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A Corpus-Based Study on Orthographic Errors of Russian Heritage Learners and Their Implications for Linguistic Research and Language Teaching

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Abstract: The challenges faced by heritage language (HL) learners in mastering spelling and orthography are well-documented. Despite these documented difficulties, this aspect of HL linguistic knowledge has received limited attention from HL researchers. Beyond instructional implications, the study of spelling and orthography in HL speakers holds significance to building a finer understanding of the nature of heritage languages, since the development of orthographic skills is intricately linked to the knowledge of phonology and morphology as well as to metalinguistic awareness in these two areas. The study presented in this paper attempts to contribute to this area of research by turning its attention to orthographic skills of Russian heritage learners with English as their dominant language. The corpus-based research presented here categorizes orthographic errors in adjectival endings in hand-written essays produced by college-age HL learners of Russian of various writing proficiency levels and attempts to provide preliminary explanations for the source of these errors. While this paper is exploratory in nature and limited in scope by focusing only on adjectival endings, our results emphasize the need for further exploration in this underrepresented area to enhance our understanding of heritage language development and improve instructional strategies.

Keywords: spelling; orthography; Russian heritage learners; literacy



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1. Introduction

Heritage language (HL) learners are widely reported to face considerable challenges in mastering spelling and orthography (Beaudrie 2012; Carreira 2002; Kagan and Dillon 2001; Loewen 2008; Pyun and Lee-Smith 2011; inter alia), even appearing disadvantaged when compared to second language (L2) learners (Kim 2013). Despite these documented considerable challenges, spelling and orthography as aspects of HL linguistic knowledge have not so far garnered significant attention in heritage language studies, with some notable exceptions, such as Beaudrie (2012) and Llombart-Huesca (2018).

The dearth of research in this particular aspect of HL development is unfortunate for several compelling reasons. Since spelling and orthography are socially valued skills (Gerber and Hall 1987; Parker 1991), subpar spelling skills can negatively impact HL speakers' employability in professions requiring certain levels of proficiency, such as government, translation, media, or marketing (Carreira 2002). At the same time, limited research into how spelling abilities develop in HL speakers leaves language instructors grappling with difficulties in teaching spelling effectively, often resulting in frustration for both teachers and students.

Beyond its pedagogical implications, research on the acquisition of spelling skills by HL speakers must be of considerable linguistic interest. As highlighted by Ravid and

Gillis (2002), spelling is a genuine linguistic act which goes beyond a mere adherence to prescriptively established phoneme–grapheme correspondences; it is closely linked to phonology and morphology of the language, and the development of orthographic skills is intertwined with the growth of metalinguistic awareness in these two areas (McBride-Chang et al. 2010). Consequently, spelling offers insights into how the phonological, morphological, and syntactic information is stored in the language speaker’s mind.

In light of these observations, the study presented in this paper attempts to contribute to this area of research by turning its attention to orthographic skills of English-dominant Russian HL learners at various levels of global language proficiency. While this paper is exploratory in nature and limited in scope, given the paucity of available research, the results point to the fact that spelling provides an important perspective on the nature of heritage language and that studying HL speakers’ orthographic skills can contribute in significant ways both to the development of pedagogical approaches to HL Russian and to linguistic theory-building.

2. Spelling and Orthography in Heritage Languages

The few existing studies that investigated orthographic errors¹ in HL learners indicate that their struggles with spelling cut across the range of proficiencies and languages (Kim 2013), and are apparent even in HLs which share alphabets with the dominant language in the pair, in which the HL learners normally receive the bulk of their formal schooling (see Beaudrie (2012); Llombart-Huesca (2018) for review of such difficulties for Spanish HL learners). For example, in one of the first systematic accounts of HL spelling challenges that investigated the misspellings in the writing of English-dominant Spanish HL learners, Beaudrie (2012) shows that even fluent HL learners enrolled in Spanish language university courses struggle with spelling. While the learners generally had a good command of one-to-one grapho-phonemic relationships in Spanish, they also exhibited some inconsistent grapho-phonemic marking and struggled with written accent marks. Interference from English spelling was observed for both consonants and vowels. Beaudrie’s detailed panoramic description of the data led to the development of specific proposals for pedagogical interventions designed specifically for these learners.

Predictably, orthographic knowledge in HL learners at a lower proficiency level and of a language that does not have a similar writing system is much weaker, as Park et al. (2016) convincingly show. Their study compared the writing of Korean HL and L2 learners and found that the percentage of orthographic errors made by the heritage group was substantially higher (47%) than in the L2 group (37% to 40% depending on the proficiency level). While the HL learners showed a significant advantage over the L2 speakers for other types of errors (morphosyntactic and lexical), their spelling proficiency was at best only on par with the beginner level L2 learners of Korean.

The observations of this study highlight that HL speakers’ well-documented advantages over L2 learners are limited. Despite their advanced knowledge and skills in morphology and lexicon as well as in phonetic and phonological aspects in comparison to L2 users of the language (Chang 2016; Montrul 2013; Polinsky 2018), they consistently demonstrate challenges with spelling accuracy even at the advanced level of overall language proficiency (Kagan and Dillon 2001; Loewen 2008; Peeters-Podgaevskaja 2024; Pyun and Lee-Smith 2011; Smyslova 2012). While it may be tempting to attribute all or the majority of spelling errors to the phenomenon of ‘ear-spelling’ or phonetic spelling (as do Loewen (2008) and Park et al. (2016), for example), the explanation is likely to be far more nuanced. Although the descriptive error analyses are necessary first steps, they are somewhat limited from the theoretical perspective. Descriptive analyses offer only a surface description of the errors, that is, the mismatch between the target grapheme and the grapheme produced by the learner, and they rarely shed light on the underlying cognitive causes of the errors or the nature of this piece of linguistic knowledge. Orthography and spelling, however, are an important aspect of linguistic knowledge since spelling does not merely represent a system of phoneme–grapheme correspondences and/or a system

of spelling conventions; across linguistic systems, spelling and orthography are closely linked to phonology and morphosyntax (and, simultaneously, depend on and foster metalinguistic awareness in these two areas). In other words, “spelling allows us to see how the phonological, morphological, and syntactical information of words is stored in the learner’s mind” (Llombart-Huesca 2018, p. 211). In fact, a greater understanding of how these skills develop in the HL is important for theory building.

Thus, Llombart-Huesca (2017) set out to investigate the role of morphological awareness in HL speakers in the cognitive processing of orthography. The study involved 41 Spanish HL college students who were asked to complete morphological awareness and spelling tasks representing conflicting phonemic, morphemic, and graphemic demands. The results of the study provide evidence for the role of morphological awareness in correct spelling of the HL learners. In a follow-up paper, Llombart-Huesca (2018) calls for a better understanding of HL spelling and orthography based on the underlying cognitive-linguistic processes. She analyzes misspellings using a cognitive-linguistic framework to understand how the Spanish HL speakers assign graphemes to phonemes.

Continuing this, in our view, promising line of research, we report on a study that attempts to contribute to this inquiry by focusing on the development of spelling and orthography skills in Russian HL learners. In this work, we focus on the spelling of adjectival endings because, as previous studies and our rich pedagogical experiences indicate, Russian HL speakers exhibit selective control of the case system in nouns and adjectives, disfavoring adjectives (Polinsky 2018), and have difficulties with the agreement feature (Meir and Polinsky 2021; Laleko 2018, 2019, *inter alia*). Focus on the adjectival system also ensured an abundance of errors for analysis, allowing us to identify patterns while at the same time providing a more manageable dataset. While this study is exploratory and descriptive in nature, the presented error analysis raises many important questions from the theoretical perspective on heritage languages which call for further investigation and has significant implications for pedagogical practice.

3. Russian Phonetics and Orthography

3.1. Russian Language Sounds and Their Representation in Writing

Russian uses the Cyrillic alphabet of 33 letters representing the total of 41 sounds: 35 consonants, one special letter Ъ/J representing a glide, or the so-called semi-vowel [j], six vowels², and two markers not representing any sounds (the soft sign Ь and the hard sign Ъ).

The fundamental and inherent characteristic of all Russian consonantal sounds is the presence or lack of palatalization. Out of 35 consonants 30 form pairs based on this feature. Only three consonants are never palatalized [z], [s], [ʃs], in writing represented in Cyrillic by Ж, Ш, Ц, and two consonants are always palatalized [tɕ] and [cɕ], and are represented by Ч and Щ.

Surprisingly for first-time learners but “naturally” for literate Russian speakers, the +/– palatalization of consonants in writing is represented by vowel letters: one set of vowel letters to indicate that the preceding consonant is not palatalized, and a different set to represent that it is. For example, graphemes МА and БА represent the phonemes [ma] and [ba] respectively, while МЯ and БЯ represent [mʲa] and [bʲa].

A proficient Russian reader will see the difference in the vowel letters but will produce (or hear) the difference in the consonant; the vowel sound will remain the same. In fact, one and the same vowel sound may be represented in writing with two different letters, depending on whether the preceding consonant is palatalized or not: specifically, vowel sound /a/ is represented by letter А following the non-palatalized consonant and by letter Я following the palatalized consonant. Similarly, /o/ is represented by either О or Ё, /u/ by У or Ю, [ɛ] by Э or Е, all based on the +/– consonantal palatalization feature (see Table 1). In addition to representing the basic vowel sounds and signaling palatalization of the preceding consonants, in certain environments, letters Я, Ё, Ю, Е represent two sounds—the glide [j] and the associated basic vowel. This happens after a vowel, at the

beginning of a word, or after the hard or soft signs³ (ъ and ъ). In such instances, they are called iotated vowels.

Я—[j] + [a]	яблоко / <i>jabloko</i> (apple), баян / <i>bajan</i> (accordion), семья / <i>sem'ja</i> (family), объяснил / <i>ob'jasnil</i> (he explained)
Ё—[j] + [o]	ёлка / <i>elka</i> (fir tree), поёт / <i>poët</i> (sings), пьёт / <i>p'ët</i> (drinks), объём / <i>ob''ëm</i> (volume)
Ю—[j] + [u]	юла / <i>jula</i> (a whirl), поют / <i>pojut</i> (they sing), пьют / <i>p'jut</i> (they drink)
Е —[j] + [ɛ]	ел / <i>el</i> ⁴ (he ate), поел / <i>poel</i> (he has eaten), в семье / <i>v sem'e</i> (in a family), въехал / <i>v''exal</i> (he drove in)

It is important to note here the functions of the soft sign. Firstly, it is used to indicate palatalization of consonants in the absence of a vowel at the end of words (день /*den'* (day)) or in a consonant cluster most often at the end of a syllable (письмо /*pis'mo* (letter)). In addition, the soft sign plays a crucial role in encoding the /j/ sound after a palatalized consonant and before a vowel sound: e.g., семья /*sem'ja* (family) vs. семя /*sem'a* (seed). Monolingual children learning to spell in Russian learn that the soft sign “separates” the /j/ sound from the preceding consonant while keeping it soft.

Before we proceed to the next section in which we discuss reduction of vowel sounds, we must address two more vowel sounds—[i] and [i] represented in Cyrillic by the letters Ъ and И. Although the distribution of these letters is also constrained by the +/− palatalization of the preceding consonant, unlike the four pairs of vowels described above, these two letters represent two *distinct* vowel sounds that do not exist in the same type of relation with each other: i.e., the letter И does not represent the sound of the letter Ъ after palatalized consonants. However, following the soft sign, И does represent a combination of glide [j] plus the sound [i] like other iotated vowel letters: воробьи /*vorob'ji* [sparrows]. We can now summarize the phoneme to grapheme representation of basic vowels in Russian in Table 1.

Table 1. Basic vowel sounds of the Russian language and their representation in letters.

Vowel Sounds	Letters Representing Basic Vowel Sounds That Follow Non-Palatalized Consonants	Letters Representing Basic Vowel Sounds That Follow Palatalized Consonants
[a]	А	Я
[o]	О	Ё
[u]	У	Ю
[ɛ]	Э	Е
[i]	-	И
[i]	Ь	-

3.2. The Sound [j]

This sound deserves a special section because of its phonetic ambiguity and the role it plays in adjectival endings, which are the object of the current study. The sound occupies an intermediate position between the consonant and the vowel, and for this reason, in different works, is referred to as a semi-consonant, a semi-vowel, a glide, or a palatal approximant (Wade 2011; Padgett 2008). Importantly, despite its vocalic nature, [j] is not syllabic as it cannot produce the nucleus of a syllable.

The sound [j] can be represented in writing in two ways: with a designated letter Ъ if it appears at the end of a word as in бой /*boj* (fighting), or between a vowel and a consonant as in лейка /*lejka* (a watering can); and by the letters Я, Ё, Ю, Е if it appears at the beginning of a word⁵ (яблоко /*jabloko* (apple)), after the soft or hard signs (семья /*sem'ja* (family), объяснить /*ob'jasnit'* (to explain)), or between two vowels (большая /*bol'saja* (big), заяц /*zajac* (hare)).

The glide is most audible at the beginning of a word, especially when followed by a stressed vowel because its articulation is the strongest. When the glide appears in an intervocalic position, its articulation is weakened and may be completely lost before an unstressed [i] (Pugh 1993; Isačenko 1976). Similarly, the glide is in its weakest position at the end of a word when it may be imperceptible, especially in fluent, connected speech.

3.3. Vowel Reduction

Out of the six basic Russian vowel sounds, three—[a], [o], [ɛ]—undergo reduction in unstressed positions and may be pronounced as: [ə], [ʊ], [ɪ], [i]. The degree of reduction depends on their proximity and positioning (before or after) in relation to the stressed syllable: the pretonic reduction is less severe than the post-tonic reduction, but generally, the farther away a sound is from the stressed vowel, the more severely it will be affected. Due to reduction, the phonemic contrast between the unstressed vowels [o] and [a] becomes neutralized, and both may be perceived as [ə], or [ɪ] in some environments or [i] when following a palatalized consonant, and the unstressed vowel [ɛ] after palatalized consonants usually sounds identical to [i]. If one were to write words purely phonetically, unstressed vowel sounds after non-palatalized consonants could be represented by the letters Ъ or А, whereas in fact, they should have been А or О. Linking unstressed vowel phonemes to graphemes requires a developed level of phonemic and morphological awareness, something that is achieved by monolingual speakers through rigorous training stretching over at least seven years of formal education. This brings us to the next section which describes orthographic principles of the Russian language.

3.4. The System of Russian Orthography

Russian orthography is considered to have a high degree of transparency in the direction from letters to sounds, but has much less predicting power and a high degree of inconsistency when encoding sounds in letters (Grigorenko 2005). The major reason for these irregularities is due to the morphological unity principle, which accounts for the spelling of the overwhelming majority of Russian words. The principle dictates that the roots and affixes are preserved in writing, regardless of their phonetic realization in speech. As a result, the Russian writing does not reflect such phonetic processes as vowel reduction, consonant devoicing, or assimilation. Russian orthography requires unstressed vowels to be spelled the same way they would be under stress and consonants the same way they would be in their strongest articulatory position in order to preserve morphological unity. Compare, for example, the spelling (bolded) and phonetic realization of a root that means ‘water/related to water:’ **вод**-а [vəd] (water), **вод**-ка [vot] (vodka), **вод**-яной [vədʲ] (pertaining to water), **подвод**-ный [vod] (underwater). Note that not only the vowel of the root changes, depending on the shifting stress,⁶ but also the consonant alternates palatalization and voicedness features. Russian schools teach students to check the morphology of words, identifying prefixes, roots, suffixes, and endings as they are presented in the strong position (for vowels) or in combination with vowels (for consonants), and following certain steps for verifying their spelling in order to write correctly.

Beyond these principles, writers of Russian must follow various spelling conventions, some of which violate the system of representation of palatalized and non-palatalized consonants described above. Specifically, the always hard consonants [z], [s] represented by the letters Ж and Ш, respectively, must always be followed by the vowel letter И which normally signals palatalization of the preceding consonant, despite the fact that what we hear is the sound [ɪ]. Similarly, the always soft [tɕ] and [cɕ] represented by the letters Ч and Щ must be followed by the letters А and У which normally indicate a lack of palatalization of the preceding consonant, despite the definite auditory perception of palatalization. The third such convention concerns the spelling of an unstressed [o] in the endings of nouns and modifiers (adjectives, participles, and possessive pronouns) and in derivational suffixes after hushers [tɕ], [cɕ], [z], [s] and [ts]. Since the vowel is unstressed, it is perceived as [ə] regardless of the preceding consonantal sound, but a speller must write the letter Е after

hushers represented by letters Ж, Ш, Щ, Ч, or Ъ, and the letter О in all other cases in hard-stemmed words.

Moreover, the spelling of grammatical endings, a prominent feature of Russian, follows fixed prescriptive rules that do not allow any deviations. In many ways, these rules may be considered spelling conventions because they do not appear immediately logical to a novice and must be memorized. Such prescriptive rules concern all grammatical endings, regardless of the word class, and specifically in the nominal and pronominal systems, they govern the spelling of the gender (M, F, N), number, and case markers. For example, the endings of neuter nouns must be spelled with О or Е,⁷ regardless of their phonetic representation: for example, [milə] (soap) is spelled as мыло/*mylo*. The choice between the two letters depends on the +/− palatalization feature of the stem consonant.

Similarly, the endings of Russian adjectives, which must agree with the nouns they modify in gender, number, and case, are expressed in writing in a consistent way governed by strict prescriptive grammatical rules. The always multiphonemic endings must be represented by specific combinations of at least two, and in some cases three, graphemes. For example, the ending of the word красивая/*krasivaja* (Nom, F) is spelled with two letters which represent three sounds [krɐsivəjə], and the ending of красивый/*krasivyj* (Nom, M) is spelled with two letters standing for two phonemes [krɐsivij]. When these words are pronounced in isolation with clear articulation, all phonemes are produced and perceived. However, in fluid and connected oral speech, adjectival endings are usually not clearly articulated or audible due to the phonological processes of the reduction of post-tonic unstressed vowels and the loss of the final or intervocalic glide [j]. As a result, only one phoneme may be present: e.g., [krɐsivə] instead of [krɐsivəjə].

Adding to this complexity in the spelling of adjectival endings, we must note four important considerations. First, the majority of the Russian adjectives are stem-stressed, leading to a high degree of reduction in the post-tonic vowel(s) of the ending. Second, adjectives may have hard or soft stems, but the overwhelming majority are hard-stemmed. Because the presence or absence of consonantal palatalization is indicated by vowel letters and because all adjectival endings begin with a vowel, for each adjectival form—in number, gender, and case—a speller must choose between two versions of the ending: hard or soft. In addition, the writer must keep in mind the spelling conventions described above. Third, three Russian consonants [k], [g], [x] cannot be followed by the high mid vowel [i] or be palatalized before [a] or [u], which means that adjectives with hard stems ending in Г/G, К/K, or Х/H may be spelled with a soft version of the ending in some forms and a hard version of the ending in others. As an example, consider the endings of four different adjectives in the Nominative case in Table 2. Finally, there is a spelling convention concerning specifically the endings of the masculine and neuter adjectives in the Genitive singular case (and masculine Accusative when describing animate nouns) which dictates that the phoneme [v] in the intervocalic position must be spelled with the letter В which normally represents the sound [g]: красивого/*krasivogo* [krɐsivəvə] (of beautiful (masc)).

In sum, the Russian orthographic system exhibits a low degree of transparency in the direction from *sounds* to *letters*, owing to the morphological principle of Russian orthography which commands the speller to ignore the phonetic shape for the sake of preserving morphemes unchanged in writing. One phonological phenomenon (among many) that contributes to this lack of transparency is unstressed vowel reduction which neutralizes differences between unstressed vowels, making it challenging to predict their spelling from sound. In addition to the morphological unity principle, the written shape of words is influenced by spelling conventions that often have numerous exceptions. The rich inflectional morphology of Russian is characterized by a high level of irregularity and complex interactions between phonology and morphology altering word forms (Rakhlin et al. 2017).

Table 2. Adjectival endings in the Nominative case singular and plural.

	Adjective with a Non-Palatalized Stem	Adjective with a Palatalized Stem	Adjective with a Stem Ending in [x] → Requiring a Spelling Rule	Adjective with a Stem Ending in [ʃ] → Requiring a Spelling Rule
Masculine	красн ый /krasnyj ['krasnij]	син ий /sinij ['sinʲij]	тих ий /tixij ['tixʲij]	хорош ий /xorošij [xɐ'roʂij]
Feminine	красн ая /krasnaja ['krasnəjə]	син яя /sinjaja ['sinʲjə]	тих ая /tixaja ['tixəjə]	хорош ая /xorošaja [xɐ'roʂəjə]
Neuter	красн ое /krasnoe ['krasnəjə]	син ее /sinee ['sinʲjə]	тих ое /tixoe ['tixəjə]	хорош ее /xorošee [xɐ'roʂijə]
Plural	красн ые /krasnye ['krasnijə]	син ие /sinie ['sinʲijə]	тих ие /tixie ['tixʲijə]	хорош ие /xorošie [xɐ'roʂijə]

All of these aspects make the acquisition of Russian orthography an arduous affair. In secondary schools in the metropoly, a considerable amount of time is dedicated to the mastering of spelling and orthography rules. In fact, orthography instruction, including word and sentence structure, morphological, derivational, and inflectional processes, and spelling rules, continues into the high school years with students often unable to exhibit spelling mastery even if they have no difficulties with reading. It is, therefore, not surprising to see Russian HL speakers who typically lack access to Russian language instruction struggle with these aspects of literacy. We hypothesize that the non-standard underlying representation of phonetic and phonological systems and the limited morphological knowledge which result from a divergent acquisitional path in heritage bilingualism, coupled with the interference from the dominant language, lead to unique challenges in spelling development for Russian HL speakers. We believe that a greater understanding of these challenges will lead to improvements in instructional approaches and contribute to a better understanding of the nature of the HL linguistic system overall.

4. The Current Study

4.1. Goals of the Study

Considering a glaring gap in research on orthography and spelling in Russian heritage bilinguals, the purpose of this study is mainly exploratory as the first and necessary step in a research agenda concerning writing in heritage Russian. Ultimately, such research would lead to a better understanding of the underlying linguistic representations in heritage bilinguals and to the development of effective pedagogical methods for teaching orthography to heritage bilingual children and adults. The current study aims to identify patterns of orthographic errors in adjectival endings produced by adult English-dominant Russian heritage learners (HL learners) from colleges and universities across the United States. Building on the pioneering work of [Beaudrie \(2012\)](#) on spelling in Spanish heritage bilinguals in the US, our exploratory research was guided by the following questions:

1. What types of orthographic errors do HL learners make in the adjectival endings when writing freely in Russian?
2. What patterns or categories of errors can be identified in adjectival endings?
3. What can these categories of errors suggest about HL learners' underlying linguistic representations?

4.2. Data and Participants

The data for the study come from a corpus of essays drawn from the 2012 National Post-Secondary Russian Essay Contest organized by the American Council of Teachers of Russian among college-aged L2 and HL learners of Russian of various proficiency levels at colleges and universities across the US. For the purpose of the study, we created a subcorpus consisting of 86 texts produced by HL learners, who were either born in the

US in a Russian-speaking family or relocated to the US before the onset of schooling, i.e., before age 7.

All essay writers, regardless of their proficiency level or year of study, were given the same writing prompt: Что такое друг?/What is a friend? The participants were not instructed to adhere to any specific writing genre, but the nature of the prompt led contestants to produce short texts with elements of narration and description. All participants wrote their essays by hand at approximately the same time (between late January and early February 2012) at their universities under the supervision of a proctor. Participants were given 60 min and were not allowed to use dictionaries, computers, or other resources (for more information on the corpus, see [Kisselev 2019](#)).

The 86 essays written by HL learners were presented as handwritten copies to an experienced certified Oral Proficiency Interview (OPI)/Writing Proficiency Test (WPT) rater who assigned a writing proficiency level following the ACTFL Proficiency Guidelines ([ACTFL 2012](#)), a standard in US language education. The resulting breakdown by proficiency levels is presented in Table 3.

Table 3. Breakdown of the heritage language learner data by proficiency levels.

Level Assigned	# of Essays in Each Level
Novice High	1
Intermediate Low	2
Intermediate Mid	21
Intermediate High	23
Advanced Low	22
Advanced Mid	8
Advanced High	6
Superior	3
TOTAL: 86	

The WPT rater additionally provided descriptive comments and rationale on which they based their decision. Notably, 78% of the comments mentioned spelling in either positive or negative ways, and 75% mentioned spelling in a negative way, e.g.,

- Intermediate Mid: **“Too many spelling/grammar mistakes often make the message unclear and difficult to read.** Basic words get systematically misspelled although the vocabulary and linking of the ideas is adequate.”
- Intermediate High: “Decent vocabulary and sufficient text type but **serious spelling and grammar issues.** Vocabulary and word order are very oral and colloquial.”
- Advanced Low: “Advanced vocabulary and almost native like syntax but **problems with spelling** and grammar. “
- Advanced Mid: “Advanced vocabulary, grammar and syntax; good text organization, able to express some details. **Makes frequent spelling and punctuation mistakes,** uses wrong endings and forms”.
- Advanced High: “Native like skills: storytelling, syntax, vocabulary, organization of discourse. **Spelling and punctuation errors.** Might have difficulty talking about abstract topics”.

The highest percentage of positive comments on spelling apply to essays that were assigned Intermediate High and Advanced Low levels. However, as can be seen from the examples of the comments above, even those essays that received high proficiency ratings still exhibited frequent spelling errors.

As a separate task in data processing, all essays were digitized preserving the original spelling. The texts were then converted into a UTF format to aid in computational analysis.

All non-standard spellings were manually marked with a tag and were followed by the correct form: e.g., <error=" Емо">Емё</error>. All errors were then extracted automatically, using the error tag. The total number of orthographic and spelling errors came to 4379.

For the purpose of the study, we narrowed the data to a subset of errors in adjectival endings which brought the number of errors down to 444.⁸ The decision to focus on spelling errors in adjectival endings specifically was motivated by the consideration that adjectival endings would lend themselves aptly to the analysis of orthographic errors because they consist of both vowels and consonants, with vowels always coming first and attaching to consonant-final stems which can be hard or soft, are usually unstressed and, as a result, subject to vocalic reduction and the weakening or loss of the intervocalic and final glide /j/. Analyzing adjectival endings would, therefore, allow us to see all of the complexity of the Russian orthographic system described in Section 1. Moreover, since the focus of the study was specifically on orthographic errors, we excluded adjectives that unambiguously contained grammatical errors (e.g., wrong gender or case assignment). To achieve this, words with errors were considered within their left and right contexts. Finally, we narrowed down the analyzable data set to include only masculine adjectives because they have a more developed declensional paradigm exhibiting a variety of forms, which makes it easier to identify patterns of errors. As an additional consideration for the selection of masculine adjectives, we noted a certain bias in the data toward masculine gender possibly because the noun ‘friend’ in the essay prompt is grammatically masculine in Russian: out of the 444 adjectives with errors used in the 86 essays, 206 (46.4%) were masculine.

Before we begin to describe data analysis, it is important to present the prescribed spelling of masculine adjectival endings across the declensional paradigm (Table 4). Any deviation from these spellings was annotated as an error.

Table 4. Masculine adjectival endings across the declensional paradigm.

	Adjective with a Non-Palatalized Stem	Adjective with a Palatalized Stem	Adjective with a Stem Ending in [x] → Requiring a Spelling Rule	Adjective with a Stem Ending in [ʃ] → Requiring a Spelling Rule
Nominative	красив ый	син ий	тих ий	хорош ий
Genitive	красив ого	син его	тих ого	хорош его
Accusative (anim.)	красив ого	син его	тих ого	хорош его
Accusative (inanim.)	красив ый	син ий	тих ий	хорош ий
Dative	красив ому	син ему	тих ому	хорош ему
Instrumental	красив ым	син им	тих им	хорош им
Prepositional	красив ом	син ем	тих ом	хорош ем

To code errors, we began by making a list of a few common errors we have seen in the writing of our own students and assigning them a code name. We expanded the list every time we encountered novel errors and, whenever necessary, changed code names, sometimes folding previously identified categories into larger ones if they appeared to be too granular and would obscure identifying potential patterns. We frequently examined the entire essays of specific writers in order to have a better understanding of their spelling habits and penmanship quirks, especially if the automatically extracted tags raised questions about the accuracy of encoding handwritten writing into typed texts.

5. Error Analysis

The few studies on spelling development in monolingual and bilingual children (Grigorenko 2011; Bučilova 2015; Eliseeva 2018; Galaktionova 2020) presented some taxonomies or attempted to present errors as patterns but were either too surface-descriptive (using

such non-specific categories as ‘letter omission’ or ‘phonetic spelling’) or were based on the pedagogical rules for spelling used in the elementary literacy education in Russian-medium schools (e.g., spelling of fricatives). Although these observations provided important starting points, they were not granular enough to account for the errors in our data and did not include all types of errors we observed; thus, in this study, the analysis of learner errors led to the creation of a taxonomy rather than being guided by one. Figure 1 presents all errors identified in this research. We will describe four large categories of errors identified in the data and attempt to provide preliminary explanations of their nature and occurrence:

- (1) representation of the sound [j];
- (2) spelling of unstressed vowels;
- (3) spelling convention errors;
- (4) representation of the palatalization or lack thereof of the final stem consonant by using inappropriate vowel letters.

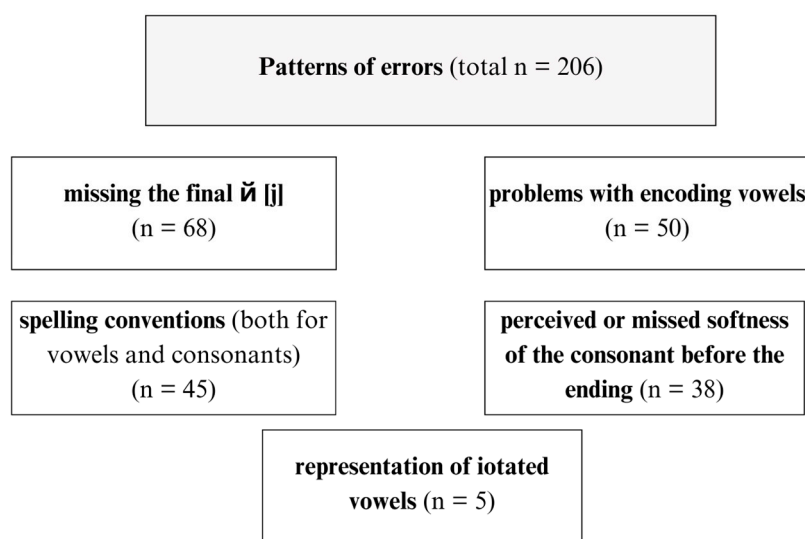


Figure 1. Numbers of spelling errors by category.

The first and most numerous category of errors that emerged from the analysis concerns the representation of the sound [j]: out of 206 total errors, 73 pertained to the glide. The most common type of error in this category ($n = 68$) is the missing letter Ъ/J in the final position: e.g., *самы/samy* instead of *самый/samyj* (most); *редки/redki* instead of *редкий/redkij* (rare). The second type of error concerning [j] manifests itself as the substitution of the letter Ъ with the iotated vowel letters Е and Ё or the letter И ($n = 5$): e.g., *настоящие/nastojščie* instead of *настоящий/nastojščij* (real); *честныи/čestnyi* instead of *честный/čestnyj* (honest).

The missing Ъ was expected since there is a documented phonological process affecting the glide in the final position in full Russian: it becomes non-perceptible in connected fluent speech (Isačenko 1976). It is harder to explain the replacement of Ъ with the letter Е although it is also possibly related to the perception of the glide [j] since this letter can be used to represent [j] in combination with the vowel sound [ε], specifically in postvocalic position. The use of the letter И may also be attributed to possible confusion with Ъ as the two letters look almost identical and the sounds they represent may be perceived by bilinguals as quite similar. This explanation is supported by our own observations of HL writing: HL learners often seem to use the two letters interchangeably, for example, putting Ъ in the middle of a word between two consonants, when they clearly must hear the sound [i] and not knowing (or understanding) that the glide [j] cannot form a syllable.

The second largest category of errors concerns the representation of unstressed vowels and manifests itself in multiple ways ($n = 50$):

- replacing unstressed О/О with А/А: e.g., *красиваму/krasivamu* instead of *красивому/krasivomu* (beautiful (male));

- replacing unstressed Ъ/Ь with О: e.g., *новом/novom* instead of *новым/novym* (new), *бедном/bednom* instead of *бедным/bednym* (poor);
- replacing unstressed И/І with Е/Е: e.g., *настоящей/nastojasčej* instead of *настоящий/nastojasčij* (real);
- replacing unstressed Е/Е with И/І: e.g., *будущим/buduščim* instead of *будущем/buduščem* (future).

Considering that the vowel letters О and Е are frequently represented in the declensional endings of masculine adjectives and are subject to severe reduction in unstressed post-tonic position, we expected to see the letter А instead of О and the letter И instead of Е: i.e., we expected HL learners to spell the endings phonetically. However, it is harder to explain the substitution of the letter Ъ with the letter О. This error is unlikely to be caused by phonology, and therefore, we hypothesize that it may be caused by HL learners' lack of experience with this letter in writing or the letter's "unusual" shape. At the same time, replacement of various vowel letters, including the letter Ъ with О, has been documented for monolingual children acquiring spelling skills in Russia and has been attributed to a possible overgeneralization of the rule for unstressed vowels and its extension to 'illegitimate' contexts (Galaktionova 2020).

Additionally, HL learners seem to interchange the letters И and Е which may be caused by the interference from English. The shape of the letter Е is the same in the two languages, but the letter represents different sounds: [j] + [ɛ] in Russian (or [ɛ] following a palatalized consonant) and [i:] in English, whereas the closest Russian equivalent of this sound—[i]—is represented by the letter И.

The next category of errors concerns violations of orthographic conventions that are highly counterintuitive, especially for novice spellers and, therefore, must be learned explicitly. In this category we can distinguish two subcategories: errors in conventions concerning the spelling of vowels (n = 22) and those concerning consonants (n = 23). For the former subcategory, Russian orthographic conventions require that after Ж/Ž and Ш/Š one must write the vowel letter И (not Ъ) and Е if the vowel is unstressed instead of О. In contrast, HL learners in our corpus wrote *хороший/xorošij* instead of *хороший/xorošij* and *хорошом/xorošom* instead of *хорошем/xorošem*. For the purposes of this analysis, we treated the requirement to write Г/G between two vowels in the ending of the Genitive or Accusative animate forms of adjectives as a spelling convention. Therefore, spellings like *таково/takovo* instead of *такого/takogo* and *плохова/ploхова* instead of *плохого/ploхого* were noted as a spelling convention error.

The most plausible explanation for this type of error is the known lack of Russian language education for Russian heritage bilinguals in the US and their inexperience with writing. Such errors are also quite common in the writing of monolingual children who have not yet developed literacy skills, i.e., before and during elementary school.

The last identified category includes errors in the use of vowel letters⁹ which affect the pronunciation of the preceding consonants: either essay writers used a vowel that indicates palatalization when the consonant of the stem is actually hard (e.g., *каждем/každem* instead of *каждом/každom*) or, conversely, when they used a vowel that indicates a lack of palatalization when in fact the preceding consonant is palatalized (e.g., *соседном/soseďnom* instead of *соседем/soseďnem*). The incorrect marking of soft consonants with a hardness-indicating vowel occurred only in 5 cases with inherently soft-stemmed adjectives and is likely related to HL learners' inconsistent lexical knowledge. Soft-stemmed adjectives are rare (only about 40 in the entire language) and most of them are low in frequency.

The largest share of errors in this category (n = 33) concerns the incorrect use of softness-indicating vowels after hard consonants: *каждем/každem* instead of *каждом/každom*. Moreover, 18 out of 33 cases (54.5%) of such misuse of vowels co-occurred with the missing Ъ at the end of the adjective.

Explaining the nature of this last category of errors presents a challenge. On the one hand, these errors can point to HL speakers' difficulties perceiving the differences between palatalized and non-palatalized consonants. However, as practice shows, the same HL

speakers who write трудни/*trudni* instead of трудный/*trudnyj* will pronounce the word with correct consonantal sound, in this case a non-palatalized [n]. The fact that in our data more than half of the cases concerning the misuse of softness-marking vowel letters Ъ or Е also involved a missing letter Ъ at the end of the adjectives may suggest that some phonological processes are at work. It is possible that HL learners may hear the glide [j] right next to the consonant of the stem and perceive that consonant as soft. However, at this point, this explanation is only speculative and requires a series of experimental tasks to uncover the true nature of this type of error.

On the other hand, the misuse of Ъ in hard-stemmed adjectives could be a purely mechanical error, i.e., HL learners have not yet fully internalized the major principle of the Russian spelling system where the softness/hardness of the consonant is marked by the following vowel letter. Additionally, they may be confusing the shape of the Russian letters Ъ, Ь, and Е due to interference from English and/or the learners' lack of experience with writing in Russian.

Now that we have described four categories identified in our analysis, we can consider another way of categorizing the errors that is based on morphology presented in Figure 2 below. Considering the multiphonemic nature of adjectival endings, we can separate all identified errors into two large groups: errors in full (i.e., multiphonemic) endings and reduced endings. The latter category is formed by those adjectives that were spelled without the final Ъ thus rendering them monophonemic against the morphological rule for adjectival endings which dictates that there must be at least two letters or more, depending on the grammatical case. Such grouping has an immediate benefit of noticing the co-occurrence of errors: in the category of reduced endings, 18 out of 68 (26%) cases also involved incorrect use of softness-indication vowel Ъ. In the full endings category, we can note four areas of difficulty for HL learners. The majority of errors concerns the representation of unstressed vowel sounds [e], [i], and [ə] with the letters А, О, Ъ, and Е not governed by spelling conventions as well as the choice between the letters О and Е after [tɕ], [ɕ:], [z], [s], and [ts] and the representation of the sound [i] after [z], [s] which is governed by spelling conventions. In fact, the second area of difficulty is conditioned by the lack of knowledge and/or practice of spelling conventions, both for vowels and consonants. Incorrect usage of vowel letters that falsely marks the +/– palatalization of the preceding consonant and the representation of the combination [j] + vowel comprise the last two, smaller, categories of errors in full endings.

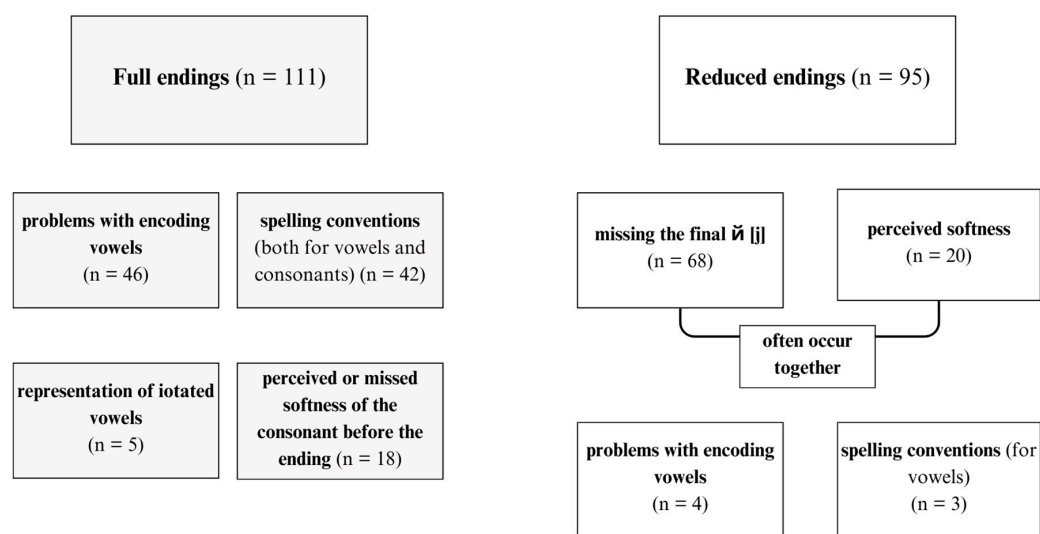


Figure 2. Categorization of errors in the adjectival endings by full vs. reduced endings.

We may now summarize that multi-phonemic endings without the presence of the glide, which comprise the majority of the masculine declension paradigm, present a chal-

lenge for encoding vowel phonemes, and the omission of the final letter Ъ leads to reduced endings in writing. In both cases, the patterns of errors suggest the lack of morphological and/or phonological awareness.

6. Discussion

As shown in the research literature on the topic—and supported by the results of the current study—spelling and orthography are worthy aspects of linguistic inquiry and, in fact, a highly consequential area of inquiry for HL studies. Spelling is not merely a system of phoneme–grapheme correspondences (perhaps complicated by the influence of the dominant language orthography in case of heritage bilinguals) which can only be patiently practiced and memorized. In Russian, as well as in many other languages with a varying degree of transparency in writing systems (Verhoeven and Perfetti 2011; Perfetti and Verhoeven 2023), accurate spelling requires developed phonological and morphological awareness, which depends on the general level of language competence and is fostered by formal instruction.

As previous research on monolingual Russian-speaking children shows (see, for example, Rakhlin et al. (2017) for a review), both types of metalinguistic awareness are important for reading and writing. Within phonological awareness, phonemic segmentation especially was shown to be a better predictor of orthographic processing and spelling than mechanisms underlying fluency, such as timing or automaticity of processing as measured by rapid automatized naming tests. Studies on Russian-speaking monolingual children reviewed by Rakhlin et al. (2017) and supported by studies in other languages (Verhoeven and Perfetti 2011) also indicate that morphological knowledge is closely connected not only to reading, but also to spelling accuracy in monolingual children. It follows that in order to represent words in writing, a Russian speaker must maintain attention at multiple levels, including phonemic (letter–sound correspondence), syllabic (marking of consonantal features with vowels), and morphemic levels (determining word stress and morpheme boundaries), a task that HL learners, especially at lower proficiency levels, may find overwhelming or even impossible, especially if their underlying representation of the sound system significantly diverges from the full variety.

Specifically, an important observation made in this study concerns the reduction of adjectival endings to just one letter by nearly half of the participants in our dataset. We posit that these “truncated” endings may be a symptom of a restructured system where the adjective does not have a multiphonemic—and hence, multi-letter—ending. This observation may help interpret the well-documented difficulties of Russian HL speakers with gender agreement in a more nuanced way. Coupled with the fact that phonetic distinctions among masculine, neuter, and plural stem-stressed adjectives in the Nominative case are mostly neutralized in fluent speech, our finding broadens the discussion of the nature of loss/restructuring of gender agreement. Our analyses suggest that exposure to the oral language and even experience with outputting the oral language do not necessarily lead to the maintenance of the standard adjectival ending. A similar observation was made by Bučilova (2015) who reported 30% erroneous forms in the unstressed endings of nouns in the writing of the bilingual children, in comparison with only 8% for the monolingual children in the study.

The absolute majority of errors concerning the omission of Ъ are found in the writing of learners at the Intermediate range of proficiency; writers at the Advanced level show a better command of the full ending paradigm, suggesting that greater literacy skills may help develop greater morphological awareness and in turn, better morphological awareness helps learners spell more skillfully.

Another type of error that requires further attention is the incorrect use of vowel letters to mark softness/hardness of the preceding consonant. On the one hand, one may attribute these errors to the quirkiness of the Russian spelling system that conventionally indicates the +/– palatalization of the consonant by the following vowel. If we assume that this is a purely mechanical error, it becomes a matter of instructional practice. However, palatalized

consonants are a feature absent from the learners' dominant language (English), which may impact the underlying representation of the HL phonological system where this distinction may be undergoing a change. The fact that this error is often made in conjunction with another particular error, omission of the final Ы/J, may indicate that this is not purely an issue of spelling mechanics. To investigate this, further experimental studies are required.

Predictably, a certain number of spelling errors belong to the category of "convention-based" and are likely driven by the lack of explicit knowledge of spelling rules. These errors, as well as errors that may result from the influence of the dominant language, do not offer much insight from the language-theoretical perspective. They seem to follow the same patterns as those observed in monolingual children (Grigorenko 2011; Sal'nikova 2014; Galaktionova 2020) and bilingual children (Bučilova 2015; Eliseeva 2018; Peeters-Podgaevskaja 2024). Since these spelling conventions are counterintuitive (i.e., they violate the expected relationship between phonemic and graphemic shape of a given word or morpheme), they may, in fact, be more indicative of the "standardness" of the underlying phonological system and simply betray the lack of literacy instruction. They may be both the most teachable and most persistent, as current research on adult Russian monolingual writers shows. Importantly, in our study HL writers were observed to commit different types of errors throughout the same text and sometimes even in the same words. In other words, the HL learners in our study can each exhibit highly variable patterns of errors similar to monolingual children, who mix both phonetic spelling and hyper-application of rules in the early stages of writing acquisition (Sal'nikova 2014).

The peculiarities of the Russian orthographic system highlight differences in the development of reading and writing skills, which in linguistic research are usually grouped together under the label "literacy." In fact, research on spelling, including this study, suggests that HL linguistics would benefit from separate investigation of these skills which may have important implications for our understanding of the nature of HL speakers' underlying linguistic knowledge.

In Russian, learning to read is facilitated by a high degree of transparency of the Russian orthography in the direction from *letters* to *sounds*: there is only one way to pronounce each syllable, with limited exceptions, and a novice reader who already speaks the language needs to learn just few rules, such as the marking of consonantal palatalization with vowels and the pronunciation of iotated vowels (Rakhlin et al. 2017). Consequently, reading skills in Russian develop much faster than spelling skills, and monolingual children are expected to achieve reading fluency by Grade 4 (at about 9–10 years of age).

In contrast, Russian orthography has a low degree of transparency in the direction from *sounds* to *letters* and reflects the underlying phonological and morphological form of the words rather than their phonetic form to which the speaker is accustomed. Thus, a novice speller, even if they are a fluent speaker, must invest significant effort into connecting the surface and the underlying forms of the word, which require developed phonemic and morphological awareness. An investigation of spelling in Russian HL can, thus, further develop a better understanding of these speakers' divergent linguistic knowledge.

Understanding the difference between these two processes involved in "literacy" is important for researchers and language instructors working with Russian HL learners. When designing an experimental study, providing separate scores or proficiency measures for reading and writing may result in a more nuanced picture of HL speakers' linguistic knowledge and/or language abilities. Educators will be able to design more effective teaching materials guided by the understanding that it may be easier to improve reading abilities of Russian HL learners (for a set of suggestions on teaching reading, see Parshina et al. 2024), but teaching spelling will require a greater amount of time and effort to develop a greater phonological and morphological awareness. In fact, this is one area of HL pedagogy where methods developed for monolingual children may be transferable to a bilingual learning environment. For example, instructors can design tasks that invite learners to assemble words from various morphemes or breaking up words into morphemes

by ear and in writing; think up words that have a specific sound; determine the position of a specific sound in a word; or identify one sound that distinguishes a pair words.

At the same time, HL learners face challenges that are different from those of monolingual Russian children, and the results of the current study suggest that there are specific areas of morpho-phonemic knowledge that should be targeted in a Russian HL classroom. First, heritage bilinguals need to learn that any adjectival ending consists of at least two sounds when pronounced in isolation and with clear articulation. Careful reading of stand-alone adjectives in various case forms as well as fluid reading of adjectival phrases may help learners notice the letter composition of adjectival endings. Breaking up adjectives into stems + ending (e.g., красн-ый/*krasn-yy*) may be an effective way to support such noticing. Crucially, learners need to explore the +/– palatalization feature of Russian consonants and must be given ample opportunities to see and to write hard and soft consonants in syllables, leading them to notice and to internalize the representation of a consonantal feature of palatalization with the help of a vowel. Next, heritage bilinguals need to be taught to notice the sound [j] in various positions in a word, and especially at the end of adjectives. Finally, considering that any given adjectival case ending has only two spelling variants, i.e., hard and soft regardless of the phonological processes affecting their auditory shape, HL learners may benefit from an approach that treats all adjectival endings as orthographic conventions rather than grammatical rules.

We must remember, however, that disproportionate attention to learning correct spelling in HL classrooms may have a negative effect on learners' motivation to engage with the language. An observation made by Kim (2013) for Korean HL learners can equally apply to Russian HL, especially considering the multi-level organization of its orthographic system and complex morphology: "upon realizing that . . . it requires much more work than just sprucing up their "spelling" skills to be an educated speaker of language, many heritage Korean students give up altogether" (Kim 2013, p. 84). In light of this observation, we recommend that teaching spelling and orthography should not only be presented in conjunction with work on other linguistic aspects, such as phonological and morphological awareness, but also be measured and "subjugated" to other types of activities that foster our learners' engagement with and love for life-long study of their HL.

7. Conclusions, Limitations, and Future Directions

One of the biggest challenges in conducting research in HL spelling/orthography lies in the overwhelming volume of data and the amount of time and effort required for manual data annotation and error analysis. Considering the complexity of the Russian orthographic system (Rakhlin et al. 2017) and lack of access to language education for Russian HL learners, the sheer amount of spelling errors comes as no surprise. In our data, spelling errors appeared in all class words and in all parts of the words: prefixes, roots, suffixes, and endings. Hypothesizing that the endings, specifically adjectival endings, are likely to be susceptible to phonological and morphological knowledge gaps, as well as lack of understanding of spelling conventions, we focused the first stage of our project on adjectival endings, narrowing the scope further to masculine adjectives.

As a necessary step in the process of annotating spelling errors, we made every possible effort to separate purely orthographic mistakes from grammatical mistakes, but this proved to be a complicated task. For example, the representation of the glide [j] with an iotated vowel letter Е instead of Ё at the end of an adjective may be considered an orthographic error or a morphological one: the learner incorrectly assigned the plural Nominative ending ИЕ /IE to a masculine singular adjective which should be spelled with ИЁ/IJ. We usually had to examine the entire essay to understand whether this particular writer had general difficulties with gender and number assignment. Such work by nature invites some imprecision and may affect our analysis and error count.

Our current analysis of errors does not take into account the frequency of various case forms in the corpus or the frequency of all other spelling errors, which leaves the following questions unanswered at the time of publication: Are some adjectival case forms used more

frequently in this particular subcorpus and, therefore, affect our analysis of errors? What percentage of errors do adjectival endings represent of the total number? These and other questions will be answered in subsequent studies based on the same dataset. In another future research project, we plan to investigate correlations between writing proficiency levels and the number of errors in the adjectival endings as well as any association of specific error patterns with writing proficiency.

Finally, in this paper, we have provided preliminary exploratory remarks concerning the nature of the observed errors. All of these explanations must be treated with caution, as finding support for some of them requires experimental studies investigating HL speakers' phonological and morphological awareness. For example, understanding the incorrect use of softness-indicating vowels in the absence of the final *ŭ* in reduced adjectival endings requires an experimental study on the perception and production of palatalization by HL learners, ideally also accompanied by writing tasks.

The current study is only the first step in a larger research agenda which we propose. This agenda would ideally involve a collaboration between experimental and classroom-based methodologies and would open new perspectives on the nature of divergent underlying HL linguistic systems as well as serve as a foundation for more effective pedagogical approaches in HL pedagogy.

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Notes

- ¹ A note on terminology: in our work, we endorse the conception that differences in HL linguistic systems from the monolingual norm should be described as divergences, using such terms as 'non-canonical' or 'non-standard' forms. At the same time, that does not entail that 'errors' are not attested in HL or L2 studies. Orthographies constitute closed systems with absolute binaries of "+/− correct." Russian orthography is a particularly strong example of such a binary system, given various spelling conventions based on historical processes and linguistic theory. Therefore, in our work on this topic, we will use the word 'error' to refer to non-standard spelling.
- ² Differences of opinion concerning the inventory of Russian vowels are outside the scope of this article: we acknowledge that some scholars distinguish five basic vowel sounds (e.g., [Rakhlin et al. 2017](#)).
- ³ The hard sign appears only at a morphological boundary between a prefix ending in a consonant and a root beginning with the glide.
- ⁴ Note that the rules of the scientific system of transliteration of Cyrillic script are inconsistent. They obscure the presence of the glide in *e* and *ë*, but represent it in the letters *ja* and *ju*.
- ⁵ Words borrowed from other languages that begin with the glide followed by a vowel are usually spelled with *Й*: Нью-Йорк, Йельский университет, Йовович.
- ⁶ Word stress is a central feature of the phonetic structure of words in Russian; correct stress placement is a prerequisite for correct identification and production of a printed word. Stress in Russian can fall on any syllable of a word and can move from syllable to syllable within the same word, depending on its grammatical form.

- 7 Except for seven words ending in -МЯ/ мја: e.g., время/vremja (time).
- 8 We included participles because they also have the grammatical agreement feature whether they were used as modifiers or as substantivized adjectives.
- 9 This category also includes one instance where a consonant and a vowel letter were misused: the letter III/ŠČ, which represents an inherently palatalized sibilant, was replaced with the letter III/Š, which represents an inherently hard sibilant, and the following vowel Ё/У violated the spelling convention.

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