Suffix diversity : investigating the morphological landscape of Russian loan verbs

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Suffix diversity: investigating the morphological landscape of Russian loan verbs

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Abstract
This article investigates the integration of loan verbs into the Russian verbal system, focusing on the patterns of suffix distribution across loan verbs. Using a database of verbs from the frequency dictionary by Lyashevskaya and Sharov (2009), our study addresses four key questions: 1) are there suffixes that function as markers for loan verbs; 2) can different suffixes be added to the same verbal stem creating morphological variation (e.g. *aktivizirovat'–aktivirovat'* 'activate), 3) which factors determine the suffix choice in loan verbs, and 4) do loan verbs exhibit distinct patterns of suffix choice compared to verbs with Slavic bases? The findings confirm *-irova-* as a distinct marker for loan verbs, likely emerging from a combination of the native suffix *-ova-* and the German suffix *-ier-* that was consequently analyzed as a loan verb marker. The suffix *-ova-* is also highly frequent and applies to both loanwords and native stems. Morphological variation is rare, with suffixal "doublets" typically reflecting semantic differences rather than proper variation. By analyzing a comprehensive database and consulting resources on etymology and word formation, we demonstrate that the period of borrowing and the source language are decisive factors in suffix selection, while morphophonology and the part of speech of the motivating base play a supplementary role. The study reveals that loan verbs display somewhat different suffixal behaviors from Slavic verbs, including the unique morphophonological feature of combining the back vowel /u/ with the *-irova-* suffix. The proposed analysis sheds light on the morphophonological characteristics and historical development of suffixes in Russian in the context of language contact and borrowing.

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1 Introduction

In the present study, we offer a corpus-based analysis of Russian verbal suffixes with original Slavic and loan stems and the variation therein. While several works present substantial analyses of prefix variation in Russian (see Sokolova, 2009; Janda & Lyashevskaya, 2011; Janda et al., 2013; Olsson, 2021), there are no comparable studies offering a comprehensive overview of verbal suffix variation and, more specifically, the affixation patterns of loan verbs. Notable exceptions include Nesset and Janda (2010), Makarova and Janda (2009), Kuznetsova and Makarova (2012), and Nordrum (2020), who examine variation in the Russian verbal suffixes *-a-/-aj-* (*dvižet – dvigaet* 'move.3SG') and *-nu-/-anu-* (*reznut' – rezanut'* 'cut.INF'); as well as Galeev and Solovyev (2017) and Kozera-Sławomirska (2020), who focus on the variation of the suffixes *-iva-/-a-* in Russian secondary imperfectives (*izgotovljat' – izgotavlivat'* 'produce.INF'). Relevant cases of affixation in loan verbs, such as the use of the suffixes *-ova-/-irova-*, have been explored in research on biaspectual verbs (Horiguchi, 2018).

This raises a general research question: how do loan verbs contribute to the distribution of various verbal suffixes within Russian and to morphological variation? More specifically:

1) are there suffixes that function as loan verb markers;
2) are there cases where different suffixes can be added to the same verbal stem;
3) which factors determine the suffix choice in loan verbs;
4) do loan verbs display a pattern of suffix choice that differs from that of verbs with a Slavic base?

In this study, we use the term "marker" without invoking any psycholinguistic assumptions about certain suffixes aiding speakers in identifying loan verbs. Rather, the term is employed in a descriptive and structural sense, referring to the indirect consequences of language change as outlined by Gardani (2016). He identifies a developmental pathway in which an infinitive marker evolves into a loan verb marker. For instance, in German, "a number of verbs have a formative *-ier-* /iʁ/ which occupies the slot between the root and the inflections and is used either to derive verbs from nouns or to mark verbs as non-native, i.e., loan verbs" (Gardani, 2016, p. 232; see also Wohlgemuth, 2009, p. 225).

We examine three key predictors for suffix selection, i.e. motivating base, the source language of the loan verb base, and morphophonology. Furthermore, our study aims to explore how loan verbs integrate into the broader linguistic patterns of Russian, specifically examining the degree to which they conform to or deviate from native Russian verbal morphology.

As loan verbs in Russian we define verbs whose base is evidently not of East Slavic origin.[1] This broader approach has two implications: (1) the definition includes both verbs that have been directly borrowed from other languages and those derived from loan nouns or adjectives — a distinction further discussed in Sect. 4.3; and (2) the study considers all non-East Slavic stems, not only recent borrowings, in order to enable broader generalizations about the dynamics of suffix usage with borrowed bases. From a formal point of view, the borrowed base can either be followed by a Slavic verbal suffix (e.g. *organiz-**ova**-t'* 'organize') or the base is borrowed together with its verbal suffix in the source language (e.g. *baz-**irova**-t'* 'base' < German *bas-**ier**-en* 'base'). It should be noted that this study focuses on standard written Russian and does not include neologisms or recent developments in non-normative usage, which are widely attested on the Internet (e.g. *model-i-t'* 'model', *test-i-t'*

[1] In the following, "Slavic" will be used as a shortcut for "East Slavic" when discussing Slavic vs. loan stems.

'test', *ignor-i-t'* 'ignore') and which often coexist with or compete against the more established forms *model-irova-t'*, *test-irova-t'*, and *ignor-irova-t'*. While there are a few qualitative studies addressing this variation (Sokolova, 2009; Buceva & Zelenin, 2025; Björklund, 2024[2]), the material discussed here pertains primarily to more established patterns and will be followed by a separate, quantitative study of prefix variation in contemporary Internet corpora.

Based on the distribution of verbs in our corpus (for details cf. Sect. 3), we check whether such factors as the loan verb's motivating base, the source language of the loan verb base and its morphophonology are good predictors for suffix selection in loan verbs. Our study reveals that verbal suffixes behave differently in terms of their frequency with loan stems, with only *-irova-* serving as a clear loan verb marker. While none of the aforementioned factors is conclusive in the suffix selection, they nonetheless provide valuable information for distinguishing among suffix allomorphs. We show that source language is not a crucial factor on its own but can explain the suffix choice in combination with the historic time of borrowing.

The article is structured as follows. In Sect. 2, we provide an overview of relevant literature relating the present case study to a more general theoretical discussion of borrowed morphology and morphological variation. Section 3 presents the corpus data analyzed in the study and specifies our research questions. In Sect. 4 we provide the overall distribution of suffixes across Slavic and loan stems (4.1) with special focus on cases of suffix variation in our database (4.2), followed by a more detailed analysis of the three relevant factors, which potentially affect the suffix choice: motivating base in 4.3, source language in 4.4, and morphophonology in 4.5. Our findings are summarized in the concluding Sect. 5.

2 Borrowed morphology and morphological variation in inflectional languages

This study contributes to broader discussions in morphological theory by examining how borrowed elements contribute to morphological variation in Slavic languages. It brings together research on borrowed morphology (Gardani et al., 2014) and linguistic variation and competition (Rainer et al., 2019), addressing an underexplored issue: what happens when verbs are borrowed into morphologically rich, inflectional languages. While few studies focus directly on borrowed verbs in inflectional systems, the broader literature on morphological borrowing offers relevant insights. Two central areas are typically discussed: (1) borrowability scales; and (2) criteria for distinguishing borrowing from inheritance (Gardani et al., 2014, p. 16).

A recurring theme in the literature is the relative borrowability of different morphological categories. Based on cross-linguistic evidence, a tentative hierarchy of borrowability has been proposed: derivational morphology is more frequently borrowed than inflectional morphology, and within inflection, inherent categories (i.e. context-autonomous inflection such as nominal number, tense, or aspect) are more prone to borrowing than contextual ones (i.e. inflection induced by obligatory syntactic government or agreement such as nominal grammatical case or verbal person) (Gardani et al., 2014, p. 9). Among derivational affixes,

[2] "In search of Russian verbs denoting the activity of shopping: Interaction of borrowing and word formation", presentation at the *Slavic Cognitive Linguistics Conference*, Jagiellonian University in Kraków, Poland, November 13-15, 2024.

adjectivizers, diminutives, and nominalizers are especially common. This supports the long-standing view that morphological categories with more "concrete" meanings are more susceptible to borrowing.

Within verbal borrowings special attention is given to denominal verbalizers, suffixes used to derive verbs from nouns, due to their specific properties and clear semantics (see Robbeets, 2014). Positioned at the derivational end of the morphological scale, they exhibit higher borrowability than inflectional categories (Matras, 2014).

Robust criteria have been proposed to identify borrowed morphology; three are especially relevant for the present study (Robbeets, 2014, p. 139–141):

1. **Productivity restricted to shared bases**. Borrowed affixes often begin as bound elements in loanwords, become extracted, and eventually appear with native bases. This pattern is documented in English with *-ize* and *-ify*, both originally borrowed from Old French verbs ending in *-iser* and *-efier*/*-ifier* (e.g., *baptize*, *stupefy*, *sanctify*). From the 16th century onward, these affixes began to form new verbs, first from Latinate bases (e.g. *equalize*, *objectify*), and later from native ones (e.g. *womanize*, *ladify*). Nevertheless, even in present-day English, *-ize* and *-ify* still tend to attach more frequently to foreign-derived bases than to native ones.
2. **Unilateral morphological complexity**: A borrowed morpheme may remain morphologically transparent in the donor language while becoming opaque in the recipient language. For instance, the German suffix *-isier-en* and the English *-ize* both originate from the Old French denominal verbalizer *-iser*, itself derived from the Romance derivational morpheme *-is* combined with the infinitive suffix *-ier*, which marked a specific class of Latin verbs ending in *-āre* (Robbeets, 2014, p. 139; Wohlgemuth, 2009, p. 232). The relationship between these Romance and Germanic verbalizers clearly indicates borrowing, as the corresponding suffix chains exist in Romance languages but not in the Germanic ones.
3. **Functional mismatch**: When affixes appear to fulfill divergent functions across languages, this mismatch can be a sign of borrowing rather than inheritance. An example is the German suffix *-ier-en*, which appears in Middle High German texts from the 12th and 13th centuries, typically attached to loan verbs from Old French and Latin (e.g. MHG *disputieren* 'to dispute' < Latin *disputāre* 'to dispute, debate', see Wohlgemuth, 2009, p. 230). Over time, *-ier-en* developed into a productive denominal verbalizer, forming verbs from both foreign and native bases. For example, the Middle High German verb *zimieren* 'to decorate a helmet with a crest' was derived from the noun *zimier* 'helmet crest', itself a borrowing from the Old French noun *cimier*[3] with the same meaning, which lacked a corresponding verb (Wohlgemuth, 2009, p. 230). As the verb did not exist in the source language, it must have been coined within German The suffix *-ier-en* was, and to some extent still is, used to form verbs from native nouns, cf. the Middle High German *walkieren* 'to interlace tightly' from *walke* 'plait' (Robbeets, 2014, p. 141) and *buchstabieren* 'to spell' from *Buchstabe* 'the letter (of the alphabeth)' (Wohlgemuth, 2009, p. 231). In Old French, *-ier* was the infinitive suffix of one inflectional class going back to a subset of Latin verbs in *-āre* whose stem ended in a palatal, like French *traitier* 'to treat' < Latin *tractāre*. By the end of the 13th century, this inflectional class had already merged with the more common *-er* class (cf. Müller, 1986, p. 75). Despite the low frequency and consequent loss of *-ier* in French, the suffix *-ier-en* became highly productive

[3] It should be emphasized that in the noun *cimier*, *-ier* is not an infinitive suffix; the verb coinage possibly involved a reanalysis of the noun stem component *-ier-* as verbalizer in analogy to already existing verbs in *-ier-en*. Examples like this contributed to the reanalysis of *-ier-en* as verbalizer and to the increased productivity of *-ier-en* in German.

in German. This development is attributed to reinforcement from similar French forms, such as the infinitive *-ir* and the nominalizer *-ier* from Latin *-ārium*. Thus, while the French *-ier* was a rather marginal infinitive suffix, in German it was reanalyzed as a loan verb marker and verbalizer, gaining productive use across borrowed and native words. This semantic and functional discrepancy between the German and the French suffixes containing the element *-ier* supports the interpretation of *-ier-en* as a borrowed, rather than inherited, element.

Our analysis of Russian loan verbs, in general, supports these tendencies. We demonstrate that the suffix *-irova-*, which includes the borrowed element *-ir-*, predominantly occurs with borrowed stems. This pattern is consistent with the expectation that borrowed derivational suffixes are initially linked to loan bases. Furthermore, as explained in Sect. 4.3, the suffix *-ova-*, considered a denominal verbalizer in some literature (Wiemer, 2009, p. 359; Robbeets, 2014, p. 140), tends to lose this function when combined with borrowed stems. The reverse, however, holds for *-i-*, which appears more frequently with nominal bases in borrowed verbs.

A key contribution of our study is that we do not limit our analysis to one suffix or one morphological process (e.g., denominal derivation). Instead, we analyze all suffixes in well-established Russian verbs of non-Slavic origin, comparing their behavior with the same suffixes attached to native stems. This allows us to investigate whether borrowed verbs follow different morphological patterns than native ones, and to assess whether the introduction of loan elements leads to increased morphological variation. The remainder of the section addresses two key theoretical issues in connection with this discussion: the types of phenomena classified as morphological variation and the factors identified in the literature as influencing such variation.

Linguistic variation is usually represented in terms of competition or overabundance. In the case of competition between functionally similar units, either one of the competing elements wins (Blevins & Blevins, 2009) or their rivalry leads to a paradigmatic division of labor or a semantic split (Lindsay & Aronoff, 2013). Overabundance, on the other hand, suggests that doublets, functionally and semantically equivalent units, are possible (Thornton, 2012). Within morphological variation, semantic and functional splits are mostly observed in the case of lexical morphemes, whereas overabundance is primarily attributed to variation in inflectional forms (Lečić, 2016). However, Slavic verbal suffixes, which represent a curious case between lexical and grammatical morphemes (Gladney, 2006, p. 16), are greatly understudied. In our case, morphological variation can be interpreted in two different ways. On the one hand, we can discuss cases of "proper" morphological variation, when different suffixes can be added to the same verbal stem (cf. *aktivirovat' – aktivizirovat'* 'activate'). Such cases are rare in our database (as opposed to e.g. some loan verbs in Bosnian analyzed in Birzer & Sokolova, 2024[4]) and mostly represent a semantic split. "Proper" morphological variation will be discussed in Sect. 4.2. On the other hand, different suffixes can accommodate loan verbs although there is no apparent difference in the meaning of these suffixes. This creates a peculiar case of morphological variation in loan verbs, which is further addressed in subsequent Sects. 4.3–4.5.

The majority of scholarly works on suffix variation focus on nominal suffixes with a rather distinct lexical meaning. Such cases include analyses of a competition between the nominalizing suffixes, e.g. *-ment*, *-ity* and *-ation* forming abstract deverbal nouns in English (Lindsay & Aronoff, 2013) and the English suffixes *-ity* and *-ness* (Arndt-Lappe, 2014).

[4] "Morphological variation in Slavic verbal suffixes", presentation at the *Slavic Cognitive Linguistics Conference*, Jagiellonian University in Kraków, Poland, November 13–15, 2024.

Other works consider the competition between the agentive suffixes (e.g. *-tel'* and *-ec* in Russian compound nouns like *basnopisec* 'fable writer' and *bytopisatel'* 'everyday-life writer' in Naccarato, 2019) and morphological rivalry in relational adjective formation (see the analysis of Russian relational suffixes, *-sk-*, *-n-*, and *-ov-* in Bobkova & Montermini, 2020). Works on morphological competition in verbs are more scarce: see Lindsay and Aronoff's analysis of the competition between *-ize* and *-ify* in English (Lindsay & Aronoff, 2013) and Galeev and Solovyev (2017) and Kozera-Sławomirska (2020) on variation of the suffixes *-iva-/-a-* in Russian secondary imperfectives (*izgotovljat' – izgotavlivat'* 'produce.INF').

All these studies place major focus on productivity and phonological factors. Some of them present a rather straightforward case where we are dealing with a phonological niche: e.g. *-ize* is dominant, while *-ify* is preferred for monosyllabic stems like *simplify*. Others mention that the competition under scrutiny is driven by a complex combination of factors, including phonological, morphological and semantic ones, but restrict the study only to phonological factors (Bobkova & Montermini, 2020).

In the case of verbal suffixes with Russian loan verbs, we are dealing with more potential rivals and a more complex historical background than in the case studies mentioned above, so in addition to the phonological factors we also consider the motivating base (in line with Naccarato, 2019) and the source language of the borrowing, which presents an additional challenge.

3 Data and research questions

In Russian, loan verbs can be introduced by a handful of suffixes: *-ova-*, *-eva-*, *-irova-*, *-stvova-*; *-i-*; *-a-*; *-ničа-*; *-e-*; *-nu-/-anu-* (see examples in Table 1 below). The suffixes *-eva-*, *-stvova-*, *-irova-* are often treated as allomorphs of *-ova-*,[5] whereas *-anu-* is considered as an allomorph of *-nu-* (Townsend, 1968; Švedova et al., 1980; Lopatin & Uluxanov, 2016). We include all of these proposed allomorphs in our analysis, even though these units frequently exhibit distinct semantic properties, as demonstrated below.[6]

Several factors determining the selection of a verbal suffix in Russian are discussed in the literature (e.g. Švedova et al., 1980):

- motivating base (e.g. *-i-* with nominal motivating bases: *frendit'* < Eng. *friend*)
- source language (e.g. *-irova-* from German *-ieren*: Rus. *basirovat'* < Ger. *basieren* 'base')
- morphonology (e.g. only *-irova-* with stems ending in a back vowel: *intervjuirovat'* < Eng. *interview*)

We address these factors from a usage-based perspective (Kemmer & Barlow, 1999) by collecting a database of all verbs that feature the suffixes listed above and have an ipm > 4 in the *Frequency dictionary* by Lyashevskaya and Sharov (2009). The dictionary is available at http://dict.ruslang.ru/freq.php and is based on the frequencies from the Russian National

[5] In this section, we refer to the traditional point of view presented in grammars and dictionaries according to which these suffixes are allomorphs. However, our study suggests that the relation between e.g. *-irova-* and *-ova-* is not as straightforward. We show that *-irova-* is a consistent loan verb marker, as opposed to *-ova-*; the criterion loan vs. Slavic is normally not discussed in the literature when establishing complementary distribution and allomorphs.

[6] Notably, the suffix *-stvova-* was not attested with loanword stems in our data, the only exception being the verb *carstvovat'* 'reign'. However, this outcome was not anticipated from the outset. For example, Björklund (2024) mentioned above observed that the verb *šopstvovat'* (related to English 'shop' and 'shopping') is marginally attested in *Integrum*, the largest electronic archive of Russian mass media.

Corpus (RNC). Our database (henceforth RNC database) comprises 6239 verbs. In this article, we are interested in robust tendencies in the selection of verbal suffixes that were established over time. We are not considering productivity as such (in terms of Baayen & Lieber, 1991; Baayen & Renouf, 1996; Baroddal, 2008), which would require an analysis of the data from an Internet corpus and an experimental study. We place major focus on the allomorphs *-ova-*, *-eva-*, *-stvova-*, *-irova-* and *-nu-*, *-anu-* and the suffix *-i-*. The suffixes *-a-* and *-e-* are extremely frequent with original Slavic stems and substantially less frequent with loan verbs, for which reason they are left outside the scope of this study.[7] We have further removed the verbs with the suffixes *-yva-*/*-iva-* and *-va-* from the analysis as this study does not consider secondary imperfectivization. The remaining data points analyzed in Sect. 4 amount to 5564 verbs.

The RNC database has been annotated according to the following criteria: Slavic vs. loan stem, motivating base (verb, noun, adjective, prepositional phrase, etc.), and morphophonology (the final segment of the stem, i.e. its coda), and the source language of the base for loan stems.

Coda is the major factor analyzed in studies that consider morphophonology when discussing suffix variation. Some works, like Bobkova and Montermini (2020), in addition, analyze the length of the stem, which is relevant e.g. in the formation of relational adjectives from nouns with the suffixes, *-sk-*, *-n-*, and *-ov-* (adjectives in *-ov-* are constructed mainly on monosyllabic stems, while for longer stems *-sk-* is preferred). The case of relational suffixes, however, differs from the verbal suffixes explored in this study in an important way. The relational suffixes in Bobkova and Montermini (2020), with the exception of *-ov-*, do not contain vowels, hence the preference of monosyllabic stems for *-ov-*. By contrast, all of the verbal suffixes considered here contain vowels and differ in their vowel count (ranging from one to three). Notably, five of these suffixes contain two vowels (*ova-*, *-eva-*, *-stvova-*, *-niča-*, *-anu-*), making it difficult to argue that suffix length alone is a decisive factor. Due to so much variation, we did not include stem length as a separate factor when annotating the database. A preliminary review of the database indicates that stem length might become relevant when choosing between the allomorphs *-ova-* and *-irova-*. We will mention this in Sect. 4.4.

For establishing the source language and the motivating base we consulted all available etymological dictionaries and dictionaries of word-formation patterns (such as Tikhonov, 1985; Lopatin & Uluxanov, 2016). Operationalizing the source language of loan verbs as an explanatory factor for suffix choice poses several challenges which also partially intertangle. One challenge is the identification of likely source language(s) as such. The second challenge is the fact that not all loan verbs came into Russian via direct contact with the source language, but were transmitted into Russian via mediator languages. For example, Russian *likvidirovat'* 'eliminate, liquidate' was borrowed into Russian from German, but German *liquidieren* 'eliminate, liquidate' itself constitutes a loan verb that has either the Italian verb *liquidare* or the French verb *liquider* as model, which, in turn, can be traced back to the Latin adjective *liquidus* 'fluent'.

In order to establish the source languages of the loan verbs in our database, we took Vasmer's etymological dictionary (Vasmer, 1964–1973) as a point of departure. If no information was available in Vasmer, we turned to the online database https://lexicography.online/etymology/, where – in addition to Vasmer – the etymological dictionaries of Krylov (2005), Semenov (2003), Uspenskij (2017) are available. If this information still proved insufficient, we consulted the etymological dictionaries available on www.etymolog.ru and on

[7] In our database there were 5 loan verbs suffixed in *-a-* (e.g. *šmonat'* 'frisk, snoop', *štopat'* 'mend, knit up') and 5 loan verbs suffixed in *-e-* (e.g. *rozovet'* 'turn pink', *ofiget'* 'freak, be blown away').

www.gufo.me. The former contains information from the etymological dictionaries by Vasmer and Černych, from Vinogradov's *Istorija slov* (Vinogradov, 1999), from the dictionaries *Iz istorii russkich slov* (Anikin, 1993) and *Novoe v russkoj ètimologii* (2003), as well as the issues of *Ètimologija* from the years 1963–2005. The electronic database www.gufo.me provides another compilation of the aforementioned sources. We referred to Dal's explanatory dictionary (Dal', 1903–1909) and to Ožegov's dictionary (Ožegov & Švedova, 2001) in order to establish the origin of inner-Slavic loans and to understand the origin of verbs whose phonological structure did not allow to hypothesize on possible source languages.

If the loan verbs belonged to a more recent layer of loans not represented in etymological dictionaries, we referred at first to the database https://www.inslov.ru/, which contains the dictionaries of foreign words by Michel'son (1865), Čudinov (1894), Popov (1907), Pavlenkov (1907), and Komlev (2000). If a lexeme can be found in this database, this may be considered a rather strong hint that it came into the Russian language around the turn of the 19th to the 20th century, as four out of five dictionaries represented in this database were published in that time period.

If the given loan verb did not occur in https://www.inslov.ru/, we referred to the database https://slovari.ru/default.aspx?s=0&p=221. We used information from all 21 dictionaries represented there. Among them are two dictionaries of foreign words, namely those by Zaxarenko et al. (2003) and by Muzurkova and Nečaeva (1995), as well as Švedova's explanatory dictionary, which quite often indicates the source language of loans. If a loan verb was attested in this database only, this may be considered a hint that the respective lexeme had come into Russian in the course of the 20th century. Epiškin's *Dictionary of Gallicisms* (2010) was used only as a last resort, because not all etymologies seemed convincing. Since inferences about the period of borrowing can be drawn from the database a lexeme occurs in, we decided to include information about the place of attestation into our database.

In all settings, we compared the information on the source language from the available dictionaries. If the information matched, it was transferred directly to the database. The ambiguous cases can be divided into two groups. The first group of ambiguous entries is characterized by the fact that the dictionary author(s) classify already existing hypotheses on the lemma's etymology as unlikely. Vasmer, for example, states on the etymology of *čalit'* 'come ashore' that none of the proposed source languages Lithuanian, Greek, Armenian or Turkic seem convincing to him.[8] In the second group of ambiguous entries, two likely etymologies are presented for a lexeme, yet the two possible source languages are genetically rather distant or even genetically not linked, as is the case e.g. with *tormoznut'* 'brake, slow down', where both Greek and Turkish are proposed as possible source languages (cf. https://tinyurl.com/32nypz2s).

If none of the consulted dictionaries provided information, we discussed the phonetic and morphological structure of the loan verbs within our working group in order to assess the probability of a pattern replication from various source languages, and then annotated the most probable source language in the database. For example, the suffix *-irova-* is a newer borrowing formed under the influence of German verbs in *-ieren* (e.g. Rus. *bas-irova-t'* < Ger. *bas-ier-en* 'base'), so its usage makes German as a source language or a transmitter language in a row of transitional borrowing likely. In contrast, e.g. the suffix *-ova-* goes back to Old Church Slavonic and combines with stems borrowed from both Slavic and other languages. For both groups of ambiguous entries, we discussed the probability of the proposed etymologies within our working group and then decided in favor of the etymology that we considered more likely. This was documented in the database in each case.

[8] Cf. the online version of Vasmer's dictionary available at https://tinyurl.com/3hz2chnu and https://gufo.me/dict/vasmer/%D1%87%D0%B0%D0%BB.

Table 1 The distribution of the suffixes across loan and Slavic verbs in the RNC database

	Loan	Example	Slavic	Example	Total
-ova-	212	*adresovat'* 'address'	266	*sledovat'* 'follow'	478
-eva-	10	*tancevat'* 'danse'	64	*voevat'* 'be at war, fight'	74
-stvova-	1	*carstvovat'* 'reign'	91	*otvetstvovat'* 'be responsible for'	92
-irova-	641	*adaptirovat'* 'adapt'	3	*skladirovat'* 'put into storage, stock'	644
-nu-	6	*kliknut'* 'click'	740	*dvinut'* 'shift, move'	746
-anu-	2	*gazanut'* 'hit the gas'	17	*sypanut'* 'strew/pour (a handful of)'	19
-niča-	12	*nervničat'* 'be nervous'	23	*spletničat'* 'gossip'	35
-i-	149	*tranžirit'* 'waste, squander'	3334	*varit'* 'boil, cook'	3483
Total	1032		4539		5571

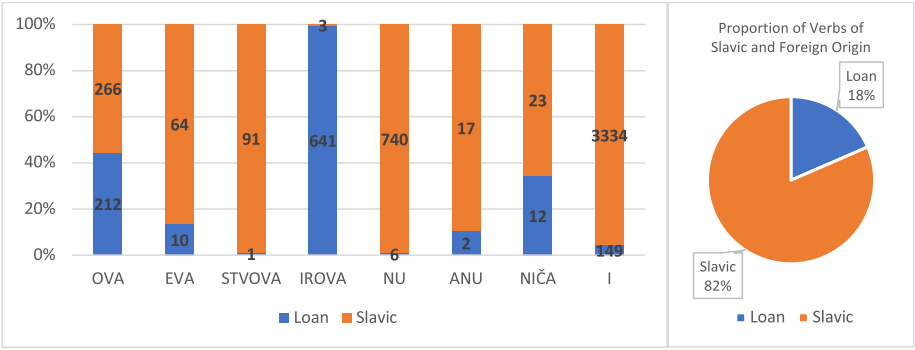

Fig. 1 The distribution of the suffixes across loan and Slavic verbs in the RNC database

Based on the compiled database, we investigate how the aforementioned suffixes are distributed among loan and original Slavic verbs and address the following research questions outlined in Sect. 1:

RQ1: Are there suffixes that function as loan verb markers?
RQ2: Are there cases where different suffixes can be added to the same verbal stem?
RQ3: Which factors determine the suffix choice in loan verbs?
RQ4: How do loan verbs contribute to the overall picture of suffix variation? Do loan verbs display a pattern of suffix choice that differs from that of verbs with a Slavic base?

The first two research questions are addressed in Sects. 4.1 and 4.2 below. RQs 3 and 4 are discussed in Sects. 4.3–4.5.

4 Analysis

4.1 The distribution of suffixes across loan and Slavic verbs

The distribution of the suffixes *-ova-*, *-eva-*, *-stvova-*, *-irova-*, *-nu-*, *-anu-*, *-niča-*, and *-i-* across loan verbs and Slavic verbs is provided in Table 1 and Fig. 1.

The most frequent suffixes for loan verbs are *-irova-*, *-ova-*, *-i-* (not just *-irova-* as in Švedova et al., 1980). The suffix *-irova-* is used exclusively with loanwords, with just one

exception *s-klad-irova-t'* 'put into storage, stock.IPF'. In contrast, *-ova-* is more versatile, being applied to both loanwords and native Slavic stems. The suffix *-stvova-*, however, is used almost exclusively with Slavic stems and typically derives from nouns or adjectives, as in *otvet-stvova-t'* 'undertake for, be responsible for.IPF' < *otvet* 'answer.N' or *bodr-stvova-t'* 'be awake.IPF' < *bodryj* 'awake, cheerful, energetic.ADJ'.[9]

The development of *-irova-* as a loan verb marker can be understood as follows: the suffix *-ova-* had already been established in Russian as a means of forming verbs and integrating loan verbs. Gardani (2016, p. 238) noted for Serbo-Croatian that *-ir-a-ti* occurs not only with loans from German such as *inform-ir-a-ti* 'inform' < German *inform-ier-en* 'inform', but also with loans from other languages without a similar sounding suffix, e.g. English *shoot* > *šut-ir-a-ti* 'shoot', which means that *-ir-* has turned into a loan verb marker.[10] By analogy, it is plausible that German verbs ending in *-ier-* were borrowed into Russian and integrated using the native suffix *-ova-*, and that this pattern was subsequently reanalyzed as the new suffix *-irova-*, which then came to serve as a dedicated marker for loan verbs. Supporting this interpretation, our data shows that *sklad-irova-t'* is the only verb with a Slavic root that uses the suffix *-irova-*.

4.2 Cases of "proper" morphological variation in the RNC database

The RNC database contains 33 cases (of both loan and Slavic verbs) where two different suffixes are added to the same base (e.g. *aktivirovat'* vs. *aktivizirovat'* 'activate') and a presumable "triplet": *formovat'* 'form, shape' – *formirovat'* 'form, generate' – *formalizovat'* 'formalize' from the nominal base *forma* 'form'. The aim of this section is to analyze a) whether they constitute cases of "proper" morphological variation, i.e. form two allomorphs, denote aspectual relations or are the exponent of a semantic split and b) whether morphological variation is more frequent with Slavic or loan stems.

Indeed, 12 of the alleged "doublets" present a case of aspectual relations between an imperfective base verb and a semelfactive verb with *-nu-*, as e.g. *psixovat'*.IPF – *psixanut'*.PF 'freak out' or *riskovat'*.IPF – *risknut'*.PF 'risk', etc. Such pairs do not instantiate morphological variation and are therefore excluded from the further analysis. The remaining 21 doublets are summarized in Tables 2 and 3 for the loan and Slavic stems respectively. The ipm frequencies in the tables are provided from Lyashevskaya and Sharov (2009).

Among the doublets with loan stems, we find 7 cases where *-irova-* (or its allomorph *-izirova-* in case 9) is at variance with the suffixes *-ova-*, *-i-*, and *-ničа-*, whose relationship, as we will show below, may be described as semantic split. Interestingly, there are also two cases (6 and 7) of variation between *-irova-* and *-izirova-* (*aktivirovat'* vs. *aktivizirovat'* 'activate' and *garmonirovat'* 'match well' vs. *garmonizirovat'* 'harmonize'), with subtle differences in semantics, which raises the question of whether these elements indeed are allomorphs or

[9] In some cases *-stv(o)-* might be interpreted as a separate nominal suffix pertinent to the base. E.g. the verb *bedstvovat'* 'live in misfortune.IPF' is formed from *beda* 'misfortune.N' according to word-formation dictionaries (Tikhonov, 1985). Historically, however, it can be motivated by the noun *bedstvo* 'calamity.N' which is not listed in dictionaries of Modern Russian but was provided alongside *bedstvie* 'calamity.N' in Pawlowski's dictionary of 1859 (Pawlowski, 1952, p. 95). Such units were nevertheless attributed to the *stvova*-type in our database.

[10] In fact, *-ir-* has a very complex history of transmission. In the Middle High German period, the German loan verb marker *-ier-* emerged, which is probably the result of a contamination of the French infinitive marker *-er* and the French suffix *-ier* to form agent nouns (cf. Öhmann, 1970: 263–264 as cited by Gardani, 2016: 232): if the French infinitive marker *-er* were replicated, the German loan verb marker should be *-er-*. It is therefore very likely that the German loan verb marker *-ier-* is the source for Russian *-ir-* and that there was no direct borrowing from French to Russian.

Table 2 Suffixal "doublets" with loan stems in the RNC database

	IROVA	ipm	OVA	ipm
1	*buksirovat'* 'taw, haul'	9	*buksovat'* 'slip, stall'	17
2	*gazirovat'* 'carbonate'	6	*gazovat'* 'rev the engine'	5
3	*komandirovat'* 'send on a business trip'	37	*komandovat'* 'command'	288
			NIČA	
4	*grimirovat'* 'make up as'	5	*grimasničat'* 'make faces, give a grimace'[1]	9
5	*nervirovat'* 'make nervous, irritate'	14	*nervničat'* 'feel nervous, be anxious'	180
			IZIROVA	
6	*aktivirovat'* 'activate'	13	*aktivizirovat'* 'activate'	49
7	*garmonirovat'* 'match well'	20	*garmonizirovat'* 'harmonize'	7
			I	
8	*bombardirovat'* 'bomb'	5	*bombit'* 'bomb'	64
	IZIROVA		**I**	
9	*signalizirovat'* 'signal'	16	*signalit'* 'signal'	7
	I		**STVOVA**	
10	*carit'* 'reign'	16	*carstvovat'* 'reign'	33

[1] In some cases, it is less apparent whether two stems differ only in their suffixes; cf., for example, the verbs *grimirovat'* 'apply makeup, disguise' and *grimasničat'* 'make faces, grimace'. However, a closer examination of their origin reveals that they, in fact, share a common historical base. *Grimirovat'* and *grimasničat'* are both related to the Germanic noun *grīm-* 'mask' (cf. https://www.dwds.de/wb/Grimasse). *Grimirovat'* is semantically closer to the noun and seems to have come into Russian via Germanic; *grimasničat'*, on the other hand, goes back to *grimace* 'grimace', a French cognate of the Germanic noun that was borrowed into many European languages predominantly in the 18th century.

Table 3 Suffixal "doublets" with Slavic stems in the RNC database

	I	ipm	STVOVA	ipm
1	*blagodarit'* 'thank'	314	*blagodarstvovat'* 'thank'	8
2	*blažit'* 'be capricious, eccentric'	4	*blaženstvovat'* 'be in a state of bliss'	15
3	*bodrit'* 'stimulate, energize'	13	*bodrstvovat'* 'be awake'	24
4	*zlobit'sja* 'get angry, be in a bad temper'	4	*zlobstvovat'* 'be malevolent to'	8
5	*mudrit'* 'overthink, scheme'	14	*mudrstvovat'* 'overcomplicate, overintellectualize'	12
6	*javit'* 'reveal'	20	*javstvovat'* 'be apparent'	24
			OVA	
7	*darit'* 'give (grant)'	223	*darovat'* 'grant (give)'	74
8	*žalit'* 'bite, sting'	21	*žalovat'* 'favor, bestow on'[1]	42
9	*krasit'* 'paint, dye, make someone look pretty'	109	*krasovat'sja* 'show off'	92
10	*sledit'* 'watch, look after, spy on'	145	*sledovat'* 'follow'	3051
			NIČA	
11	*plotit'* 'make into a raft'	81	*plotničat'* 'work as a carpenter'	79

[1] The historical semantic bridge between *žalit'* 'bite, sting' and *žalovat'* 'favor, bestow on' is the pain that results from the biting on the one hand and grieve as emotional pain on the other hand. From 'grieve' developed the meaning 'show compassion' and in a final step 'show mercy, favor'.

rather instances of a light semantic split. And finally, there is *carit'* 'reign' and *carstvovat'* 'reign' with rather similar meaning but different collocational preferences.

Let us first consider the instances where *-irova-* varies with *-ova-* and *-niča-*. As can be seen from the glosses in Table 2, most of these "doublets" represent a clear-cut semantic split, cf. e.g. *buksovat'* 'slip, stall' and *buksirovat'* 'taw, haul' in examples (1) and (2):

(1) *Motor tjanul xorošo, kolesa **ne buksovali** po derevenskoj grjazi.*
'The engine pulled well and the wheels **did not slip** in the village mud.'

(2) *Zatem ego kater **buksirovalsja** k teploxodu.*
'Then his boat **was towed** to the ship.'

Additionally, only *-irova-* is used to form transitive verbs (see examples 1 and 2).

According to definitions available in dictionaries (Ožegov & Švedova, 2001; Švedova, 1998), four pairs of loan doublets can be seen as overlapping in at least one of the meanings: *aktivirovat' – aktivizirovat'* 'activate'; *bombardirovat' – bombit'* 'bomb'; *signalizirovat' – signalit'* 'signal'; *carit' – carstvovat'* 'reign'. However, even in these pairs we observe a split both in terms of semantic nuances (as illustrated by examples (3–10) below extracted from the RNC) and in terms of the frequency of usage[6] (see the columns with frequencies in Table 2).

aktivirovat' (13) – *aktivizirovat'* (49) 'activate'

(3) *Japoncy zajavili o namerenii **aktivizirovat' (?aktivirovat') sotrudničestvo** s regional'nymi stranami i v voenno-političeskoj sfere.*
'The Japanese announced their intention to **intensify cooperation** with regional countries in the military-political sphere.'

(4) *Kakie dlja menja mogut byt' posledstvija, esli **aktivirovat' (?aktivizirovat') kartu** v internet-banke, i NE aktivirovat' eë potom po telefonu?*
'What consequences could there be for me if I **activate the card** in Internet banking and do NOT activate it later by phone?'

As can be seen from examples (3)–(4), *aktivirovat'* is preferred with concrete nouns, whereas *aktivizirovat'* is more often combined with abstract nouns denoting processes and events. More general contexts with *aktivizirovat'* are more frequent than the more concrete uses of *aktivirovat'*.

bombardirovat' (5) – *bombit'* (64) 'bomb'

(5) *Ja ne mog ponjat', kak armija sposobna **bombit' (?bombardirovat') svoj narod**.*
'I couldn't understand how an army could **bomb its own people**.'

(6) *On prodolžal, ja by skazal, **bombardirovat' (?bombit') nas svoimi voprosami**.*
'He continued, I would say, to **bombard us with his questions**.'

In contexts referring to physical act of bombing *bombit' i*s preferred, however, *bombardirovat'* is stronger associated with metaphorical contexts. *Bombit'* is more frequently used than *bombardirovat'*.

signalizirovat' (16) – *signalit'* (7) 'signal'

(7) *Ot"ezžajuščij seryj Hendaj načal **signalit' (*signalizirovat') levym povorotom**.*
'A gray Hyundai driving away began to **signal a left turn**.'

(8) *Ix delo korrektirovat' vlast'*, ***signalizirovat'*** **(**signalit'*)** ***o narušenijax i perekosax***, *i ne bolee togo*.
'Their job is to correct the government, **signal violations and imbalances**, and nothing more.'

As shown by examples (7)–(8), *signalit'* has a more concrete meaning related to giving a physical signal (e.g. in the contexts of road traffic); *signalizirovat'* is used in more abstract contexts by referring to a non-physical sign or consequence of an event. More specific contexts of providing a physical signal expressed by *signalit'* are less frequent than more general contexts expressed by *signalizirovat'*.

carit' (16) – *carstvovat'* (33) 'reign'

(9) *Govorili o tom, čto esli Mixail ne soglasitsja* ***carstvovat'*** **(*?carit'*)**, *to Russkaja zemlja pogibnet*.
'They said that if Mikhail did not agree to **reign**, then the Russian land would perish.'

(10) *Polnyj xaos načinaet* ***carit'*** **(**carstvovat'*)** ***na dorogax***.
'Complete chaos begins to **reign on the roads**.'

Carstvovat' is stronger associated with the historical contexts of reigning and unlike *carit'* is not typical for metaphorical uses. *Carstvovat'*, with its literal uses, shows a higher frequency than *carit'*.

With regard to the "triplet" based on *forma* 'form' and conveying the idea of shaping or structuring, the RNC database shows distinct nuances for each verb: *formovat'* 'form, shape' (6) – *formirovat'* 'form, generate' (236) – *formalizovat'* 'formalize' (13). *Formovat'* refers to giving something a tangible form, such as shaping clay (*formovat' glinu* 'shape clay'). In contrast, *formirovat'* has broader applications, indicating the process of creating or organizing, either by developing certain qualities — *formirovat' sil'nye xaraktery* 'build strong characters'—or establishing formal structures like a government or a military unit (*formirovat' pravitel'stvo* 'form a government'). Finally, *formalizovat'* is used to express the transformation of abstract content into a formal system, such as in the phrase *formalizovannyj jazyk* 'formalized language'. The broadest one, *formirovat'*, is also most frequent, while the most specific *formovat'* is least frequent in the "triplet".

The doublets with Slavic stems present 12 cases where the suffix *-i-* alternates with *-stvova-*, *-ova-*, and *-niča-*. With two exceptions (1 and 7), these alternations may be considered instances of a semantic split, as can be seen from the glosses. The two exceptional pairs on the list (1 and 7) can be analyzed as a case of leveling (see Bjorvand, 2000; Blevins & Blevins, 2009), whereby one form seems to oust its rival or to restrict it to old-style specific contexts: *blagodarstvovat' – blagodarit'* 'thank'; *darovat' – darit'* 'grant, give', where *-ova-* marks the old-style verb.

To sum up, morphological variation "proper" is not common in the RNC database – neither for the Slavic nor the loan verb "doublets". Firstly, the type numbers of alleged doublets per se are relatively small, and a more thorough analysis of the verbs shows that they always represent a semantic split, or in some cases reveal leveling where the old-style verb contains *-ova-* (*blagodarstvovat' – blagodarit'* 'thank'; *darovat'— darit'* 'grant, give'). This holds equally true for both loan and Slavic verbs: the "doublets" with loan stems constitute approximately 48% of all attested "doublets", illustrating that loan and Slavic verbs are equally prone to semantic splits, but neither of them tend to morphological variation proper. The two suffixes that most often vary with other suffixes are *-irova-* for loan stems and *-i-* for Slavic stems.

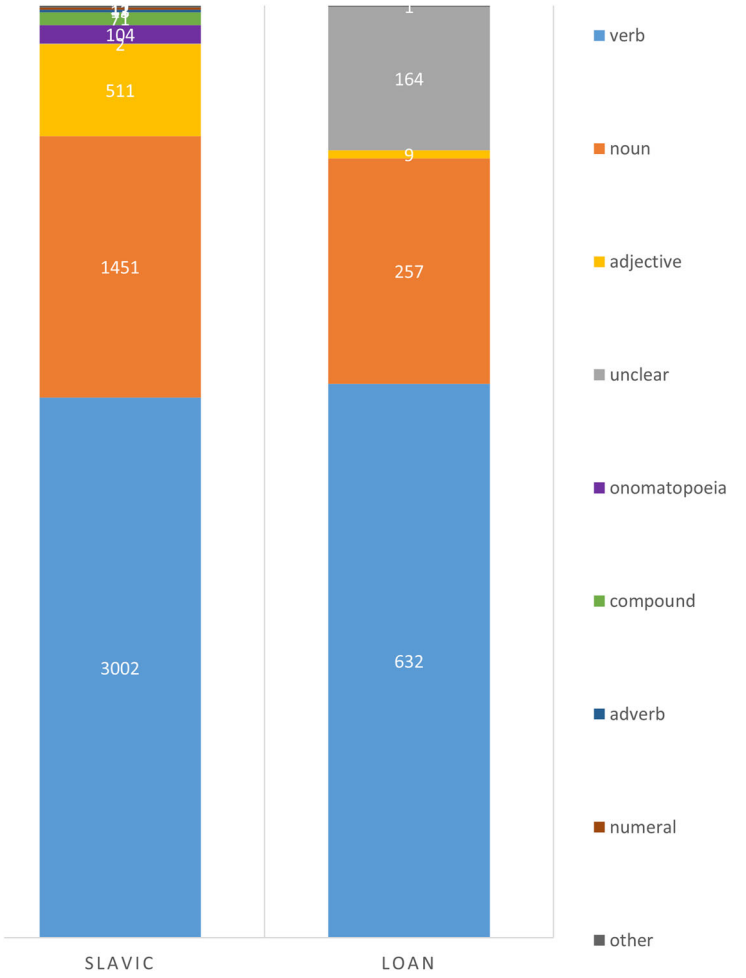

Fig. 2 The overall distribution of motivating bases (PoS) across Slavic and loan verbs

In the next three sections we consider a more general type of morphological variation – the multiplicity of suffix alternatives when introducing loan verbs – and investigate which factors determine the suffix choice.

4.3 Motivating base

Let us compare the general distribution of the bases within all Slavic and loan verbs in our database. Both loan and Slavic verbs show a strong preference for verbal bases. This distribution is to be expected, as verbs are more likely to be derived from other verbs than from nouns or adjectives. Figure 2 illustrates that in both loan and Slavic verbs over 50% of the motivating bases are verbs, over 30% are nouns, followed by adjectives (for Slavic verbs) or an unclear motivating base (for loan verbs). This "unclear" category captures a notable number of cases of Romance or Germanic origin (over 15%) that are characterized by an unclear motivating base, either noun or verb (cf. *testirovat'* 'test' from English *test* which

Table 4 The distribution of suffixes across the bases of Slavic verbs

Suffixes	verb	noun	adjective	unclear	other
-irova-	0	3	0	0	0
-ova-	144	97	23	0	2
-i-	1591	1216	428	0	97
-eva-	58	6	0	0	0
other suffixes	1221	130	60	0	100

Table 5 The distribution of suffixes across the bases of loan verbs

Suffixes	verb	noun	adjective	unclear	other
-irova-	432	77	6	126	0
-ova-	149	25	0	38	0
-i-	15	134	1	0	1
-eva-	10	0	0	0	0
other suffixes	25	22	2	0	0

could be both a verb and a noun[11]), which prevents a more detailed analysis for loan verbs. Taking into account these two patterns (the predominance of verbal bases and the presence of an ambiguous category), our results align with Haugen's (1950) borrowing hierarchy, according to which, when a linguistic unit is borrowed from one language to another, nouns are more likely to be borrowed than verbs, verbs are more likely to be borrowed than adjectives, and adjectives are borrowed more often than adverbs and prepositions. Overall, these findings indicate that the general distribution of motivating bases in loan verbs closely mirrors that of Slavic verbs and aligns with the pattern previously described in the literature. The following paragraphs examine how specific derivational suffixes interact with different types of motivating bases.

We analyze whether particular suffixes show preferences for motivating bases, and whether these preferences differ between Slavic and loan verbs. Tables 4 and 5 and Figs. 3 and 4 below illustrate the distribution of suffixes across the bases of Slavic and non-Slavic origin. From the figures, we have excluded suffixes with very few data points, namely *-ničа-* (with 12 loan and 23 Slavic verbs) and *-irova-* for Slavic. As can be seen, the distribution of base types for the suffixes *-irova-* and *-ova-* is almost identical, the major difference being more adjectival bases for the Slavic stems and more undefined (verb or noun) cases for loan stems. The major aspect in which the two Figures converge is the distribution of bases associated with the suffix *-i-*: in loan verbs, this suffix is almost exclusively reserved for nominal bases (e.g. *pudrit'* 'powder' from French *poudre* 'powder').

Moreover, it can be argued that the choice of the suffix *-ova-* is influenced by the semantics of the base, which varies depending on the source language. Specifically, *-ova-* tends to

[11] It should be pointed out that the base for loan verbs was tagged according to the language indicated as the source in etymological dictionaries and dictionaries of foreign words. In the case of *testirovat'* such language is English, although the English word *test* can be traced back to Latin *testis* 'witness'. However, in other cases, dictionaries provide only the Latin word as the source, e.g. *aktivirovat'* 'activate' from *activus* 'active'. Although most likely the verb *aktivirovat'* entered the Russian language via French *activer* 'activate', we marked Latin as the first source in our database following the information in the dictionaries and added our opinion on the most likely source language in an additional column of our database. To avoid such inconsistencies, the source languages were merged into bigger contact groups in the final analysis, which is further explained in Sect. 4.4.

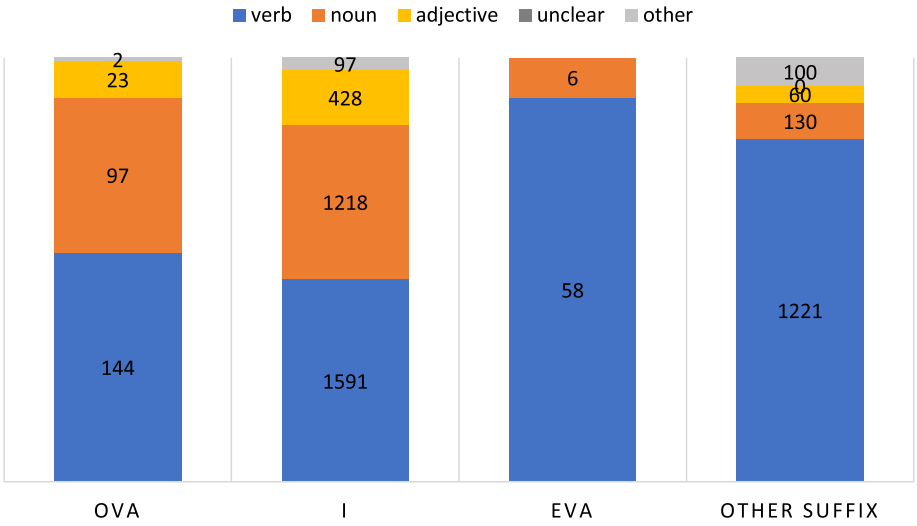

Fig. 3 The distribution of suffixes across the bases of Slavic verbs

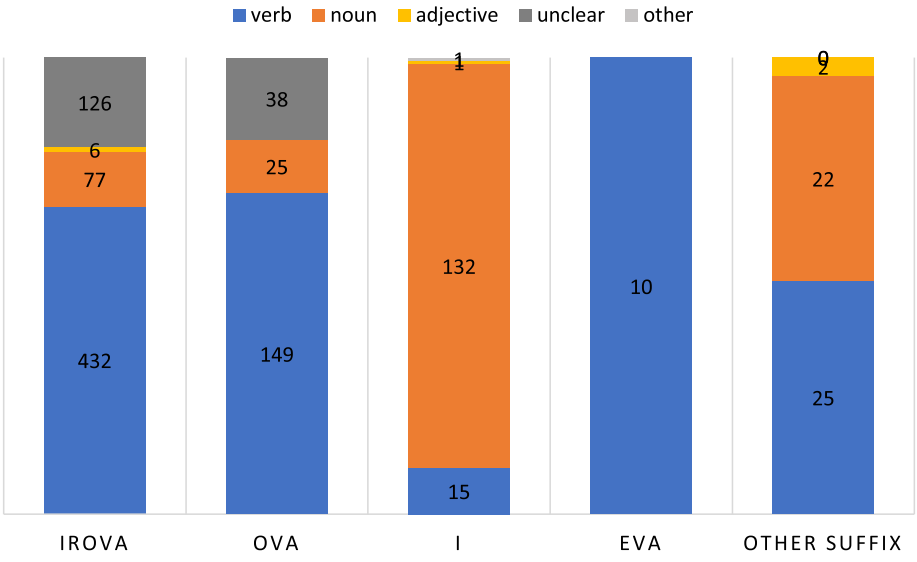

Fig. 4 The distribution of suffixes across the bases of loan verbs

favor nominal bases with different semantic characteristics within loan and Slavic verbs: it is more commonly associated with abstract meanings in loan bases, while used with concrete meanings in Slavic bases. Slavic verbs derived from adjectives typically express the duration of experiencing a particular feeling or state, as seen in *radovat'sja* 'rejoice' and *prazdnovat'* 'celebrate'. The Slavic verbs derived from nouns in our database often describe habitual behavior or intense experiences, such as *vorovat'* 'steal' and *torgovat'* 'trade'. Loan verbs derived from nouns, however, tend to denote a temporary process of experiencing a state, as

in *kompleksovat'* 'have a complex' and *psixovat'* 'freak out'. Additionally, loan verbs derived from either nouns or verbs can reflect two patterns: (a) the noun represents an abstraction of the activity (*atakovat'* 'attack.IPF/PF', from *ataka* 'attack.N'), or (b) the noun represents the result or outcome of the verb's action (*arestovat'* 'arrest.IPF/PF', from *arest* 'arrest.N'). Since abstract meanings are less typical for nouns, the frequency of nominal bases with abstract meanings is generally lower across languages. Abstract nouns may also be considered part of lexical elaboration (Jackendoff, 2002), which may explain why many abstract nouns, e.g. technical terms, are attested at a later stage in the development of the respective language than the majority of nouns with a concrete meaning, and why loan bases are used to form these nouns. This discrepancy may explain why there are fewer loan verbs with *-ova-* derived from nominal bases compared to Slavic verbs.

In general, adjectival motivating bases are not typical for loan verbs. The few cases with adjectival bases are attested with *-ničа-* (*exidničat'* 'sneer, make spiteful comments' and *kaprizničat'* 'be naughty, get cranky') and *-irova-* (e.g. *aktivizirovat'* 'activate' ultimately going back to Latin *activus* 'active'; however, units not containing the Russian adjectial suffix *-n-* may be interpreted as verbal borrowings from a range of (Western European) languages such as French *activer* 'activate' or English *activize*). Overall, there are only 5 instances of *-ničа-* with loan verbs and all of them, except for *nervničat'* 'be nervous', are characterized by low type frequency (*nervničat'* 'be nervous': ipm = 180; *koketničat'* 'flirt, coquette': ipm = 32; *kaprizničat'* 'be naughty, get cranky': ipm = 29; *pajasničat'* 'jest, act up, act the clown': ipm = 11; *grimasničat'* 'make faces, give a grimace': ipm = 9; *exidničat'* 'sneer, make spiteful comments': ipm = 5).

Although characterized by low type frequency, *-ničа*-verbs occupy a special niche. Upon reviewing the *-ničа*-verbs in the RNC database and the contexts in the RNC, it appears that all verbs ending in *-ničа-* describe typical or habitual behaviors, indicating characteristic traits. From a morphological perspective, each of these verbs can be associated with either a noun ending in *-nik*, which denotes a person exhibiting these traits (see *čaevnik* 'tea-drinker, teetotaler' associated with *čaevničat'* 'drink tea' in example 11), or an adjective ending in *-n-* (cf. *grimasnyj* 'grimacing' associated with *grimasničat'* 'make faces, give a grimace' in example 12).[12]

(11) *Vy znaete, čto v Anglii, v Irlandii, v S. Amerikanskix Štatax suščestvujut obščestva vozderzhanija, členy kotoryx nazyvajutsja teetotallors, t. e. čajepijtsami,* ***čaevnikami****; sleduyatel'no, nezametno dlja nas samix, obščestva èti est' i u nas, tak čto pateru Met'ju, pravo, nečego by delat' v Belokamennoj.*

[I. T. Kokorev. Chay v Moskve (1849)]

'You know that in England, Ireland, and the United States of America, there are temperance societies whose members are called "teetotallers", that is, tea-drinkers, **teetotalers**. Therefore, without realizing it, we have these societies among us as well, so Father Mathew would truly have nothing to do in White-stoned Moscow.'

[I. T. Kokorev. Tea in Moscow (1849)]

[12] The diachrony of occurrence for the potential nominal bases and the derived verbs is difficult to reconstruct for several reasons: Firstly, the historical subcorpora of the RNC are not extensive enough (all historical subcorpora together comprise just 15 million tokens) to reliably determine the first occurrence of a lexeme or to make reliable statements about the frequency of use of specific lexemes in a particular historical period. On the other hand, unlike e.g. the *Oxford English Dictionary*, the historical dictionaries of Russian do not provide information on the first occurrence of lexemes, which means that they cannot be used as an instrument for establishing the derivational path. Therefore we decided to reconstruct the derivational path formally on the basis of the respective suffixes in a lexeme.

(12) *Litse ego, kakъ u vsěxъ gorbunov, vyražalo čto-to sardoničeskoe*, ***grimasnoe****: sъ trudom možno bylo otkryt' podъ stradal'českimi čertami ètogo litsa priznaki neistoščimoj dobroty, vykazyvavšejsja minutami ili vъ glazaxъ ego počti kosyxъ, ili vъ ulybke iskrivlennyx gubъ.*

[Poslědnjaja ljubov' (perevod povesti É. Suvestra s francuzskogo) // "Moskovskiy nabljudatel"', 1837]

'His face, like that of all hunchbacks, expressed something sardonic, **grimacing**: it was difficult to discern, beneath the suffering features of his face, signs of inexhaustible kindness, which would occasionally show either in his almost-crossed eyes or in the smile of his crooked lips.'

[Last Love (translation of É. Souvestre's novella from French) // Moscow Observer, 1837]

Thus, the analysis of the motivating bases in the dataset reveals several key patterns. Overall, the major bulk of motivating bases for both loan and Slavic verbs is constituted of verbal and nominal bases, with a similar distribution of these bases in loan and Slavic verbs. Over 50% of the motivating bases are verbs, while nouns account for more than 30%. However, in a significant portion of loan verbs (over 15%), the part of speech of the motivating base remains unclear (verb or noun), complicating further analysis. Regarding specific suffixes, loan verbs featuring the suffix *-i-* are predominantly associated with nominal bases. Adjectival bases are rarely observed and tend to occur with suffixes such as *-niča-* and *-irova-*. Verbs with *-niča-* are consistently associated with the corresponding noun in *-nik* or adjective in *-n-*, where the suffix *-niča-* carries a specific semantic function of expressing characteristic properties or recurrent states in individuals. Additionally, the allomorphs *-irova-* and *-ova-* demonstrate similar distribution patterns across verbal and nominal bases, though more adjectival bases are associated with Slavic stems, while loan stems feature more unclear cases of whether the base is a noun or a verb.

4.4 Source language

Table 6 shows the distribution of the various loan suffixes across the source languages that were identified in the process described above. As the mere visual inspection of the table shows, language genealogy is not an apt predictor for suffix choice, e.g. *-ova-* occurs with stems from eight languages, among them such distant languages as e.g. Tatar, Greek, and German.

Moreover, as has been hinted above, some loan verbs have a rather complex history of transmission, which makes it difficult (and possibly also unjustified) to establish one single source language (to give just one example, cf. Rabus (2013) on the problems of identifying an unequivocal source languages in inner-Slavic contact scenarios).

Since loan words took different ways of transmission in different periods of the history of Russian, we decided to form clusters of source languages which often feature as source or transitional language in a given historical period. We will discuss the clusters and the reasons for their formation in the following.

Cluster 1 comprises (geographically more) Western European languages, namely the Romance languages French and Italian and their predecessor Latin (for convenience referred to as Romance in the following), the Germanic languages German, Dutch and (Eastern) Yiddish and the (Western) Slavic languages Polish, Czech and Rusyn/Ruthenian and the Baltic language Lithuanian, but also Hebrew. Loans from this language group entered Russian in, roughly speaking, two waves: from the Renaissance onwards until roughly the 18th century,

Table 6 The distribution of the suffixes according to the source languages

Source languages	Numbers
Arabic	1
Bulgarian	1
Dutch	19
Dutch/ French	3
Dutch/ German	2
English	38
French	222
French/ German/ Polish	2
French/ Polish	4
German	378
German/ Italian	1
German/ French	61
Germanic	4
Gothic	2
Greek	25
Italian	14
Latin	139
Lithuanian	1
Old German	1
Old German/ Dutch	1
Old Scandinavian	2
Persian	1
Polish	74
Polish/ German	17
Serbo-Croatian	1
Tatar	1
Turk	23
Uighur	2
Yiddish/ Hebrew	1
Yiddish	1
Total	**1042**

loans mainly from Latin, Italian and German came into Russian via Polish, Ruthenian and, to a lesser extent, Lithuanian, which served as official languages of the Polish-Lithuanian Commonwealth (cf. Danylenko 2011, 2017). Eastern Yiddish has a special status in this cluster, as it was co-territorial with both the official languages of the Commonwealth, i.e. Polish, Ruthenian and Lithuanian (cf. Danylenko, 2011; Verschick, 2022; Schäfer, 2022; Gajek, 2023), but also with those historic varieties of the Eastern Slavic languages Belarusian and Ukrainian (cf. Šišigin and Lebedeva 2015, 2021) located in territories under Russian rule and, to a much lesser extent, co-territorial with Russian itself (cf. Weinreich, 1959; Hentschel, 1999; Wiener, 1895). It might be surprising to see that Hebrew is also included into cluster 1, but Eastern Yiddish functioned as transmitting language for Hebrew stems (cf. Weinreich, 1959; Fridman, 1931 for a case study on the argot of thieves). The second wave starts in the 20th century and comprises mainly loans from English (cf. Styblo, 2007 for approaches on investigating nominal loans; to the best of our knowledge, there are no publications on recent English loan verbs).

Cluster 2 comprises Old Scandinavian and Gothic, i.e. Old Germanic languages that had been in contact with Common East Slavic already in the Early Middle Ages (cf. first and foremost Pronk-Tiethoff, 2013, but also Sitzmann, 2003; Koškin 2006, 2008; Kuz'menko, 2011; Uspenskij, 2000; Meyer, 1928; on the problem of discerning Middle High German from Scandinavian as contact language cf. Kiparsky, 1949).

The Turkic languages Turkish, Tatar and Uyghur form the third cluster. They, in turn, borrowed words from Arabic and Persian, which is why these two languages are also assigned to this cluster. Common East Slavic and Russian have been in contact with various Turkic languages since the 7th century (cf. Stachowski, 2014, p. 1200; on even earlier contact with Altaic languages cf. Granberg, 2009). Contact with (Ottoman) Turkish was most intense between the 14th and 19th centuries (cf. Stachowski, 2014, p. 1201–1202). Stachowski also mentions that verbs of Turkic origin become morphologically integrated into the Slavic languages, but the number of suffixes employed for the integration is rather limited, namely *-'a-*, *-'asa-*, *-'ava-*, *-ej-*, *-i-*, *-isa-*, *-isova-*, *-iva-* and *-ova*/*eva-* (2014, p. 1206).

Cluster 4 comprises the Southern European languages Greek, Bulgarian and Serbo-Croatian who exerted influence on Russian mainly via Church Slavonic. Greek is the biblical language that served as model language for Old Church Slavonic translations of biblical texts and thus exerted influence on all Slavic languages (Fuchsbauer, 2015 is a recent study on lexical influence). The Russian redaction of Church Slavonic witnessed South Slavic influence in the 14th century mainly from the Bulgarian redaction of Church Slavonic (cf., among others, Afanasyeva, 2016, and Talev, 1973). The history of Russian, in turn, is characterized by the diglossia of vernacular Russian and Church Slavonic well into the 18th century (cf. Rabus, 2014; Bunčić, 2015). Furthermore, Greek, Bulgarian and – to a smaller extent – Serbian are members of the *Balkansprachbund*, whose languages have been interacting intensely for centuries.

However, we need to point out that at a still earlier period Greek also exerted significant influence on Latin, so Greek roots took their way into Russian also via several Western European languages, e.g. Greek *symbállein* 'throw, lay, join together' > Greek *sýmbolon* 'characteristic, mark, emblem' > Latin *symbolum* 'characteristic, mark, emblem' > Latin *symbolizare* 'symbolize' > French *symboliser* 'symbolize' > German *symbolisieren* 'symbolize' > Russian *simvolizirovat'* 'symbolize' (cf. https://www.dwds.de/wb/symbolisieren). Therefore, we checked for every Greek root individually whether it came into Russian via the Balkan or Western European languages.[13]

Since language contact with the different language clusters took place at different phases in the history of Common East Slavic and Russian, Figs. 5 and 6 show not only the distribution of suffixes across the language clusters, but also reveal in which periods the respective suffixes were or are productive as loan verb markers.

Thus, loan verbs that came into Common East Slavic via contact with Old Germanic languages in the Early Middle Ages use exclusively *-i-*, as e.g. *lečit'* 'heal, provide medical

[13] A particularly fascinating case in this context is the verb *psixovat'* 'behave like a psycho'. It is derived from the Russian noun *psix* 'psycho' and thus ultimately goes back to Greek *psyché* 'spirit, soul'. In Russian, no further steps in the derivational path are documented, so at first consideration one would assign it to the Balkan cluster. However, if we compare the first attestation of *psix* and *psixovat'* in the RNC with the first occurrences of *psycho* in the corpora of Western European languages (e.g. German *Psycho* 'psycho' in the DWDS corpus), it becomes clear that all of these lexemes are first attested at the beginning of the 20th century (probably as a result of the further development of psychoanalysis) and that *psixovat'* must therefore be attributed to Western European influence. We are dealing with a case of *-ova-* functioning simultaneously as verbalizer and loan verb marker. Gardani (2016, p. 232) mentions this dual function for German *-ier-* (i.e. the replica model for Russian *-irova-*). Since it may also be observed with e.g. RUS *telefon-ir-ova-t'* (and German *telefon-ier-en*), there is reason to assume that the dual function as loan verb marker and verbalizer is quite widespread and also pertains to *-ova-*, an allomorph *-irova-*).

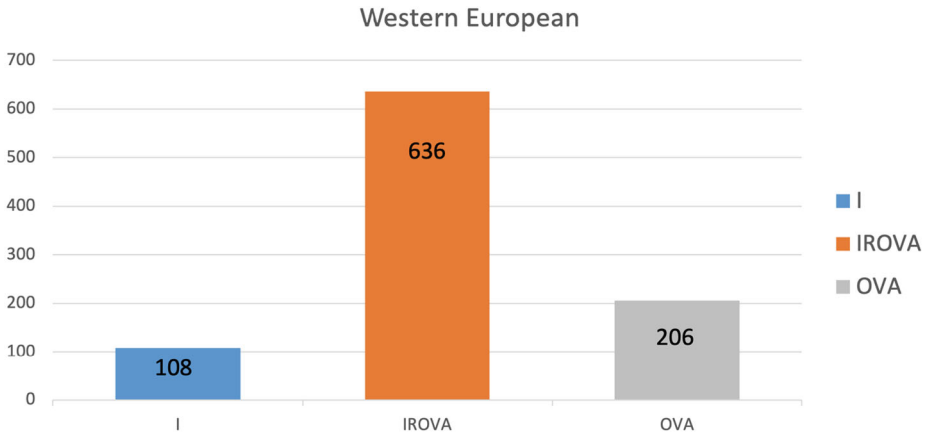

Fig. 5 The distribution of the suffixes according to source language clusters (Western European cluster)

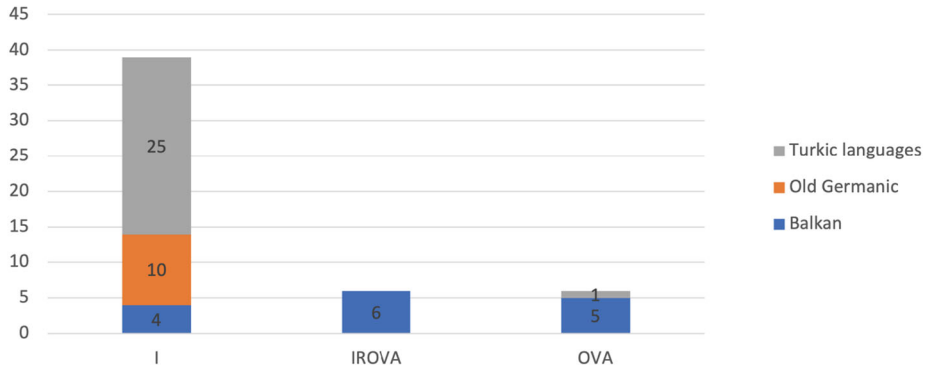

Fig. 6 The distribution of the suffixes according to source language clusters (other clusters)

treatment'. Contact with Turkic languages set on as early as in the 7th century, i.e. roughly at the same time as with Old Germanic, so it is not surprising that *-i-* is also predominant with loan verbs from Turkic languages, e. g. *barabanit'* 'play the drum'.[14]

In the Balkan cluster the three suffixes *-irova-*, *-ova-* and *-i-* are used in almost equal shares. This may be considered evidence that Russian had indeed been in contact with the Balkan languages for centuries and thus integrated the loan stems with the help of the suffixes that were productive in the respective contact phases. The suffix *-i-* occurs in very early loans and occupies the third place in frequency. It is attested e.g. in *kurolesit'* 'play pranks', which goes back to Greek *kýrie eléison*, or in *vypotrošit'* 'disembowel'. The suffix *-ova-* occurs both with loan translations such as Greek *symphonein* > Church Slavonic *soglasovat'* 'agree' and with loan stems such as *rifmovat'* 'rhyme' < Greek *rhythmos* 'rhythm'.

[14]Only three loan verbs take other suffixes: *tormoznut'* is the perfective aspect partner of *tormozit'* 'step on the brake; slow down', so this is not a case of suffix variation, but grammatical derivation. *Čaëvničat'* 'indulge in tea-drinking; be a tea lover' exploits the marker *-niča-* that is used for loan verbs conveying characteristic traits and occurs e.g. in *koketničat'* 'be coquettish' < French *coquette*. Finally, *kajfovat'* 'abuse narcotics; feel intoxicated' < Arabic *kef* 'intoxication by hashish' uses the suffix *-ova-*.

It ranks second in frequency and may possibly be considered the most frequent loan verb suffix in Church Slavonic (p. c. with Dmitrij Sichinava). The suffix *-irova-* has the highest usage frequency and occurs mostly in scientific terms such as *travmirovat'* 'traumatize' or *agonizirovat'* 'agonize'. These terms entered Russian during the phase of elaboration, i.e. at a time when many verbs were borrowed from the Western European languages and *-irova-* had its peak of productivity in this cluster.

Almost two thirds of all loan verbs from the Western European cluster are formed with the help of *-irova-*. As has already been hinted above, the verbs in *-irova-* are mostly scientific terms like *avtomatizirovat'* 'automatize' or *ob"ektivirovat'* 'objectivize' and were borrowed in the elaboration phase of Russian. In the second place follows *-ova-*, which is attested in roughly 22% of all loan verbs from this cluster, to be followed by the suffix *-i-* that is used for more than 10% of the Western European loan verbs. The remaining suffixes have such a low usage frequency that they may be considered occasionalisms. Quite interestingly, the overwhelming majority of loans in *-ova-* in this cluster are also scientific terms that were integrated into Russian at the same time as those in *-irova-*. Therefore, in the next section we will analyze whether morphophonology influences the choice between these two suffixes.

The loans in *-i-* are either very old, such as *celit'* 'aim' < German *zielen* 'aim'[15] or very recent, as e.g. *piarit'* 'make PR'. This suggests that *-i-* has two peaks of productivity, namely at the beginning of the first period of borrowing from Western European languages, when borrowings in *-i-* from Old Germanic or Turkic languages possibly still served as a model, and secondly in the 20th century when many loan verbs from English entered Russian.

To sum up, the analysis of suffix distribution across Russian loan verbs highlights the influence of historical contact with different language groups. Early borrowings from Old Germanic and Turkic languages predominantly use the suffix *-i-*, while loan verbs from Balkan languages demonstrate a more balanced use of *-i-*, *-irova-*, and *-ova-*, reflecting ongoing linguistic interaction. Western European loan verbs, particularly from the Renaissance onward, show a preference for the suffix *-irova-*, especially in scientific vocabulary, with *-i-* re-emerging in English loanwords during the 20th century. These patterns underscore the evolving productivity of suffixes in response to language contact over time. Furthermore, this raises the question whether the usage of various suffixes for the morphological integration of loan verbs is subject to a pragmatically motivated, spiralic (in von der Gabelentz' sense 1901, p. 256) process of language change. Additionally, our findings display a parallel with an observation Wiemer and Seržant (2017, p. 239) made about Slavic verbal affixation and aspect, namely that since Common Slavic, affixation has moved away from "highly lexically conditioned and versatile suffix choices" towards "fewer and more transparent suffixes": likewise our data shows that from all suffixes that can potentially be used for the integration of loan verbs only two, namely *-irova-* and *-i-*, may be considered as loan verb markers proper, i.e. highly productive loan verb markers with alternating peaks of productivity.

4.5 Morphophonology

To check which role morphophonology plays in the suffix choice of loan verbs we analyzed the coda of the stem directly preceding the suffix. The suffix and the infinitive postfix were automatically removed in the database and the first symbol to the left of the suffix was considered. The stems were grouped according to the place of articulation of the codas attained

[15] *Celit'* 'aim' is attested in the earliest texts of the Middle Russian (*starorusskij*) subcorpus of RNC dating to the 1350s. The fact that it is not attested in the Common East Slavic (*drevnerusskij*) subcorpus is most likely an artefact of the corpus architecture.

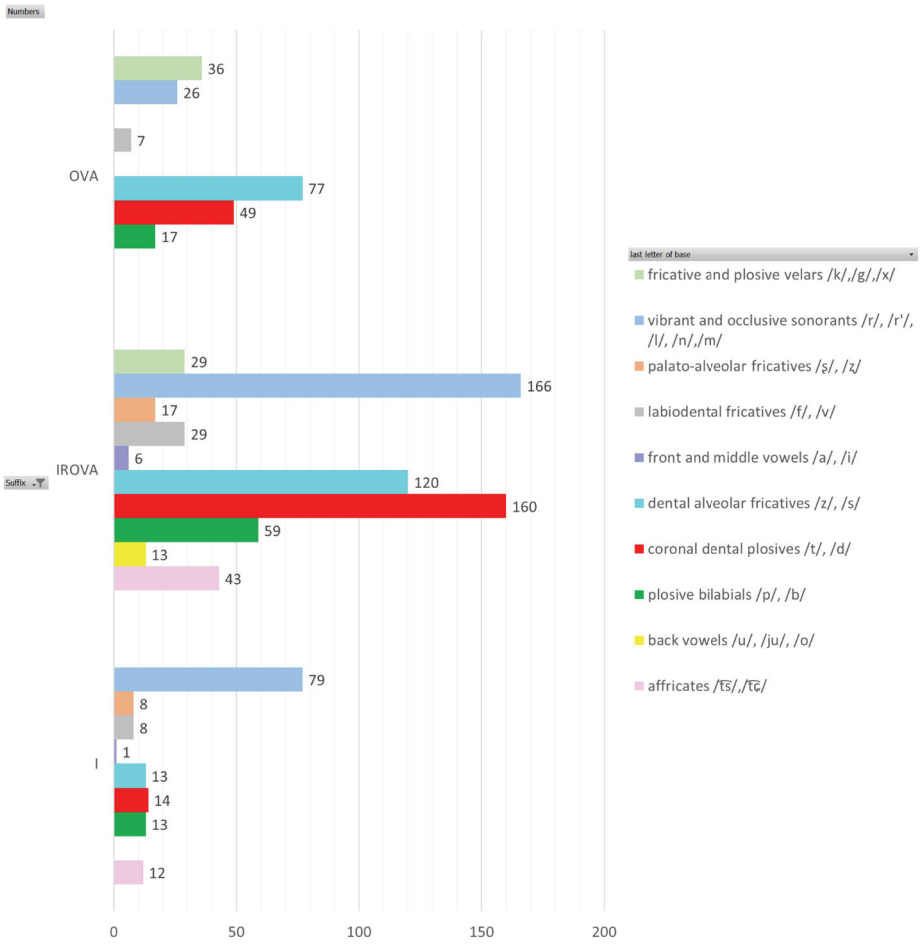

Fig. 7 The distribution of the suffixes according to the coda of the stem in the loan verbs

as a result of this procedure. One of the expectations was that palatalized consonants would be associated with suffixes starting with a front vowel (e.g. *-irova-* and *-i-* and *-eva-* but not *-ova-*; cf. the loan verb *celit'* 'aim (at)' and the respective noun *cel'* 'aim, goal' vs. the Slavic verb *celovat'* 'kiss'). However, in the majority of cases, it was not possible to determine whether the final consonant of the motivating base was palatal/palatalized due to the lack of such distinctions in the source language (cf. *konfliktovat'* 'conflict, quarrel' and the noun *konflikt* 'conflict' vs. *fartit'* 'be in luck' and the noun *fart* 'stroke of luck', where both *konflikt* and *fart* end in a consonant cluster with the final /t/). Furthermore, the verbs in the database have a rather high ipm (>4), which sets certain restrictions on the search and excludes marginal verbs and hapaxes.

The distribution of different codas among the suffixes is summarized in Figs. 7 and 8. For loan verbs, the suffixes *-i-*, *-irova-* and *-ova-* are characterized by the highest type frequency as they are attached to the largest number of stems, and can be called "big" suffixes, similar to the term "big" prefixes introduced in Janda et al. (2013) for aspectual prefixes recruited for a large number of aspectual pairs. Furthermore, *-irova-* and *-i-* also show the highest

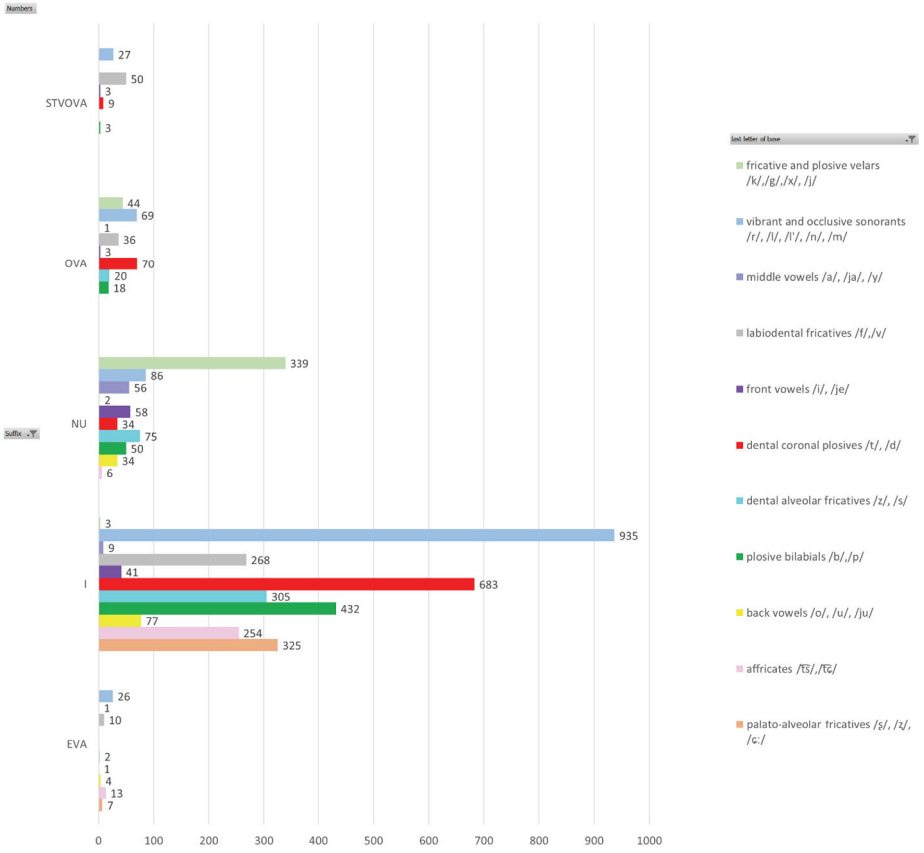

Fig. 8 The distribution of the suffixes according to the coda of the stem in the Slavic verbs

compatibility range across different codas, as they are compatible with the largest number of different coda types (see Fig. 7).

Our findings support Švedova et al.'s (1980) observation that stems with back vowels are predominantly associated with the suffix *-irova-*. However, the number of such loan verbs in our database is small, with only 13 examples. Upon reviewing all loan verbs with back vowel stems, we identified 13 that take the *-irova-* suffix and one that uses *-i-*. These verbs mostly represent older loanwords from Latin, transmitted through French or German, such as *konstituirovat'* 'constitute' (Lat. *constituere* > Ger. *konstituieren*) and *attenuirovat'* 'attenuate' (Lat. *attenuare* > Fr. *atténuer*). These verbs uniformly display the $u + i$ vowel combination, reflecting a morphophonological pattern inherited from the source language. Notably, *attenuirovat'* is the sole instance where the original language features $u + e$ rather than $u + i$. The only exception in this pattern is *tatuirovat'* 'tattoo', which, if a more recent borrowing, could be viewed as an analogical formation. Additionally, a cross-check of Slavic verbs in the online database reveals that the $u + i$ combination, as in *struit'sja*, is merely an orthographic artifact, as the actual base is *struj*. The same applies to Slavic verbs like *bespokoit'*, which exhibit $o + i$ due to orthographic convention. Therefore, we conclude that the combination of a back vowel (u) with a front vowel suffix (*-i-*, *-irova-*) is a distinctive loan

morphophonological feature, whose modest spread in Russian may have been facilitated by the aforementioned orthographic artifacts.

The allomorphs *-ova-* and *-irova-* in loan verbs have a similar distribution in terms of the stem coda. However, there are some remarkable differences: *-ova-* is more often combined with the coda ending in velars than *-irova-* (36 vs. 29), *-irova-* is more often combined with sonorants (166 vs. 26), and only *-irova-* is attached to the affricates /ˈt͡ɕʰ/, /t͡ʂ/ (43) and back vowels (13). Overall, as expected, alveolar affricates /ˈt͡ɕʰ/, /t͡ʂ/ are only combined with the suffixes starting with a front vowel: *-eva-*, *-i-*, and *-irova-*. A preliminary review of the database indicates that an additional factor, when choosing between the allomorphs *-ova-* and *-irova-*, could be the length of the stem. The suffix *-ova-* tends to be used with stems that contain two or more syllables, whereas *-irova-* appears to be preferred when the stem consists of a single syllable, as seen in examples like *maskirovat'* 'camouflage, mask off'. This factor requires further investigation.

Thus, the analysis of morphophonology in Russian loan verbs has revealed that *-irova-*, *-ova-*, and *-i-* are the most frequent and versatile suffixes in loan verbs. The suffix *-ova-* is common with velars and dentals, *-irova-* often combines with dentals and sonorants, while *-i-* is most frequent with sonorant codas. Stems with back vowels are mainly linked to *-irova-*, though this pattern is based on a limited number of verbs. The suffix *-irova-* can be attached to affricates and back vowels, while *-ova-* appears to be favored for multisyllabic stems. In general, although the morphophonological factor highlights the importance of stem structure and vowel compatibility in suffix selection, it seems to be secondary to the time and the source of the borrowing.

5 Conclusion

This study explores the integration of loan verbs into the Russian verbal system, addressing how these verbs align with or diverge from native Russian morphological patterns.

With regard to RQ1 (Are there suffixes that function as loan verb markers?), our data confirm that *-irova-* serves as a distinct marker for loan verbs. Most probably, the suffix *-irova-* emerged from the combination of the established suffix *-ova-*, used for verb formation and integrating loan verbs, with the German suffix *-ier-*, which speakers of Russian had analyzed as a loan verb marker. This synthesis created a new suffix, *-irova-*, specifically designed to denote loan verbs. Further supporting its role, our database reveals that *skladirovat'* 'store' is the only verb with a Slavic root utilizing the *-irova-*suffix, underscoring its function as a loan verb marker.

Furthermore, our findings indicate that the most frequent suffixes for loan verbs are *-irova-*, *-ova-*, and *-i-*. Contrary to Švedova et al. (1980), who emphasized *-irova-*, our research highlights that *-ova-* is also highly frequent, used with both loanwords and native Slavic stems. On the other hand, *-stvova-* is reserved for Slavic stems and typically derives verbs from nouns or adjectives, as demonstrated by *bedstvovat'* 'live in poverty'.

Addressing RQ2 (Are there cases where different suffixes can be added to the same verbal stem?), we observe that morphological variation is relatively rare in Russian, particularly among the frequently used verbs documented in the RNC database. While there are over 20 instances of "doublets", a closer examination reveals that these variations typically signify a semantic differentiation. In some cases, they also illustrate a process of leveling, where older verbs with the suffix *-ova-* are replaced by forms with an alternative suffix (e.g., *blagodarstvovat' – blagodarit'* 'thank'; *darovat' – darit'* 'grant, give').

RQ3 investigates the factors influencing suffix choice in loan verbs, focusing on motivating base, source language, and morphophonology. By examining a comprehensive database and referring to various resources on etymology and word formation, we have shown that the time and the source of borrowing are decisive factors in suffix selection, whereas morphophonology and the part of speech of the motivating base play an additional role when explaining the suffix variation within a given historic period.

We grouped the contact languages of Russian into four clusters based on historical periods and modes of transmission. Cluster 1 includes loan verbs that came into Russian from or via Western European languages, primarily from the Renaissance to the 18th century. Cluster 2 encompasses Old Scandinavian and Gothic, which influenced East Slavic languages during the Early Middle Ages. The third cluster consists of Turkic languages (e.g., Turkish, Tatar) along with their contact languages Arabic and Persian, whose contact with Common East Slavic and later Russian dates back to the 7th century. Lastly, Cluster 4 features Southern European languages (Greek, Bulgarian, Serbo-Croatian) that impacted Russian primarily through Church Slavonic.

The distribution of suffixes across loan verbs reveals distinct patterns based on their source languages and the period of their transmission, which in turn, tells something about the productivity of the respective suffixes. Loan verbs from Old Germanic languages exclusively employ the suffix *-i-*, while verbs borrowed from Turkic languages also predominantly use *-i-*, both clusters reflecting early contact. In the Balkan cluster, the suffixes *-i-*, *-irova-* and *-ova-* are used almost equally frequently, indicating prolonged contact with these languages. Notably, *-irova-* is the most frequently used suffix for Western European loan verbs, predominantly scientific terms introduced during the elaboration phase of the Russian language. The *-i-* suffix shows two productivity peaks in this cluster, namely in very early borrowings and again in the 20th century with English loan verbs. These patterns highlight the evolving productivity of suffixes in response to language contact, while also raising the question of whether the use of different suffixes for the morphological integration of loan verbs follows a pragmatically motivated, spiral process of language change. In short, it appears that the source language groups are predictive of the suffixes used; however, this association likely stems from the fact that the language groups represent distinct periods of intense borrowing. Different Russian suffixes were productive during various historical periods, reflecting the temporal nature of language contact and borrowing.

With respect to RQ4 (Do loan verbs display a pattern of suffix choice distinct from that of verbs with Slavic bases?), the findings indicate certain distinctions. The suffix *-irova-* is exclusively used with loan verbs. Additionally, preferences for parts of speech as motivational stems vary among different suffixes depending on whether the suffix follows a Slavic or loan base: e.g. for *-ova-*, there are more nominal motivating bases in the case of Slavic verbs, while *-i-* is predominantly used with nominal bases when forming loan verbs but not Slavic verbs. Notably, the combination of a back vowel /u/ with a front vowel suffix (*-irova-*) emerges as a unique morphophonological characteristic of loanwords.

Our study has illuminated important patterns in the use and productivity of suffixes in Russian loan verbs, particularly the suffixes *-i-*, *-irova-*, and *-ova-*. To advance our understanding of these morphological patterns, further research should focus on several key areas. First, a comprehensive analysis of the productivity of these suffixes across different historical periods will provide insights into their evolving usage and the factors driving these changes. This temporal perspective could reveal shifts in morphological preferences and their correlation with sociolinguistic and historical developments. Second, a detailed examination of very recent loan verbs with the suffix *-i-* is necessary, especially in their interaction with earlier borrowings that employ *-irova-*. Investigating how verbs with the suffix *-i-*, such as

model-i-t' 'model', coexist with and potentially affect the use of *-irova-* (cf. *model-irova-t'* 'model') in terms of productivity and frequency will shed light on competitive and coexistent morphological processes.

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Declarations

Competing interests We are not aware of any conflicts of interest regarding this article.

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