the accusative case, emphasizing the movement toward a destination.

There are two Natural Perfectives where the base verbs reflect this meaning: *upakovat'* 'pack up' and *ukomplektovat'* 'complete with all necessary parts'. The latter is closely related to *ustroit'(sja)* 'arrange, settle down'.

Upakovat' 'pack up' can be classified as both 7. PLACE/FIT and 9. COVER COMPLETELY,

since in addition to 'pack up' it has the closely related meaning 'wrap, cover with'; compare the former meaning in 2) with the latter in 3):

2) *Instrumenty upakovany v special'nyj čemodančik, ich udobno chranit', da i vo vremja raboty ničego ne poterjaetsja.* [Tat'jana Bulgakova. Cvetočnaja "kosmetička" (2003)]

'The instruments are packed into a special case, where they are conveniently stored, and thus nothing gets lost while work is going on.'

3) *Nekotorye žurnaly prodajutsja isključitel'no upakovannymi v cellofan.* [Kot v cellofanovom meške (2002)]

'Some magazines are only sold wrapped in cellophane.'

8. KEEP/SAVE

There is a metonymic relationship between 7. PLACE/FIT and 8. KEEP/SAVE, in that the latter verbs refer to a static state that can result from a dynamic act of placing or fitting such as *ukorenit'sja* 'take root'. *Usidet'* 'remain sitting' is thus a static version of *usadit'* 'seat' cited under 7. PLACE/FIT. Both meanings imply a force that is directed away, opposing some activity, thus holding something back. This meaning is additionally connected to the lack of access entailed by movement away, as in *umolčat'* 'remain silent about'.

Both static positions and secrecy are reflected also in the Natural Perfectives, as we see in *uvjaznut'* 'be stuck' and *utait'* 'conceal, keep secret'.

9. COVER COMPLETELY

An object that is covered completely is not visible and thus has moved away from the sphere of accessibility. This metaphorical movement establishes a link to the prototype, and the verb *upakovat'* 'pack away, cover completely' highlights the link between 9. COVER COMPLETELY and 7. PLACE/FIT, as described above. Here we find Specialized Perfectives denoting the placing of objects on others, such as *uvešat'* 'cover by hanging objects', *usypat'* 'cover by strewing', and *ukryt'* 'cover up, give shelter'.

In addition to *upakovat'* in its 'wrap' meaning, there is the Natural Perfective *ukutat'* which also means 'wrap'.

10. DEPART FROM NORM

In this meaning, a norm is a standard that one “moves away” from metaphorically. The Specialized Perfectives form two groups, one containing factitive verbs, and the other with verbs denoting an exceptional act. The factitive verbs have, in addition to a verbal base, an adjectival, nominal or numeral base and mean ‘make X Y or Yer’ or ‘subject X to Y’ (Townsend 1975, 143-144). Verbs in this group describe taking something further along on some scale and thus farther away from where it started. These include verbs such as *uravnjat* ‘make equal’, and *udvoit* (*sja*) ‘double, reduplicate’. Exceptional acts involve being more clever than usual, as in *uchitrit* *sja* ‘manage to, contrive to’ and the synonymous *umudrit* *sja*; see example 4).

4) *Andrej Nikolaevič poobedal v bufete, uchitrivšis’ koe-to prikupit’ dlja doma.* [Anatolij Azol’skij. Lopušok Novyj Mir 1998]
 ‘Andrej Nikolaevič ate lunch in the buffet, and managed to buy something to take home too.’

The Natural Perfectives in this meaning also include both factitives, such as *ustaret* ‘grow old, become obsolete’ and *umnožit* ‘multiply, increase’, and exceptional acts like *učudit* ‘act in a strange way’.

3.1.2 V- INTO¹²

55 SPs + 2 NPs = 57 total

| |
|--|
| 1. INTO SP (55) <i>vvesti</i> ‘bring in, lead in’ NP (2) <i>vkolot</i> ‘(col.) inject’ |
|--|

Figure 4: Radial Category for the prefix v-

1. INTO

The prefix v- has a minimal radial category, with only one member. Specialized Perfectives prefixed in v- can be built from verbs of motion, such as *vbežat* ‘run into’ and *vletet* ‘fly into’, and a number of verbs denoting activities that can be used to effect insertion, such as *vstavit* ‘insert’, *vpisat* ‘insert in text’, and *vlepit* ‘stick in’. Base verbs that involve manipulation of substances acquire the added meaning of absorption and mixing when prefixed in v-, as in *vpitat* ‘absorb’,

¹² This interpretation of v- is adapted from Kuznetsova 2010b.

vsosat 'absorb', *vlit'(sja)* 'pour into', and *vmešat'sja* 'mix into'. Metaphorical uses include perception verbs in which the prefixed verb indicates that one has entered deeply into something with one's senses or one's mind, as in *vslušet'sja* 'listen attentively to', *vsmotret'sja* 'look closely at', and *vdumat'sja* 'ponder'. Getting involved with other people is expressed by verbs like *vvjazat'sja* 'get involved', *vlit'sja* 'join' and *vmešat'sja* 'intervene'.

One Specialized Perfective deserves special mention: *vrubit* 'turn on'. This verb is related to the word *rubil'nik* 'knife switch', a lever with a handle that opens and closes an electric circuit. It looks like a knife and is inserted into a slot to close a circuit. This noun first appears in the RNC in the 1920s, and is used with the verb *vključit*. The metonymic leap from 'cut in' to 'turn on' comes somewhat later, and is attested from the 1960s in examples like 7):

7) *Kto-nibud', kto poblíže, vrubite zvuk!* [Boris Levin. *Inorodnoe telo* (1965-1994)]
 'Someone who is closer, turn on the sound!'

There are only two Natural Perfectives formed with *v*-. One is associated with the base verb *kolot* in its meaning 'inject', producing *vkolot* 'inject', where we see a parallel with the verbs referring to insertion among the Specialized Perfectives. The other Natural Perfective is *vputat'(sja)* 'involve (get involved, get mixed up in)', which follows the model of the verbs of involvement noted above.

3.2 Prefixes where Natural Perfectives show nearly complete semantic overlap
 The range of meanings for five of our ten prefixes revealed by Specialized Perfectives is slightly larger than the range of meanings found in the base verbs that form Natural Perfectives. These five prefixes are: *raz*-, *ot*-, *pri*-, *vz-/voz*-, *vy*-, and *iz*-. The latter two, *vy*- and *iz*-, have a special relationship as near-synonyms and share a single radial category. For this reason they are treated together in one section.

3.2.1 *Raz*- APART¹³

¹³ The analysis here is entirely parallel to that in Janda & Nessel 2010, except that the radial category has been condensed somewhat in order to standardize the presentation across all ten prefixes. In the present article, we combine the

152 SPs + 75 NPs = 227 total

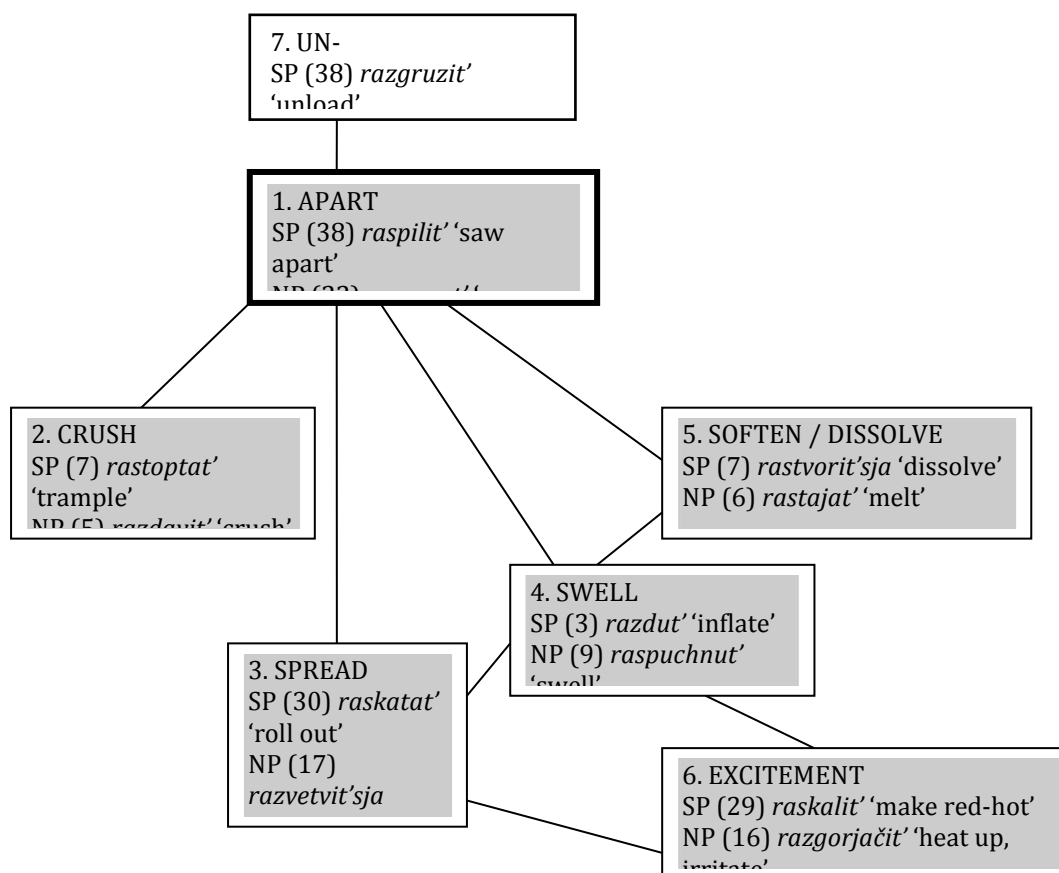


Figure 5: Radial Category for the prefix *raz-*

1. APART

In the prototype we find Specialized Perfectives formed from motion verbs: *raznesti* 'deliver to different places, disperse', *razvezti* 'deliver to different places by vehicle', *razojtis'* 'walk away in different directions', and *razletet'sja* 'fly off in different directions'. Movements that can be used to scatter things are also recruited, as in *razmetat'* 'scatter' (from *metat'* 'throw'), *razobrat'* 'take apart' (from *brat'* 'take') and *razoslat'* 'distribute' (from *slat'* 'send'). Verbs of cutting, breaking, and shaking disrupt the integrity of an object, and thus can be enhanced by the APART meaning, as in *raspilit'* 'saw apart', *rastreskat'sja* 'crack apart', and *rasšatat'* 'shake loose'. We also find here verbs that refer to behaviors that people typically engage in when parting, such as bowing *rasklanjat'sja* 'exchange bows on leaving' and saying good-bye *rasproščat'sja* 'take final leave'.

following meanings distinguished in Janda & Nessel 2010: SPREAD and METAPHORICAL SPREAD > SPREAD; EXCITEMENT, METAPHORICAL EXCITEMENT, and INGRESSIVE > EXCITEMENT; and UN- METAPHORICAL UN- > UN-.

The base verbs that form Natural Perfectives in this meaning encode destructive acts that necessarily result in the dispersal of multiple pieces, as in *razbit* 'break', *razdrobit'(sja)* 'crumble', *razorvat'(sja)* 'explode', *rasporot'(sja)* 'rip apart', and *rastoloč* 'pulverize'.

2. CRUSH

2. CRUSH is metonymically related to 1. APART in that the internal structure of an object is destroyed and in the process the edges of the object may move apart. Here we find Specialized Perfectives built from verbs denoting actions such as hitting *razdolbat* 'crush by hitting', stamping *rastoptat* 'trample', and bombing *razbombit* 'bomb flat'.

By contrast, the Natural Perfectives are formed from base verbs that directly denote crushing, in *razdavit* 'crush' and *razmjat* 'crush', and flattening, as in *rasplastat* 'flatten' and *raspljuščit* 'flatten'. There is additionally a generalized verb of crushing in this group: *razgromit* 'destroy'.

3. SPREAD

3. SPREAD is related to both 1. APART and 2. CRUSH in that the edges move apart, but in this meaning there is no destruction. A number of Specialized Perfectives in this group are built from verbs that involve manipulation of liquids, spreadable substances, or cloth, as in *razlit'(sja)* 'spill (of liquids)', *rassypat'(sja)* 'spill (of dry substances)', *razmazat* 'smear all over', *raskrasit* 'paint all over', *raskatat* 'roll out (dough)', and *rasstelit* 'spread out (a cloth)'. Other actions can yield discontinuous spreading, as in *razbrosat* 'throw in different directions' and *razrastis* 'spread by growing'. Metaphorical uses include the spreading of information, as in *razreklamirovat* 'publicize all over' and *raspisat* 'enter figures into an accounting book, elaborate on a description with details', and generalized elaboration and development, as in *razrabotat* 'work out, elaborate' and *razvit'(sja)* 'expand, develop'.

Natural Perfectives likewise show both concrete and metaphorical uses. There are base verbs that entail concrete spreading, as in *razvetvit'sja* 'branch out' and *rasplodit'(sja)* 'multiply'. *Rassortirovat* 'sort' works in both a concrete sense (physical objects can be put in different piles) and a metaphorical one

(arrangement according to conceptual categories); *rasklassificirovat'* 'classify' is primarily metaphorical. Similarly, *rastranžirit'* 'squander money in various places' can involve real movement of real money, whereas *rastrezvonit'* 'spread the word' deals metaphorically with the spreading of information.

4. SWELL

4. SWELL is similar to 3. SPREAD, but specifies a three-dimensional expansion. This meaning is likewise visible in both concrete Specialized Perfectives, like *razdut'(sja)* 'inflate', as well as metaphorical ones, like *razžit'sja* 'get rich'.

Natural Perfectives have base verbs that involve swelling, fattening, or surface expansion of objects, as in *raspuxnut'* 'swell', *rastolstet'* 'get fat', and *raspušit'* 'make fluffy'. There is also a metaphorical expansion in terms of wealth in *razbogatet'* 'get rich'.

5. SOFTEN/DISSOLVE

In this meaning a substance loses its internal cohesion, and expands or is distributed. Specialized Perfectives here include verbs like *razmjat'jsa* 'soften up (by kneading)', *razmyt'* 'erode', and *rastvorit'sja* 'dissolve'.

Parallel meanings are found in the base verbs that form Natural Perfectives, as in *razmjaknut'* 'soften', *rastajat'* 'melt', and *rasplavit'(sja)* 'liquefy (by heating)'.

6. EXCITEMENT

6. EXCITEMENT is motivated by metonymic links to both 3. SPREAD and 4. SWELL since excitement tends to spread (as in neural systems) and things that are excited often swell (most substances expand when heated). This meaning often has an ingressive flavor. Specialized Perfectives with concrete meanings tend to involve heating, as in *razogret'* 'warm up' and *raskalit'* 'make red-hot'. Metaphorical uses tend to refer to human emotions and associated behaviors, as in *razveselit'sja* 'cheer up', *razvolnovat'sja* 'get upset', and *rasplakat'sja* 'burst into tears'.

A small group of Natural Perfectives is more concrete: *razb/veredit'* 'irritate' and *rasšvelit'* 'set into motion'. But the majority have base verbs that

refer to human emotions and behaviors, such as *rassmešit* ‘make someone laugh’, *rassedit'(sja)* ‘make (become) angry’, and *raskajat'sja* ‘repent’.

7. UN-

This meaning is related to the prototype because “undoing” is a kind of taking APART. Many Specialized Perfectives are built from base verbs that mean putting things together, a process which is thus reversed in examples like *razvjazat'(sja)* ‘untie’, *razlepit* ‘unglue’, and *raz"edinit* ‘disconnect’, which represent reversals of *svjazat'(sja)* ‘tie’, *zalepit* ‘glue’, and *soedinit* ‘unite’. Other Specialized Perfectives refer to more generalized types of undoing, such as *razgruzit* ‘unload’ and *rasšifrovat* ‘decipher’. Metaphorical uses involve a new perspective, as in *razdumat* ‘change one’s mind’ (“un-thinking” previous thoughts) and *rasxotet'(sja)* ‘stop wanting’; or finding a solution (“undoing” a problem), as in *razgadat* ‘solve a puzzle’. *Rasslyšat* ‘catch (hearing)’ and *rassmotret* ‘discern (visually)’ are parallel to *rasšifrovat* ‘decipher’ in that they involve extracting information encoded in channels of perception.

7. UN- is the only meaning of *raz-* that lacks Natural Perfectives and it is easy to see why. In a Natural Perfective, the base verb and the prefixed perfective have the same lexical meaning. In this meaning, *raz-* creates prefixed perfectives that have the opposite meaning of the base verbs. This clash makes it impossible to form Natural Perfectives from *raz-* in this meaning.

3.2.2 Ot- DEPART

94 SPs + 23 CAPs + 58 NPs = 175 total

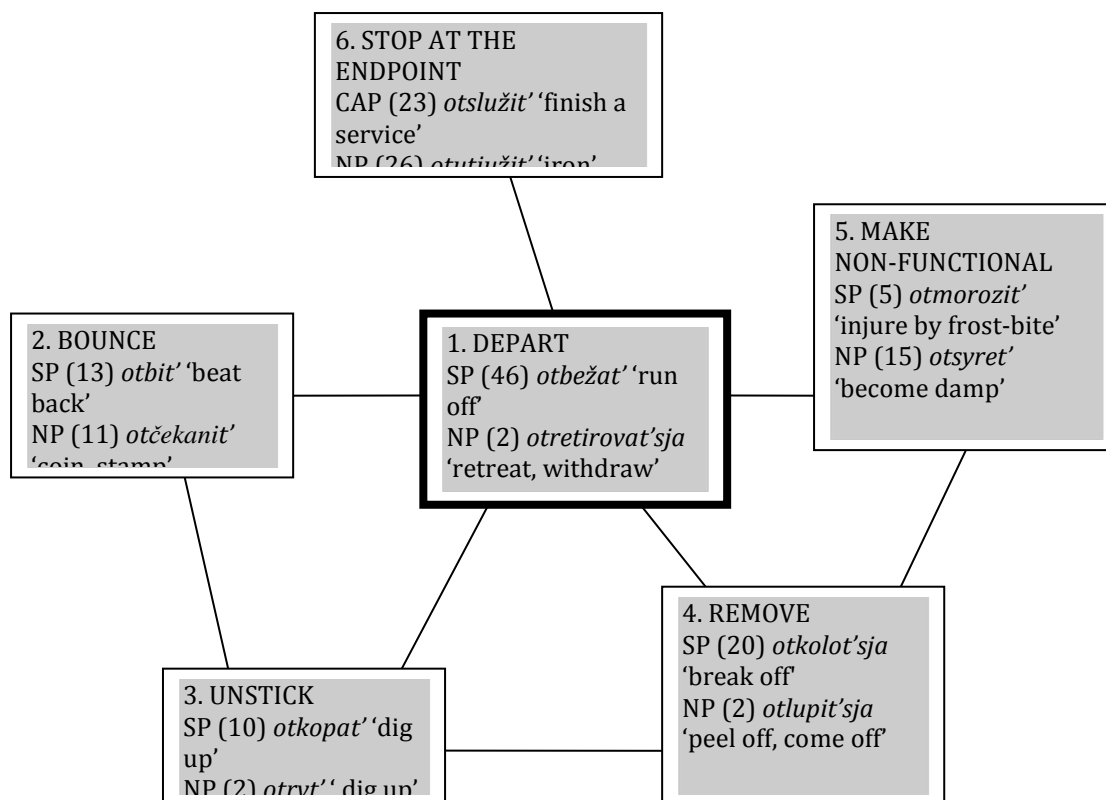


Figure 3: Radial Category for the prefix *ot-*

1. DEPART

Unlike *u-*, *ot-* does not specify that the trajector moves beyond the range of accessibility. *Ot-* instead focuses on the first stage of moving away, which the label DEPART is meant to emphasize. The prototype is well-represented among motion verbs, as we see in *otojti* 'step away from', *otletet'* 'take off (flying)', and *otplyt'* 'set sail, swim off', as well as in the generalized verb *otbyt'* 'depart'. Other kinds of motions are also possible, as in *otmesti* 'sweep aside', *otklonit'(sja)* 'deflect', and *ottjanut'* 'pull away'. Many of these verbs admit metaphorical uses, as in *otmesti* 'reject', *otklonit'(sja)* 'decline, reject', and *ottjanut'* 'delay', and some verbs have only metaphorical uses, as in *otgovorit'* 'dissuade', which has no spatial basis. Standing one's ground to beat off competitors is likewise part of this meaning, as in *otbit'(sja)* 'defend against, repulse' and *otstojat'* 'defend, stand up for'. Two verbs denote growing in situations where the outer edge of something growing departs from the point of origin: *otrasti* 'grow out' and *otrastit'* 'let grow out'.

Pulling away is the meaning we see in the base verb of the Natural Perfective *otretirovat'sja* 'retreat, withdraw'. The other Natural Perfective,

otparirovat' 'parry (defensive move in fencing)', is parallel to *otbit'(sja)* 'defend against, repulse', with the difference of course in that the meaning of defense and repulsion are already in the base verb *parirovat'* 'parry', whereas *bit'* only means 'beat'.

2. BOUNCE

This meaning presupposes a situation or stimulus that the activity denoted by the verb interacts with. This interaction can involve literally bouncing off of something or an impression that is created by contact, or a more metaphorical reaction. Both *otletet'* and *otbit'* as Specialized Perfectives can appear in the concrete meanings of bouncing here, with the former referring to an object like a ball bouncing off of a wall, and the latter having a similar but more general meaning. *Otpečatat'sja* 'be imprinted' is an example of how contact and then removal from contact can leave an impression. More metaphorically we see Specialized Perfectives like *otblagodarit'* 'show gratitude to', *otplatit'* 'pay back', and *otrabotat'* 'work off (a debt)', along with the more general verb *otozvat'sja* 'respond'.

Natural Perfectives come in two groups, one focused on imprinting or shaping, as in *otčekanit'* 'stamp a design (as in a coin)' and *otlit'* 'cast (in metallurgy, as in a bell or cannon)', and another group of reaction verbs, such as *otreagirotvat'* 'react', *otsaljutovat'* 'salute', and *ot(o)mstit'* 'take revenge'.

3. UNSTICK

Like 2. BOUNCE, 3. UNSTICK often makes a presupposition, this time in terms of a previous action that is undone, freeing an object from a fixed position or state. We see this in terms of concrete Specialized perfectives such as *otvjazat'(sja)* 'untie', uncover', *otvintit'* 'unscrew' and *otperet'* 'unlock', which presume previous actions of tying, screwing and locking, all of which put objects in a fixed position. Metaphorically one can also unlock mysteries with *otgadat'* 'solve by guessing'. Low temperature can freeze things in a fixed state, which is undone by warming things up, as in *ottajat'* 'thaw out' and *otogret'sja* 'warm up to normal'.

No Natural Perfectives are attested in this submeaning.

4. REMOVE¹⁴

This meaning is closely related to both 1. DEPART and 3. UNSTICK, but differs from them in that here the trajector is a part of the landmark. The Specialized Perfectives can be grouped according to whether the part is an identifiable piece of something or a portion of a mass. Pieces can be removed by tearing (*otorvat'(sja)*), breaking (*otkolot'(sja)*), and chopping (*otrubit'*), and there is a generalized verb as well: *otdelit'(sja)* 'detach'. The sampling of masses can involve liquids and foods, as in *otkačat'* 'pump out', *otpit'* 'take a sip of', *otvedat'* 'taste (food)', or can be more generalized, as in *otmerit'* 'measure out some of', or metaphorical, as in *otsledit'* 'notice by regular observation' (where the mass is information).

Two Natural Perfectives belong here due to the meanings of their base verbs: *otlupit'sja* 'peel off' and *otčerenkovat'* 'remove a piece of a plant (in order to graft it to another).'

5. MAKE NON-FUNCTIONAL

This meaning involves action that goes so far that it renders the trajector non-functional. With the prefix *ot-*, such excessive actions involve beating and changes of state, both of which cause damage. The Specialized Perfectives in this meaning include two that refer to beating, *otbit'* 'beat up' and *otdelat'* 'beat up', plus three that involve changes of state: *otležat'* 'make numb by lying', *otsidet'* 'make numb by sitting', and *otmorozit'* 'injure by frost-bite'.

Thirteen of the fifteen Natural Perfectives in this meaning refer to beating, such as *otdubasit'* 'beat up with a cudgel', *otstegat'* 'whip', and *otšlepat'* 'smack'. This group includes one verb of verbal attack: *otrugat'* 'curse someone out'. There are two Natural Perfectives that denote changes of state, both can be glossed as 'be damaged by moisture': *otsyret'* and *otvolgnut'*. 6) illustrates this meaning:

6) *Ja vstal, čuvstvuju tjažest' namokšej odeždy. Spički otsyreli. Den'gi tože.* [Sergej Dovatov. Zapovednik (1983)]

¹⁴ This meaning is analogous to the SEVER meaning identified by Janda (1986, 205-207) for *ot-*. Note also that 5. MAKE NON-FUNCTIONAL is identified as EXCESS in Janda 1986.

'I stood up and felt the weight of my water-soaked clothing. My matches were ruined by the damp, and so was my money.'

6. STOP AT THE ENDPOINT

This meaning is a metaphorical extension of the prototype 1. DEPART: it denotes a "departure" from an activity that a person was preoccupied with for some time (referred to as CLOSURE in Janda 1986). Since the meaning of the prefix involves placing an endpoint on an activity, we find Complex Act Perfectives here like *otcvesti* 'finish blossoming', *otslužit* 'finish a tour of duty', and *otvoevat* 'finish fighting'. Perfectives derived from non-determined motion verbs (cf. Janda 2010) are also found here: *otletat* 'stop flying after a given period', *otchodit* 'stop walking, finish attending meetings/concerts, etc.'

The Natural Perfectives in this meaning form two groups. The first group involves applying corrections or improvements to an object, and this activity ceases when all the changes are done. These include verbs like *otremontirovat* 'repair' and *otredaktirovat* 'edit'. A more concrete group of verbs denote a change that is applied to the surface of an object, as in *otštukaturit* 'plaster' and *otpolirovat* 'polish'. These activities cease when the entire surface has been treated.

3.2.3 *Pri-* ARRIVE¹⁵

89 SPs + 13 CAPs + 24 NPs = 126 total

¹⁵ This interpretation of *pri-* is adapted from Kuznetsova 2010c.

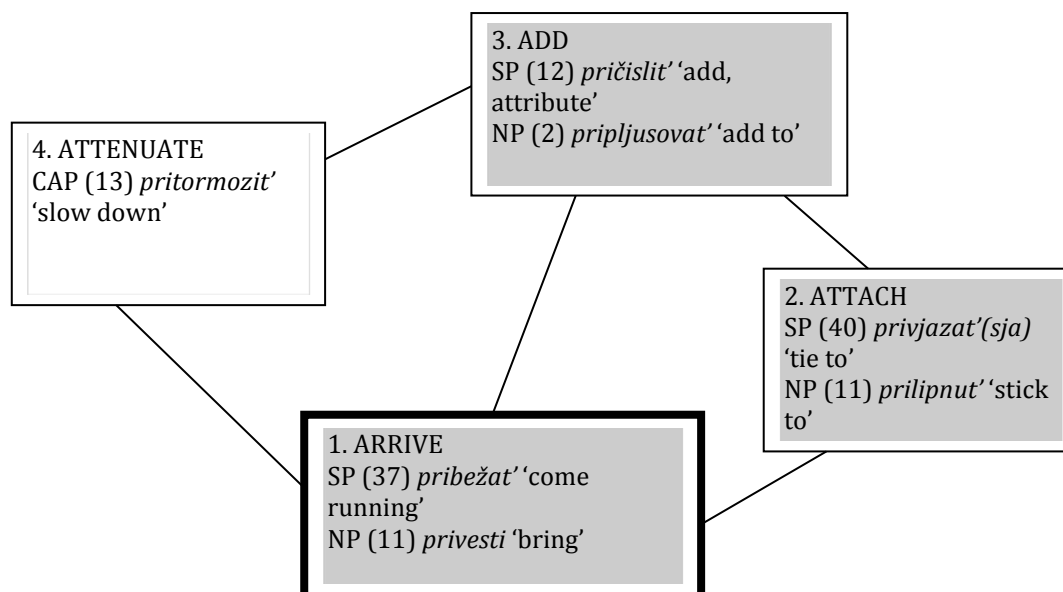


Figure 6: Radial category for the prefix *pri-*

1. ARRIVE

The prototype is dominated by Specialized Perfectives formed from motion verbs, such as *pribežat'* 'arrive running', *priletet'* 'arrive flying', and *prinesti* 'bring (carrying)'. A generalized verb of this type is *pribyť* 'arrive'. Other movements are also possible as in *primčat'sja* 'rush to a place', *prislat'* 'send to a place', *privleč'* 'drag to a place', as well as requests that yield arrival, as in *priglasit'* 'invite'. Metaphorical arrivals can include thoughts as in *pridumat'* 'think up', causes as in *pričinit'* 'cause', and bringing something into an orderly state as in *pibrat'* 'tidy up' (the latter is also connected to verbs involving pressing and smoothing in 2. ATTACH). A subgroup of Specialized Perfectives denotes the bringing of perception or attention to something, as in *prismotret'sja* 'focus on an image', *prislusat'sja* 'listen with attention, heed', and *primetit'* 'notice'.

Two Natural Perfectives in this meaning denote motions: *priblizit'sja* 'approach' and *privesti* 'bring (leading)'. Several are metaphorical and focus on the arrival of dreams as in *prisnit'sja* 'appear in a dream', as well as orderly states as in *prigotovit'sja* 'prepare, cook'. One Natural Perfective belongs to the perception/attention subgroup: *pricelit'sja* 'aim'.

2. ATTACH

This meaning differs from 1. ARRIVE in that something becomes fixed in place as a result of the activity. Both usually share the expectation that the trajectory (the

item that arrives or is attached) is relatively smaller in some way than the landmark (place of arrival or site of attachment). Attachment can be concrete, as in the Specialized Perfectives *privintit* 'screw onto', *prikleit* 'stick onto', and *prikovat* 'forge onto', and there are generalized verbs for this meaning such as *pridelat* 'attach' and *prikrepiť* 'fasten to'. Attachment can be achieved by pressing, as in *pritisnut* 'press against' and *prižat'sja* 'press to, nestle up to', and pressing can have secondary effects as in *prigladit* 'press to make smooth' and *prigret* 'press to warm up'. *Privjazat'sja* can be interpreted both concretely as 'get tied onto', but more often metaphorically as 'become emotionally attached to, pester'. Other metaphorical Specialized Perfectives include *priznat'sja* 'confess' (in which one attaches guilt), and *prigovorit* 'sentence' (in which punishment is attached).

Concrete Natural Perfectives in this meaning have base verbs that involve attachment or clinging, as in *prilipnut* 'stick to', *prišvartovat'(sja)* 'moor to' and *pril'nut* 'cling to', as well as one verb with a secondary purpose: *primerit* 'try on', where placing clothing against the body makes it possible to determine whether they fit. Metaphorical uses include *prilaskat'(sja)* 'snuggle up to, become emotionally attached to', *primirit'(sja)* 'reconcile' (attach peace to), and *prisovetovat* 'advise' (attach advice to a specific person).

3. ADD

This meaning is close to both 1. ARRIVE in that something is brought to something else and to 2. ATTACH in that the item that is brought is smaller, thus constituting an addition to a larger whole. Concrete Specialized Perfectives include *priložit'(sja)* 'put, add' *pristroit'(sja)* 'build on', *pričislit* 'number, add', and there is a generalized verb for this meaning: *pridat* 'add'. *Pripisat* can mean both 'add more writing' and 'attribute' (the latter closer to 2. ATTACH). Note also the verb *pripasti* 'increase supplies'.

The two Natural Perfectives in this meaning are *pripljusovat* 'add to' and *pritorgovat* 'buy something extra for somebody' (note the parallel with *pripasti* 'add to supplies').

4. ATTENUATE

The idea of something smaller that is apparent in both 2. ATTACH and 3. ADD motivates this meaning, which involves a smaller amount of an activity. In a sense, prefixed verbs in this meaning parallel the role of diminutives (cf. Makarova in progress). This meaning is actually more clear and pervasive when derived from perfective base verbs such as *priotkryt'* 'open a bit' and *priostanovit'* 'stop (for) a bit'.¹⁶ Examples of Specialized Perfectives with imperfective base verbs in our database include verbs involving sounds such as *priglušit'* 'muffle a bit', *primolknut'* 'become a little silent', *pritchnut'* 'calm down a bit'. Other verbs in this meaning refer to small reduction in intensity, such as *prismiret'* 'become a little quiet, submissive', *pritormozit'* 'brake slightly', *pritupit'* 'blunt slightly'.

No Natural Perfectives are formed in this meaning, which is reasonable since simplex verbs in Russian do not express attenuation and thus *pri-* in the ATTENUATE meaning cannot overlap with the meaning of a simplex verb.

3.2.4 Vz-/voz- MOVE UPWARD¹⁷

54 SPs + 45 NPs = 99 total

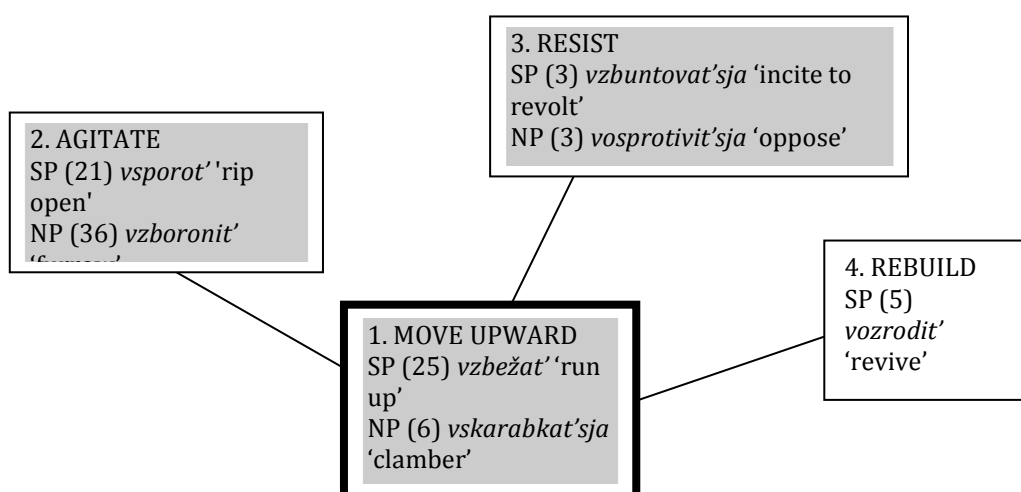


Figure 7: Radial category for the prefix *vz-/voz-*

¹⁶ But recall that Specialized Perfectives with perfective bases were removed from our database in order to make it parallel to the prefixed Natural Perfectives formed from imperfective base verbs, cf. 2.2.1 above.

¹⁷ This analysis is adapted from Baydimirova & Sokolova 2010. It is also inspired by and compatible with Gallant 1979.

In this article we treat *vz-* and *voz-* as a single prefix, though *voz-* is often associated with a higher register due to its Church Slavonic origins.¹⁸

Etymologically both *vz-* and *voz-* come from the same Indo-European source **ud-* ‘up’, which yielded *vъz-* (Vasmer 1976 v. 1, 214), subsequently realized as *vz-* in Russian (since no roots begin with a *jer*). Artificial Church Slavonic pronunciation of *voz-* in places where Russian had only *vz-* introduced Church Slavonicisms into the language (Thomas 1969, xx). In modern Russian we find that *vz-* and *voz-* share a single radial category in all meanings and this justifies treating them together as allomorphs.

1. MOVE UPWARD

Again we find motion verbs among the Specialized Perfectives in the prototypical meaning: *vzbežat’* ‘run up’ and *vzletet’* ‘fly up’, along with more generalized verbs for upward motion: *vzobrat’sja* ‘climb up’ and *vozvysit’sja* ‘raise, elevate, rise’. A metonymic meaning is found in *vzvesit’* ‘weigh’, since weighing involves an upward movement, either in the hand or when adding weights to the other side of the scale causes the item being weighed (which hangs on the scale) to rise. Metaphorical uses appear in the domain of nurturance and status, as in *vospitat’* ‘raise, bring up’, *vozvesti* ‘elevate (e.g. to the throne)’, *vostoržestvovat’* ‘celebrate, triumph’, and *vostrebovat’* ‘call for, demand’ (here we have high register verbs).

Natural Perfectives are entirely parallel, with base verbs that denote climbing upward, as in *vzgromozdit’sja* ‘tower, clamber up’ and *vskarabkat’sja* ‘climb up’, upbringing in *vzleljat’* ‘foster’ and *vozmužat’* ‘reach maturity’, and status in *vospet’* ‘praise eulogize’ and *vospol’zovat’sja* ‘make use of’ (high register verbs).

2. AGITATE

In this meaning agitation is applied to the upper part of the landmark, namely the surface, often invoking domains of either landscape surfaces (water and soil)

¹⁸ In considering *vz-* and *voz-* to be a single prefix, we follow Townsend (1975, 123). By contrast, Isačenko (1960, 149), Švedova et al. (1980, 357-358), and Vinogradova (1984, 24-26) list *vz-* and *voz-* as two prefixes that differ in register. The question of whether *vz-* and *voz-* are allomorphs of a single morpheme or separate prefixes is taken up in more detail in Baydimirova in progress.

or human surfaces (skin and hair). 2. AGITATE is connected to 1. MOVE UPWARD in two ways, via the upper surface and metaphorically since agitation involves raising the energy level. Concrete Specialized Perfectives are formed from a range of base verbs involving breaking, tearing, and taking apart, as in *vzbit'* 'shake, fluff, whip up', *vzorvat'sja* 'explode', *vzломат'* 'break open (e.g. a lock)', *vsporot'* 'rip open', and *vskryt'(sja)* 'open, unseal'. Metaphorical uses belong to the domains of sounds and emotions: *vskričat'* 'exclaim', *vostrubit'* 'blow a trumpet (announcing an event)', *vozbudit'* 'awaken, arouse', *vozljubit'* 'come to love', *vspylit'* 'fly into a rage'.

Natural Perfectives are plentiful in this meaning. In concrete domains they are built from base verbs that specify the stirring up of various substances and objects, such as soil in *vspachat'* 'plow', liquids in *vzmutit'* 'make turbid, stir up' and *vspenit'* 'make frothy', hair in *vz"erošit'* 'tousle', and skin in *vspuchnut'* 'swell up'. Emotional agitation is found in verbs like *vzvolnovat'(sja)* 'disturb, worry', *vzbodrit'* 'cheer up', and *vzbesit'(sja)* 'infuriate, go mad'.

3. RESIST

Raising resistance has a metaphorical vertical dimension, and thus a connection to the prototype. Specialized Perfectives include *vozderžat'sja* 'abstain from' and *vozzrazit'* 'raise an objection'.

Natural Perfectives in this meaning have base verbs that directly encode resistance, as we see in *vosprotivit'sja* 'resist' and *vosprepjatstvovat'* 'hinder'.

4. REBUILD

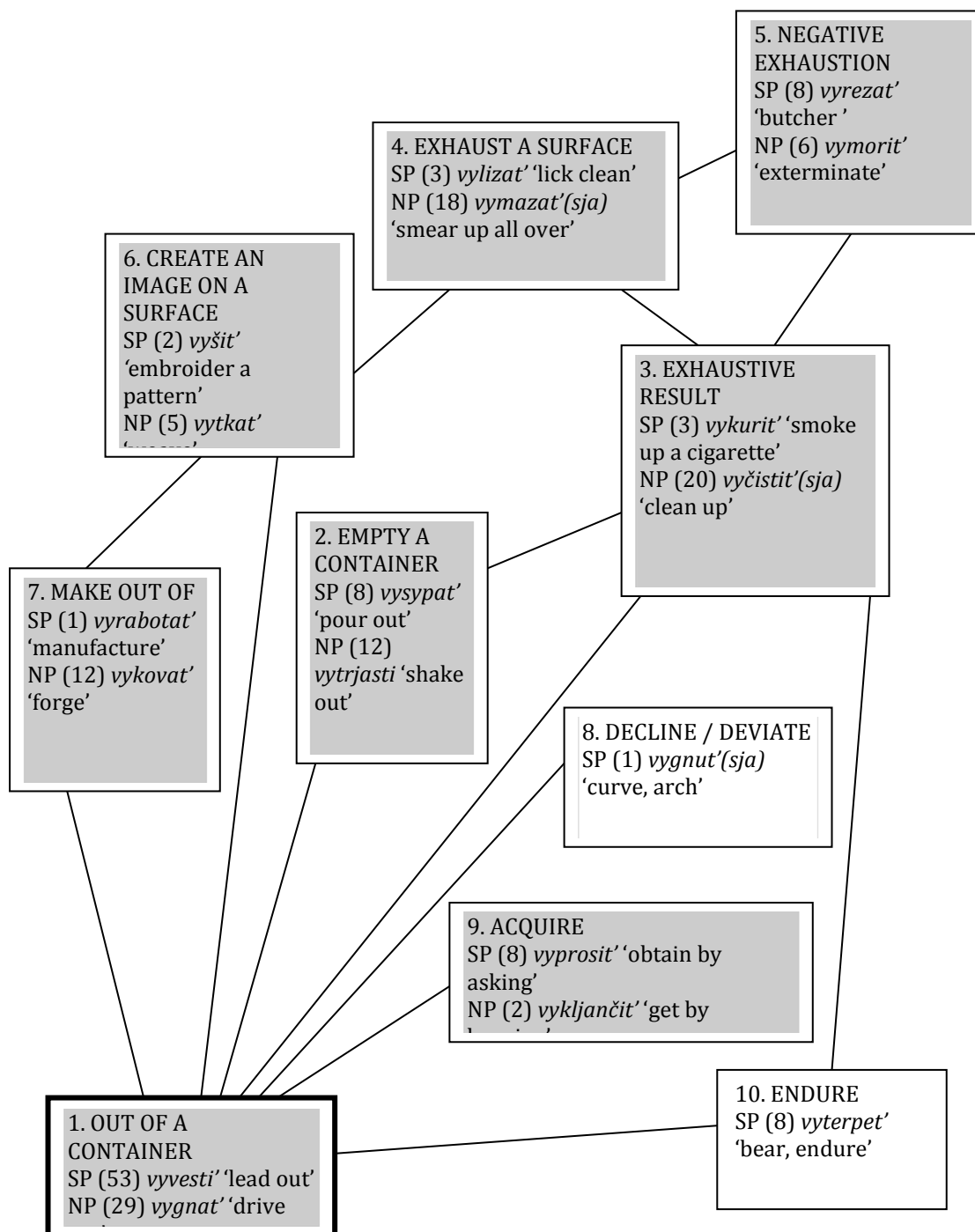
This meaning refers to a presupposed situation in which something was ruined, destroyed, or lacking, such that a new round of activity is undertaken to revive, restore, or fill out what was missing. There are five Specialized Perfectives here: *vozrodit'* 'revive', *vosstanovit'* 'restore, renew', *vspomnit'(sja)* 'recall to mind', *vozvratit'* 'return, give back', and *vospolnit'* 'make up for'.

This meaning is incompatible with simple perfectivization since it involves not one action, but a comparison between an original action and a new one, and no Natural Perfectives are found here.

3.2.5 Vy- and iz- OUT OF A CONTAINER

vy-: 95 SPs + 104 NPs = 199 total

iz-: 38 SPs + 39 NPs = 77 total

Figure 8: Radial category for the prefix *vy-*

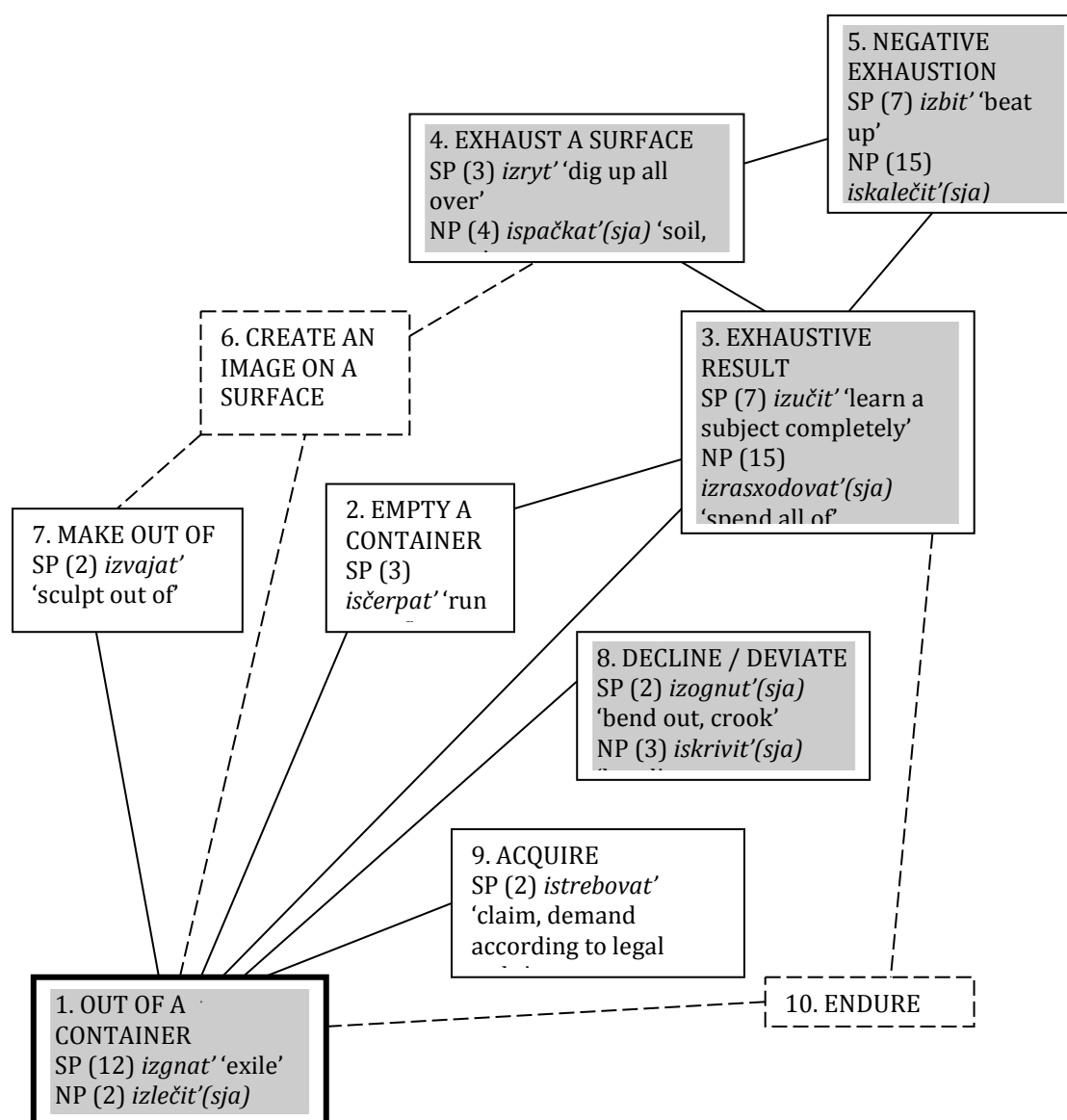


Figure 9: Radial category for the prefix *iz-*

As Nessel, Baydimirova, and Janda (in press) have shown, *vy-* and *iz-* share a single radial category, so it makes sense to examine them together. Scholars often identify *iz-* as a Church Slavonic variant of the native Russian *vy-* (Berneker 1924, 440; Vasmer 1976 v. 1, 473; Townsend 1975, 125; Dem'janov 2001, 336). However longitudinal studies show that spatial meanings of *iz-* have over time been transferred to *vy-* (Dadavaeva 1978), and that some meanings of *iz-* (specifically exhaustiveness) cannot be attributed to Old Church Slavonic influence (Belozercev 1966). In other words, the two prefixes have co-evolved, influencing each other. Of course *iz-* is not entirely a borrowed element in Russian, and both *vy-* and *iz-*-prefixed verbs collocate with the preposition *iz* in a variety of meanings, as in *vygnat' iz doma* 'chase out of the house' vs. *izgnat' iz*

strany ‘banish from the country’ and *vylepit’ iz gliny* ‘model out of clay’ vs. *izgotovit’ iz dereva* ‘manufacture out of wood’. Though these four examples show that both prefixes can express concrete meanings, *vy-* tends to be more concrete as opposed to *iz-*, which is often more abstract, as in *vylit’ vodu* ‘pour out water’ vs. *izlit’ gnev* ‘pour out/express anger’.

The notion of a container is crucial for both prefixes and thus deserves elaboration. A prototypical container is a bounded three-dimensional space, such as a building someone exits (*vyjti iz zdanija* ‘exit a building’), or a vessel someone empties (*vypit’ stakan* ‘drink up a glass’). Metaphorically states often behave as containers as well, as in *vylečit’* ‘cure’, in which a person exits a state of illness.

In each subsection we follow the usual order, first looking at the Specialized Perfectives for both *vy-* and *iz-*, then comparing them with the Natural Perfectives for both verbs (where they exist). Figures 8 and 9 depict the same radial category for the two prefixes. In Figure 8 we see that *vy-* inhabits the entire radial category, though Natural Perfectives are not attested for meanings 8. DECLINE/DEVIATE and 10. ENDURE. While *iz-* shares the same radial category, it does not utilize all of the meanings. Two meanings, 6. CREATE AN IMAGE ON A SURFACE and 10. ENDURE are missing from the *iz-* inventory and these are represented by dotted lines and nodes that lack examples. Additionally three meanings do not have associated Natural Perfectives: 2. EMPTY A CONTAINER, 7. MAKE OUT OF, and 9. ACQUIRE.

1. OUT OF A CONTAINER

Though both prefixes are found in this meaning, *vy-* predominates, and the prototypical meaning corresponds to that suggested by Botvinik (2009) and Dobrušina and Paillard (2001): the trajector moves from a more close, restricted, less visible space to one that is more open, less restricted and more visible. Specialized Perfectives with *vy-* and *iz-* in this meaning express movement out of a container, be it concrete, as in *vyvoloč’* ‘drag out’ and *izvleč’* ‘extract, take out of’, or metaphorical, as in *vydumat’* ‘think up’ (where an idea emerges from a mind) and *izvinit’(sja)* ‘excuse’ (where one gets out of guilt). The determined stems of motion verbs are prominent among *vy-*-prefixed Specialized Perfectives, as we see in verbs like *vybežat’* ‘run out’, *vyletet’* ‘fly out’ and eight others.

However determined stems are rare among *iz*-prefixed verbs, with only two in this meaning, *izgnat* 'banish' and *izbežat* 'avoid'.

Both prefixes form Natural Perfectives in this meaning, but all of them are metaphorical, referring to nurturing (causing something to emerge in a mature state), healing (out of the state of illness), and more generalized change. Here are some examples: *vypoit* 'bring up an animal', *vyrastit* 'cultivate, bring up', *vylečit'(sja)* 'cure', *izlečit'(sja)* 'cure', *izmenit'(sja)* 'change'.

2. EMPTY A CONTAINER

This meaning adds the nuance that the container is emptied as a result of the action. Both prefixes form Specialized Perfectives in this meaning. Some verbs belong primarily to concrete domains, such as *vyteč* 'flow out' and *vycarapat* 'scratch out', some can refer to both concrete and metaphorical actions, like *isčerpát* 'run out of', and others are primarily metaphorical, like *vymučit* 'extort', *vygovorit'sja* 'say all that is on one's mind', and *izložit* 'express'. Note that *iz-* can only be used in references to the emptying of metaphorical containers.

Only *vy-* forms Natural Perfectives in this meaning and these include verbs signalling emptying both physical, as in *vypít* 'drink up', *vysmorkat'(sja)* 'blow (one's) nose', and *vydolbit* 'hollow out', and metaphorical, as in *vyrugat'sja* 'swear'.

3. EXHAUSTIVE RESULT

This meaning is a metaphorical extension of 2. *EMPTY A CONTAINER*, drawing a parallel between emptying a container and carrying out an action exhaustively. Examples of Specialized Perfectives include: *vykurit* 'smoke up a cigarette', *vyspat'sja* 'get a good night's sleep', *izorvat* 'tear all up into pieces', *istlet* 'rot, reduce to dust', *ispisat* 'write all over, using up all paper or ink', *izučit* 'learn a subject completely', *isteč* 'expire (of time)'.

Natural Perfectives are quite parallel: *vyučit'(sja)* 'learn', *vysochnut* 'dry up', *vyslušat* 'listen to all of', *iskrošit'(sja)* 'crumble up', *ispeč'(sja)* 'bake', *izraschodovat'(sja)* 'spend all of'.

4. EXHAUST A SURFACE

This meaning differs from 2. EMPTY A CONTAINER in that the focus is on the item that is emptied rather than the item that moves out. We see this clearly in example 8):

8) *Glebov netoroplivo vylizal misku.* [V. T. Šalamov. Kolmyskie rasskazy (1954-1961)]
 'Glebov unhurriedly licked the bowl clean.'

This shifts the emphasis to the change of state effected on the surface of an object. Specialized Perfectives are formed from verbs that involve various kinds of impact, as in *vytoptat'* 'trample down', *istoptat'* 'trample all over', *vyteret'* 'wipe up, rub dry', *izryt'* 'dig up all over', and *iscarapat'* 'scratch all over'.

Natural Perfectives are built from verbs more narrowly tailored to changing the surface of an object, as in *vygladit'* 'iron', *vyzolitit'* 'cover with gold', *vymazat'(sja)* 'smear all over', *izmazat'(sja)* 'smear all over', *vypačkat'(sja)* 'soil, stain', *ispačkat'(sja)* 'soil, stain'.

5. NEGATIVE EXHAUSTION

This meaning is similar to both of the previous two, but has the added nuance that the result is negatively evaluated. Specialized Perfectives are built from base verbs expressing a variety of actions that can be damaging if taken to an extreme: *vyest'* 'corrode', *vymeret'* 'die out, become deserted', *vyteret'* 'wear out', *iznosit'* 'wear out', *izvesti(s')* 'poison, waste, wear self out', *izbit'* 'beat up'.

Natural Perfectives are more narrowly focused on beating, torture, damage, and distress: *vyporot'* 'whip', *iskalečit'(sja)* 'cripple, break', *izmučit'(sja)* 'torment', *vymorit'* 'exterminate', *isportit'(sja)* 'spoil', *ispugat'(sja)* 'scare', *vyrugat'* 'scold'.

6. CREATE AN IMAGE ON A SURFACE

This meaning is motivated in various ways within the radial category. On the one hand, an image appearing on a surface as in *vyšit' uзор na rubaške* 'embroider a pattern on a shirt' is parallel to the appearance of someone who emerges before an audience as in *vyjti na scenu* 'walk out onto the stage'. Both the image and the person thus become available to perception, creating a link with 1. OUT OF A CONTAINER. This meaning is also close to 4. EXHAUST A SURFACE, but lacks the

exhaustiveness. Only *vy-* forms perfectives in this meaning, and there are only two Specialized Perfectives: *vyšít* ‘embroider’ and *vyžeč* ‘brand, make a mark by burning’.

Vy- additionally forms Natural Perfectives from base verbs that specify the making of patterns: *vygravirovat* ‘engrave’, *vytatuirovat* ‘tattoo’, *vyštamovat* ‘print or stamp an image’.

7. MAKE OUT OF

This meaning shares with the previous one the appearance of something, since once an object has been manufactured it becomes available. However, verbs in this meaning refer to the creation of entire objects, not just patterns on the surface. We have only three Specialized Perfectives in this meaning in our database: *vyrabotat* ‘manufacture’, *izgotovit* ‘make out of’, and *izvajat* ‘sculpt out of’.

Only *vy-* forms Natural Perfectives in this meaning, primarily from verbs associated with metallurgy, sculpting, sewing, and woodwork: *vykovat* ‘forge’, *vylepit* ‘mould’, *vystročit* ‘sew on a sewing machine’, *vytočit* ‘make on a lathe’.

8. DECLINE/DEVIATE

This meaning is directly connected to the prototype via a parallel between a container and a position. In the collocation *vygnut’ spinu* ‘stretch out, curve one’s back’ the back moves “out” of its original position. Two other Specialized Perfectives are formed with *iz-*, one in the concrete domain, *izognut’(sja)* ‘bend out, crook’, and one in the domain of behavior, *izlovčit’sja* ‘do something cunning’.

Only *iz-* forms Natural Perfectives in this meaning, and all refer to bending or distortion: *iskoverkat* ‘distort, mangle’, *iskrivit’(sja)* ‘bend, distort’, *iskorežit’(sja)* ‘bend, warp’.

9. ACQUIRE

In this meaning *vy-* and *iz-* express getting things out of others, in a variety of ways. Specialized Perfectives include: *vyigrat* ‘win’, *vyprosit* and *isprosit* ‘obtain

by asking', *istrebovat'* 'claim, demand according to legal right', *vychlopotat'* 'obtain after much trouble'.

Only *vy-* forms Natural Perfectives in this meaning, and there are only two of them, *vykljančit'* and *vycyganit'*, both of which mean 'obtain by begging'.

10. ENDURE

This is another metaphorical extension from 1. OUT OF A CONTAINER in which the trajector moves out of one state to get to another one. Only *vy-* builds verbs in this meaning, all such verbs are Specialized Perfectives, and they all involve waiting or suffering through something until one "comes out on the other side": *vyždat'* 'wait for the right time', *vyderžat'* 'endure', *vystradat'* 'suffer through'.

Although *vy-* and *iz-* inhabit the same radial category and overlap in nearly all meanings in that category, they have very different centers of gravity. The majority of *vy-* prefixed verbs, both Specialized and Natural Perfectives, are found in meanings 1 and 2, which refer to removal of items from containers. By contrast, *iz-* prefixed verbs are found predominantly among the continuum of meanings (3, 4, 5) connected with exhaustion. *Iz-* combines with overall fewer verbs and is absent in two of the ten meanings: 6. CREATE AN IMAGE ON A SURFACE and 10. OVERCOME.

3.3 Prefixes where Natural Perfectives show partial semantic overlap

3.3.1 *Pere-* TRANSFER¹⁹

125 SPs + 7 NPs = 132 total

¹⁹ There is a Church Slavonic variant of this prefix, namely *pre-*, but since it does not form any Natural Perfectives, we do not consider it here.

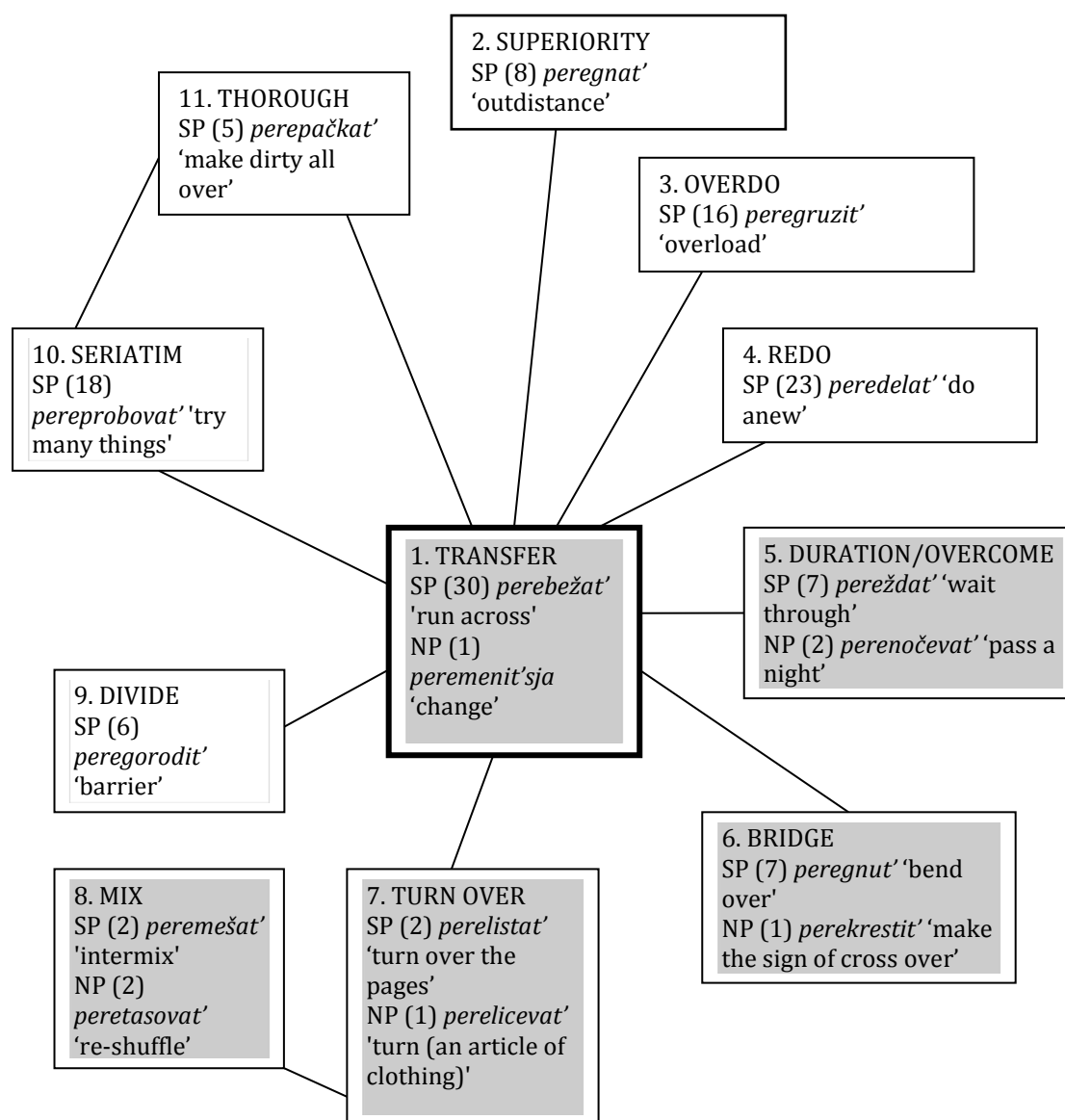


Figure 10: Radial category for the prefix *pere-*

The prototypical meaning of *pere-* is TRANSFER, expressing movement from one point to another, often with an intervening barrier, such that the movement is usually conceived of as an arc. Meanings 2-4 involve comparison with another performance that is exceeded, yielding SUPERIORITY, OVERDO, and REDO. In the DURATION/OVERCOME meaning (5), the barrier is a time period. Meanings 6-8 represent variations on the arched movement of transfer, realized as BRIDGE, TURN OVER (for a single object), and MIX (for substances or collections). If the action involves cutting, going from one point to another creates a DIVIDE (9). Meanings 10-11 involve distribution of an action across either a number of items, SERIATIM, or across a single object or mass, THOROUGH. Many Specialized Perfectives prefixed in *pere-* have multiple interpretations representing more

than one meaning. For example, *переварить/pere-varit'* (*варить/varit'* 'cook') can mean 'overcook' in the OVERDO meaning, 'cook again' in the REDO meaning, and 'digest' in the DURATION/OVERCOME meaning.

While there are many Specialized Perfectives prefixed in *pere-*, only a handful of Natural Perfectives use this prefix. Still, we find systematic overlap here, as indicated by the shading in boxes 1 and 5-8. The Natural Perfectives are found in the prototypical meaning, plus the cluster of meanings involving time (DURATION/OVERCOME) and the arched path of BRIDGE, TURN OVER, and MIX. Natural Perfectives are missing in the meanings that involve comparisons and certain kinds of quantification, consistent with the pattern we have seen among the prefixes in the previous section.

1. TRANSFER²⁰

The prototype meaning TRANSFER involves movement of the trajector from one place to another, proceeding over a vertical object as in *perelezt'* (*čerez zabor*) 'climb over (a fence)', across a boundary as in *perenesti* (*čerez porog*) 'carry over the threshold', or from one side to the other of a horizontal space as in *perejti* (*ulicu*) 'cross (a street)'. Focus can be shifted from crossing a barrier or boundary to simple change in physical location, as in *perevesit' kartinu* 'move a painting to a different place (on a wall)'. Motion verbs are strongly represented among Specialized Perfectives, as in *perebežat'* 'run across, cross running' and *pereletet'* 'fly over', as are other movements, as in *perekočevat'* 'migrate over' and *pereselit'(sja)* 'move, resettle'. Metaphorically, 1. TRANSFER can refer to "movement" to a new format, as in *pererabotat'* 'convert into' and *perevesti* 'translate'.

There is only one Natural Perfective in this meaning, denoting metaphorical TRANSFER: *peremenit'sja* 'change, become different'.

2. SUPERIORITY

This meaning "compares the trajector's performance with that of another agent" (Janda 1986, 148), and here crossing the boundary means going beyond the

²⁰ 1. TRANSFER collapses the meanings of TRANSFER and OVER in Janda 1986; likewise 6. BRIDGE collapses BRIDGE and BEND.

compared performance, hence superiority. Specialized Perfectives of this type include both concrete actions, like *peregnat* 'outdistance, leave behind' and *perekričat* 'outshout', and more abstract ones such as *pereborot* 'master' and *perechitrit* 'outwit'.

No Natural Perfectives are formed in this meaning.

3. OVERDO

The boundary that is crossed in this meaning is a standard performance, such that the result is something that is done too much, as in *perepolnit* 'overfill' and *peregruzit* 'overload', or too long, as in *peresidet* 'sit too long' and *pererabotat* 'work too long'. A number of cooking verbs appear among the Specialized Perfectives in this meaning, such as *peresolit* 'oversalt' and *perevarit* 'cook too long'.

No Natural Perfectives are formed in this meaning.

4. REDO

This meaning is close to metaphorical uses of 1. TRANSFER. Janda (1986, 153) describes it thus: "the product of an action (landmark) is either repaired or changed fundamentally". A wide variety of base verbs are used to build Specialized Perfectives in this meaning, as we see in these examples: *perezvonit* 'call again', *perepisat* 'rewrite', and *peredumat* 'rethink, change one's mind'. We also find the generalized verb *peredelat* 'redo'.

No Natural Perfectives are formed in this meaning.

5. DURATION/OVERCOME

5. DURATION/OVERCOME is a metaphorical realization of 1. TRANSFER in the domain of time. Here "the landmark is a period of time during which the trajector pursues a given activity" (Janda 1986, 143). Specialized Perfectives in this meaning include verbs like *pereždat* 'wait through', *perežit* 'live through', *perebolet* 'recover (at the end of an illness)', and *perespat* 'spend the night (sleeping)'.

Two Natural Perfectives are associated with this meaning, and both encode a time period directly in the base verb: *perenočevat* ‘spend the night’ and *perezimovat* ‘spend the winter’.

6. BRIDGE

In this meaning, the trajector is placed or shaped so that each end corresponds to one end of the landmark. As a result the trajector bridges or covers the landmark. We find four concrete Specialized Perfectives in this meaning:

perekryt ‘close, cut off, dam (a river)’, *peregnut* (*sja*) ‘bend over’, and *perebintovat* and *perevjazat*, both of which mean ‘put a bandage across’.

Metaphorical uses belong to the domain of communication, in which the action is often reciprocal, as in *peregovorit* ‘discuss, talk over (the phone)’, *peredraznit* ‘tease, mimic’, and *perezvonit* ‘call back’.

Only one Natural Perfective is associated with this meaning:

perekrestit (*sja*) ‘make the sign of the cross over’.

7. TURN OVER

In this meaning the trajector and landmark coincide, such that when one end is moved to another place, the whole object is turned around (see Figure 11, adapted from Janda 1986, 170-171).

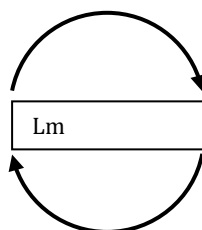


Figure 11: *pere-* 7. TURN OVER

Two Specialized Perfectives were found in this meaning: *perelistat* ‘turn over pages’ and *perekosit* ‘warp, distort’.²¹

There is one Natural Perfective in this meaning: *perelicevat* ‘turn inside out (of clothing)’.

²¹ Note that a common Specialized Perfective in this meaning, *perevernut* ‘turn over’, was not included in this study because it has a perfective base (see 3.0).

8. MIX

8. MIX is entirely parallel to 7. TURN OVER, except that here verbs refer to the manipulation of multiple objects or masses instead of a single item. Thus by moving one portion from one place to another, the group or mass gets mixed. Two Specialized Perfectives in this meaning are *peremešat'(sja)* 'intermingle, shuffle' and *pereplestis'* 'interweave'.

The two Natural Perfectives that pertain to this meaning are *pereputat'(sja)* 'entangle' and *peretasovat'* 'shuffle (cards)'.

9. DIVIDE

9. DIVIDE is related to 1. TRANSFER in that the action is one of cutting or partitioning rather than mere movement. Specialized Perfectives in this meaning include *pererezat'* 'cut off', *perelomit'* 'break in two, fracture', and *peregorodit'* 'partition off'. Note that *perebit'* can be used both for a concrete break as in *perebilo nogu* 'broke someone's leg', as well as metaphorically in the meaning 'interrupt'.

No Natural Perfectives are formed in this meaning.

10. SERIATIM

In relation to the prototype, here we see that "the landmark [LM] is multiplied a finite number of times. The set (LM₁, LM₂, ...LM_n) represents all of a series of objects, each of which is subjected to the action of the verb. The landmarks are dealt with one after the other and these separate units are summed up as one large landmark, all of which has been affected" (Janda 1986, 161). This meaning is very productive, with Specialized Perfectives built from a wide variety of base verbs, as in *perebit'* (*vse tarelki*) 'break (all the dishes)', *pereigrat'* (*vo vse igry*) 'play (all the games)', *perečitat'* (*vse knigi*) 'read (all the books)', *pererezat'* 'slaughter all of', *perestreljat'* 'shoot all of, use up all ammunition'.

No Natural Perfectives are formed in this meaning.

11. THOROUGH

11. THOROUGH is related to 10. SERIATIM in that the landmark is conceptualized as a single mass rather than a series of objects. Here we see Specialized Perfectives

such as *perepačkat'* 'make dirty all over' and *perepugat'(sja)* 'frighten thoroughly'.

No Natural Perfectives are formed in this meaning.

3.3.2 *Pod-* APPLY TO BOTTOM²²

67 SPs + 12 CAPs + 5 NPs = 84 total

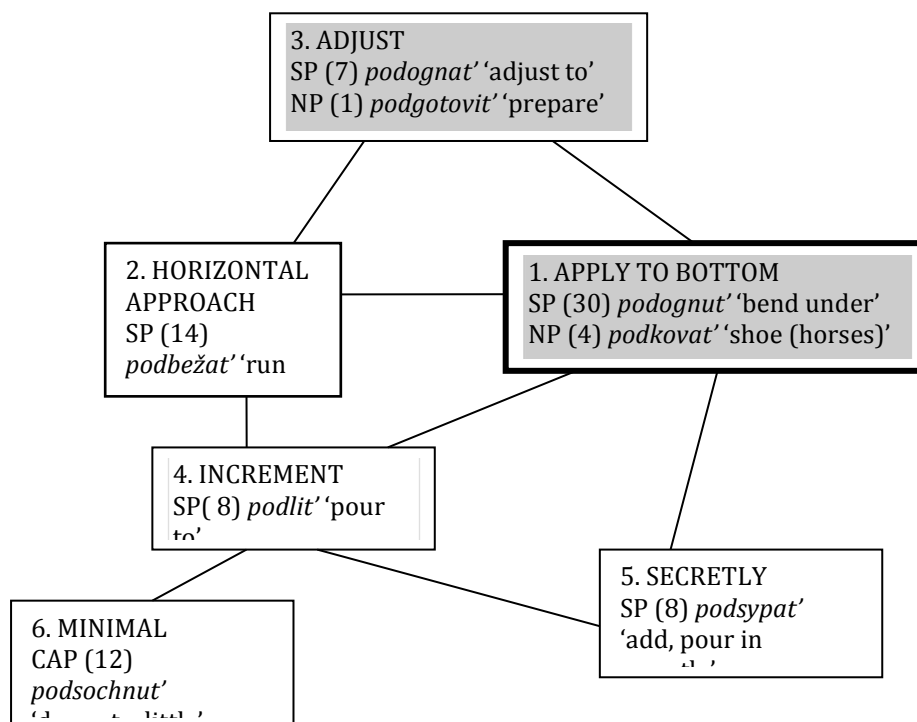


Figure 12: Radial category for the prefix *pod-*

1. APPLY TO BOTTOM

The prototypical meaning encodes a movement at the bottom of a landmark that is more salient and usually much larger than the trajector. Specialized Perfectives in this meaning are built from a variety of base verbs, as we see in this sample: *podbit'* 'beat from underneath (repair a sole; bruise)', *podperet'* 'prop up', *podšit'* 'sew underneath, line, sole', *podžeč'* 'set fire to', *podstavit'* 'place under', *podsvetit'* 'light from beneath', and *podpisat'(sja)* 'sign'. Only two motion verbs are common in this meaning, namely *podpolzti* 'creep up under' and *podvesti* 'place at the bottom', the latter of which is used primarily in collocation

²² Overall this analysis of *pod-* is compatible with that presented in Plungjan 2001.

with *itog* 'sum', *čertu* 'line' and *liniju* 'line', which go at the bottom of accounting sheets and other documents. The motion verbs are more attracted to 2.

HORIZONTAL APPROACH, though there is evidence of a gradual transition between the meanings, as noted in the next subsection. Metaphorically 1. APPLY TO BOTTOM can refer to the domains of control, as in *podčinit'(sja)* 'place under the command of, subordinate to', and danger, as we see in the metaphorical use of *podstavit'* in 9):

9) *On dumaet, izobretaet, kak by poxitree zamanit' vas v lovušku, podstavit' pod udar, ispol'zovat' vašu ošibku.* [Vladimir Vojnovič. Ivan'kiada (1976)]
'He's trying to come up with a clever way to draw you into a trap, to expose you to danger [lit: place you under a blow], take advantage of your mistake.'

Alternatively this meaning can be extended metaphorically to social and emotional support. *Podderžat'* 'support' serves in both concrete and metaphorical uses, while several other verbs express mainly metaphorical uses: *podbodrit'* 'cheer up', *podkrepit'(sja)* 'support, fortify (oneself)', *podtverdit'* 'confirm, corroborate'.

Natural Perfectives in this meaning are built from base verbs that refer specifically to actions that apply to the bottoms of things, namely *podkovat'* 'shoe (a horse)', *podmesti* 'sweep (a floor)', and *podytožit'* 'sum up'. There is also one Natural Perfective representing the domains of emotional and social support: *podfartit'* 'bring luck, get lucky'.

2. HORIZONTAL APPROACH

In this submeaning the vertical dimension present in 1. APPLY TO BOTTOM is absent, but the relative salience of the landmark as opposed to the trajector remains. It is perhaps not surprising that most of the motion verbs are found here, since human motion mostly takes place in reference to the surface of the earth. The predominance of this meaning for motion verbs leads Shull (2003, 85) to call *pod-* a "generalized Goal proximity prefix indicating motion toward", lacking reference to any vertical dimension, cf. Apresjan et al. (2010, 314) who liken *pod-* to *ot-* as a prefix of proximity. However, in an analysis of over four thousand examples attested in the RNC of motion verbs prefixed in *pod-*, Baydimirova 2010b, found that while 92% of them are of collocations with the prepositional

phrase *k* + Dative (indicating merely motion toward), 8% of attestations are with the preposition *pod* + Accusative (indicating a vertical movement).²³ We therefore recognize a gradual transition between the two meanings, with 1. APPLY TO BOTTOM exemplified in 10) and 12), and 2. HORIZONTAL APPROACH in 11) and 13), using the same verbs and destinations:

10) *I oni podošli k dubu vozle Ežikinovo kryl'ca.* [Sergej Kozlov. *Kak Ežik s Medvežonkom spasli Volka*// "Murzilka", No 11, 2003]
'And they walked up to the oak tree next to Hedgehog's porch.'

11) *...razdalsja glas s veršiny kudrjavoj jabloni, i my podošli pod samoe derevo.* [V. T. Narežnyj. Bursak (1822)]
'...a voice was heard from the top of the bushy apple-tree, and we walked up under/to the bottom of that same tree.'

12) *Margarita zažmurilas', i č'ja-to ruka podnesla k ee nosu flakon s beloju sol'ju.* [M. A. Bulgakov. *Master i Margarita* (1929-1940)]
'Margarita screwed up her eyes, and someone's hand brought a vial with smelling salts to her nose.'

13) *Zavedujuščaja morščilas', kak budto ej podnesli pod nos kakuju-to drjan'...* [Tat'jana Mospan. *Podium* (2000)]
'The manager grimaced, as if someone had brought a piece of trash up to her nose...'

Eleven motion verbs form Specialized Perfectives in this meaning, plus three others: *podozvat* 'call up to, beckon', *podkrast'sja* 'sneak up to', and *podtjanut* 'pull up to'.

No Natural Perfectives are formed in this meaning.

3. ADJUST

The proximity of a smaller trajector to a larger landmark can be exploited in another way. The larger (or simply more salient) landmark can serve as a standard against which the trajectory is compared for the purposes of checking for a match and making adjustments. We see this in Specialized Perfectives such

²³ Baydimirova 2010b analyzed 4125 examples of *pod*-prefixed motion verbs. 3813 (92%) were collocated with *k* + Dative, while 312 (8%) were collocated with *pod* + Accusative. An additional 12 attestations of use with *pod* + Instrumental were found, but this constitutes less than 1% of the total.

as *podojti* 'match, fit', *podobrat'(sja)* 'select', *podognat'* 'adjust to fit to', *podygrat'* 'play into someone's hand', and *podstroit'(sja)* 'adjust (oneself) to, fit to'.

One Natural Perfective expresses this meaning: *podgotovit'(sja)* 'prepare, get ready for'.

4. INCREMENT

This meaning takes the comparison between the smaller trajector and the larger landmark in another direction. Here the trajector effects a small increase, as in the following Specialized Perfectives: *podlit'* 'pour an additional amount', *podsolit'* 'add more salt to', *podsadit'* 'fit in extra people (in addition)', *podstroit'* 'add on (e.g. a porch to a house)', *podkrasit'* 'tint, touch up (make up)', and *podrabotat'* 'earn additionally'.

No Natural Perfectives are formed in this meaning.

5. SECRETLY

The lower salience of the trajector in this meaning is interpreted as secrecy or underhanded behavior. Specialized Perfectives in this meaning refer to clandestine and/or dishonest behaviors. In the sensory realm we have two verbs for secret collection of information: *podslušat'* 'eavesdrop on' and *podsmotret'* 'spy on'. Two more verbs are used for stirring up trouble: *podbit'* and *podgovorit'*, both of which can be translated as 'incite'. *Podstroit'* can be used to mean 'play a trick on', and *podoslat'* here means 'send on a secret mission'. There is also a verb that can be used in a generalized way for this meaning: *poddelat'* 'fake, forge'.

No Natural Perfectives are formed in this meaning.

6. MINIMAL

Here we find only Complex Act Perfectives which are somewhat similar to the Specialized Perfectives in the 4. ATTENUATE meaning for *pri-*. The smaller trajectory here represents an action with minimal impact or realization below a standard of comparison, as in *podstrič'* 'trim', *podtajat'* 'thaw a little', *podmerznut'* 'get a little frozen', *podportit'* 'spoil slightly', and *podoždat'* 'wait for a little while'.

No Natural Perfectives are formed in this meaning.

3.4 Summary of analysis

This study is based on two databases of perfective verbs formed via prefixation of ten prefixes. The data is aggregated from standard reference sources and the RNC. The first database contains all attested Natural Perfectives, in which the prefixes are traditionally considered “empty”. The second database contains Specialized and Complex Act Perfectives found in the RNC. To calibrate for differences in type and token frequency, the second database retained only verbs with a frequency of over 100 in the Modern Subcorpus of the RNC (approximately equivalent to the average median frequency of Natural Perfectives). The meanings added by each prefix in the Specialized and Complex Act Perfectives were analyzed to discover radial categories. These radial categories were then compared with the meanings of the base verbs that form Natural Perfectives with the same prefixes. In all ten cases we see that the two radial categories coincide. For two prefixes, all meanings found among Specialized and Complex Act Perfectives with a given prefix are also reflected in the base verbs that form Natural Perfectives with that prefix. Six prefixes show this type of overlap in all but one of their meanings, and two prefixes show overlap in a smaller part of the radial category. The prototypical meaning is also found among the base verbs of Natural Perfectives in all ten cases. In the two cases where we observe the least overlap, namely *pere-* and *pod-*, the meanings that are associated with Natural Perfectives are not randomly distributed, but form a contiguous subset of the radial category.

We see some strong overall patterns. For one, Specialized Perfectives built from determinate motion verbs seem to cluster at the prototypical meanings, at least in their concrete uses. This is true for all prefixes except *iz-* and *pod-*. In the case of *iz-* one could argue that the prototype is actually elsewhere in the radial category, namely in meanings 3, 4, and 5 which focus on exhaustive actions. Motion verbs are strongly represented in the second meaning for *pod-*, 2. HORIZONTAL APPROACH, and this is probably motivated by the fact that human movement is gauged according to the earth’s surface, and therefore predominantly horizontal. At any rate, motion verbs have a special relationship to the prototype for most prefixes, and this comports well with Janda’s (2008;

2009) finding that motion verbs play a prototypical role in the Russian aspectual system.

The meaning “colors” of the prefixes emerge from the analysis and this helps to distinguish prefixes that might at first glance appear similar. For example, *u-*, *ot-*, *raz-*, and *vy-/iz-* all have meanings that might be glossed as ‘away’, but each prefix brings its own “hue” to the notion of separation. *U-* takes us ‘away’ to a place that is beyond the horizon of accessibility, below it in a sense, and also more controlled. *Ot-* does not go so far, focusing only on the initial stage of departure, removal of contact. *Raz-* assumes that the ‘away’ movement is distributed among many trajectories or parts thereof or that it is a metaphorical movement ‘away’ from a previous state. *Vy-* is more focused on emergence from a container in which going ‘away’ often makes things more accessible and the container empty; this is also possible for *iz-*, but here we see more focus on the metaphorical implications of emptying, namely exhaustion. *V-*, *pri-*, and *pod-* can describe motion ‘to’, but *v-* proscribes entry into a container, *pri-* is more general or external, and *pod-* emphasizes the lower salience and smaller size of the trajector with respect to the landmark. Both *raz-* and *vz-/voz-* can refer to excitement or agitation, but *raz-* does so in the context of outward movement motivated by swelling and spreading, whereas for *vz-/voz-* the motivation is upward, to the upper surface. Like *vz-/voz-*, *pod-* can refer to a vertical dimension, but *pod-* comes from beneath and focuses on the difference in salience between the trajector and the landmark. *Pod-* and *pri-* both have a diminutive “tint”, in that they can both refer to doing something just a little bit, and they are very close, but *pri-* suggests a reduction in intensity. Four different prefixes can be used to describe the focusing of perception: *u-* does so by directing the subject’s attention “away” toward the object (*usmotret* ‘keep an eye on’); with *v-* the subject metaphorically “enters” the object of perception (*vsmotret’sja* ‘scrutinize, peer into’); *raz-* is used to perceptually “unpack” the information in the percept (*rassmotret* ‘discern, make out’); and *pri-* merely brings attention to the object (*prismotret’sja* ‘look closely at’). Numerous further comparisons could be made. The overall range of meanings in each radial category contextualizes the way each meaning “color” is interpreted with given base verbs.

Another means for examining the semantic relationships among prefixes is via prefix variation, which is present when an imperfective base verb forms two or more Natural Perfectives (see 1.3). Examples involving our ten prefixes include *lečit'(sja)* 'cure' with both *vylečit'(sja)* and *izlečit'(sja)*, and *topit'* 'heat; drown' with six Natural Perfectives, four formed with prefixes from our list of ten: *utopit'*, *rastopit'*, *vytopit'*, and *istopit'*, plus two others: *potopit'* and *stopit'*. While prefix variation is a robust phenomenon, it is neither comprehensive nor random. If we look just at binary combinations, our ten prefixes can theoretically yield $10!/(2!(10-2)!) = 45$ combinations. Twenty-two of these combinations are not attested in Russian.²⁴ Eighteen of the non-attested combinations involve the three prefixes with the lowest frequency of Natural Perfectives: *pere-* (7 NPs), *pod-* (5 NPs), and *v-* (2 NPs). Given their very low frequency, the statistically expected frequency for all combinations with these three prefixes is less than one, so their absence is not surprising. Only four other combinations are unattested: *vz-/voz-|iz-*, *vz-/voz-|ot-*, *vz-/voz-|pri-*, and *ot-|pri-*. These four combinations involve prefixes with strongly complementary meanings, opposing the 'upward' of *vz-/voz-* with the 'out' of *iz-*, the 'away' of *ot-* and the 'toward' of *pri-*, plus the clear opposites *ot-* 'away' vs. *pri-* 'toward'.

Of the combinations that do exist, among the most robust is *iz-|raz-*. There are nine verbs that can form Natural Perfectives with these two prefixes (and some can form additional Natural Perfectives with other prefixes as well), and they can be arranged in two groups:

"damage": *kromsat'* 'cut up', *krošit'(sja)* 'crumble', *mel'čit'* 'crush', *mjat'* 'crumple', *polosovat'* 'flog', *toloč'* 'crush', *trepat'* 'beat, fray';

"other": *menjat'* 'change', *topit'* 'heat'.

While many of the verbs denoting damage are nearly interchangeable with the two prefixes, *iz-* tends to focus on the intensity and undesirability of the result, while, *raz-* emphasizes the loss of wholeness. In some instances the meanings are complementary: *razmjat' (glinu)* is 'knead (clay until soft)', whereas *izmjat'*

²⁴ The non-existing combinations from our list of ten prefixes are: *v-|vz-/voz-*, *v-|vy-*, *v-|iz-*, *v-|ot-*, *v-|pod-*, *v-|pri-*, *vz-/voz-|iz-*, *vz-/voz-|ot-*, *vz-/voz-|pere-*, *vz-/voz-|pod-*, *vz-/voz-|pri-*, *vy-|pere-*, *iz-|pod-*, *ot-|pere-*, *ot-|pod-*, *ot-|pri-*, *pere-|pod-*, *pere-|pri-*, *pere-|raz-*, *pere-|u-*, *pod-|raz-*, *pod-|u-*. More details and statistics on prefix variation can be found in Janda and Lyashevskaya in press.

(*listok*) is ‘crumple (a piece of paper)’. The verbs in the “other” category are differentiated by their direct objects: compare *izmenit’* ‘change (in general)’ with *razmenjat’* (*kvartiru, storublevku*) ‘(ex)change (one’s apartment, a 100-ruble note)’, and *istopit’* (*peč’*) ‘heat up (a stove)’ with *rastopit’* (*led*) ‘melt (ice)’.

Conversely, if we focus on the meanings that do not form Natural Perfectives, a pattern emerges. Table 1 collects all of the meanings where no Natural Perfectives are attested, listing an example for each meaning established on the basis of Specialized and Complex Act Perfectives.

| Prefix | Meaning | Example | Comment |
|-----------------|------------------------|---|--------------|
| <i>raz-</i> | 7. UN- | <i>razgruzit’</i> ‘unload’ | annulment |
| <i>ot-</i> | 3. UNSTICK | <i>otvintit’sja</i> ‘unscrew’ | annulment |
| <i>pri-</i> | 4. ATTENUATE | <i>priormozit’</i> ‘slow down’ | small amount |
| <i>pod-</i> | 4. INCREMENT | <i>podlit’</i> ‘pour into’ | small amount |
| <i>pod-</i> | 5. SECRETLY | <i>podsypat’</i> ‘pour in secretly’ | small amount |
| <i>pod-</i> | 6. MINIMAL | <i>podsochnut’</i> ‘dry out a little’ | small amount |
| <i>vy-/iz-</i> | 10. ENDURE | <i>vyterpet’</i> ‘bear, endure’ | large amount |
| <i>pere-</i> | 2. SUPERIORITY | <i>peregnat’</i> ‘outdistance’ | large amount |
| <i>pere-</i> | 3. OVERDO | <i>peregruzit’</i> ‘overload’ | large amount |
| <i>pere-</i> | 10. SERIATIM | <i>preprobovat’</i> ‘try many things’ | large amount |
| <i>pere-</i> | 11. THOROUGH | <i>perepačkat’</i> ‘make dirty all over’ | large amount |
| <i>vz-/voz-</i> | 4. REBUILD | <i>vozrodit’</i> ‘revive’ | repeat |
| <i>pere-</i> | 4. REDO | <i>peredelat’</i> ‘redo’ | repeat |
| <i>pere-</i> | 9. DIVIDE | <i>peregorodit’</i> ‘divide with a barrier’ | other |
| <i>pod-</i> | 2. HORIZONTAL APPROACH | <i>podbežat’</i> ‘run up to’ | other |

Table 1: Meanings that do not form Natural Perfectives

Since *raz-* 7. UN- and *ot-* 3. UNSTICK denote annulment of an action, this meaning is clearly in conflict with the goal of forming a Natural Perfective, which should simply perfectivize the base verb. Meanings that quantify the action as being relatively small or large are also incompatible with the formation of Natural Perfectives, and note that these often involve evaluation, which is usually negative. Small amounts include *pri-* 4. ATTENUATE, *pod-* 4. INCREMENT, *pod-* 5. SECRETLY, and *pod-* 6. MINIMAL. Large amounts are signalled by *vy-/iz-* 10. ENDURE, *pere-* 2. SUPERIORITY, *pere-* 3. OVERDO, *pere-* 10. SERIATIM, and *pere-* 11. THOROUGH.

Making something happen again or restoring a former state are likewise incompatible with the formation of Natural Perfectives, as we see in *vz-/voz-* 4. REBUILD and *pere-* 4. REDO. Many of the meanings mentioned immediately above involve some kind of comparison, between a previous action that is undone or repeated or measured against, or a standard for quantity and it may be that this level of complexity, involving not just one action, but something it is compared with, is what yields the incompatibility with Natural Perfectives. The remaining two meanings are also arguably more complicated than what is needed for a Natural Perfective. *Pere-* 9. DIVIDE specifies cutting across the width of an object. *Pod-* 2. HORIZONTAL APPROACH is arguably a more complicated version of *pri-* 1. ARRIVE, in that with *pod-* the difference in salience of the trajector and landmark is also relevant. In all cases, it is hard to imagine what kind of a base verb could exist that would coincide with these meanings to the extent that a Natural Perfective could be formed.

4.0 Conclusions

Our analysis presents evidence in support of the Overlap Hypothesis, documenting which meanings of the prefixes overlap with which base verbs in Natural Perfectives. Radial category profiling facilitates a precise and consistent analysis across the ten prefixes. This methodology shows that prefix and base verb meanings overlap in forty-two of fifty-seven meanings. We have thus plentiful evidence that the prefixes are not semantically “empty”.

At the level of individual prefix meanings, the base verbs that build Specialized Perfectives are typically semantically diverse, often referring to a wide variety of actions, and also including a more generalized action built from a “default” verb like *delat* ‘do’. Natural Perfectives, by contrast, tend to focus on more specific actions that are maximally compatible with the meaning of the prefix. Meanings that are not associated with Natural Perfectives involve quantification and comparison and are thus incompatible with “pure” perfectivization.

This analysis shows that it is possible to discover the meaning “colors” of the prefixes and to show that in the case of Natural Perfectives prefixal meanings coincide with the meanings of the base verbs. Each prefix represents more than a

single point on a “color” spectrum, for they are as a rule polysemous, but they are at the same time distinct from each other. This kind of analysis respects the complexity of semantic relationships and makes it possible to both find overall patterns and detect points of interaction among the prefixes. A few of these have been highlighted in the analysis, but there is room for much more research on inter-prefixal relationships.

This study makes a positive statement about what the meanings of the prefixes are and how they interact with the meanings of verbs. This is an improvement over previous studies that either treat prefixes as abstractions (van Schooneveld 1958) or as lists (Bogusławski 1963; Švedova et al. 1980, 355-374). The method of isolating first the verbs in which prefixal meaning is tangible (among the Specialized and Complex Act Perfectives) and then examining the verbs in which prefixal meaning is camouflaged (Natural Perfectives) yields a more principled analysis than was previously achieved (Janda 1986).

The result presented in this article is a better scholarly analysis that has pedagogical implications. In the long run, it may indeed be possible to provide a semantic “color chart” of prefixes and verbs for students, making it possible for them to interpret and produce “matches” with better accuracy and attain a richer understanding of the overall system.

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