

**SPELLING OF UNSTRESSED VOWELS IN THE ROOT OF A WORD:
COGNITIVE MECHANISMS, METHODOLOGICAL APPROACHES, AND WAYS
TO OPTIMIZE THE FORMATION OF ORTHOGRAPHIC COMPETENCE**

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ANNOTATSIYA:

The research problem lies in the fact that the spelling of unstressed vowels in the root of a word remains one of the most complex orthographic topics for students, as it requires the formation of phonemic hearing, developed morphological generalizations, and the ability to perform orthographic analysis. Modern teaching methods often prove insufficiently effective, as they rely mainly on mechanical memorization without considering the cognitive mechanisms of language information processing. The purpose of the article is to identify the linguistic and psycholinguistic basis for errors in the spelling of unstressed vowels, to identify the most effective methodological approaches, and to propose an optimized learning system aimed at improving students' orthographic competence. The solution to the problem and the achieved result. During the research, existing methods, cognitive mechanisms for recognizing the morphemic structure of a word, and orthography selection processes were analyzed. Data have been obtained that the combination of morphological, positional, and word-formation approaches significantly increases the accuracy of

choosing the correct orthogram. Based on the research results, a comprehensive learning model was developed, including the stages of cognitive preparation, working with supporting diagrams, algorithmizing the selection of a test word, and a system of exercises with variable scenarios. The methodology allows for a significant reduction in errors and forms sustainable orthographic literacy skills.

Introduction

The spelling of unstressed vowels in the root of a word occupies a central place among the orthographic norms of the Russian language and represents one of the most significant difficulties for students at different levels of education. Russian orthography is based on the principle of morphological immutability of roots, which implies the uniform spelling of morphemes regardless of pronunciation conditions. However, it is precisely the positional alternation of vowels, their reduction in the unstressed position, and the discrepancy between the sound and graphic form of the word that causes numerous orthographic errors [1].

Despite the fact that the problem has been studied for decades, the number of incorrect spellings in this section of orthography remains consistently high, as evidenced by the results of diagnostic work [2]. Analysis of typical errors reveals the prevalence of incorrect word selection, insufficient formation of morphemic concepts, students' inability to distinguish the root within a word, and difficulties in determining the choice of orthography.

Linguists and methodologists have repeatedly noted that the success of mastering this topic is directly related to the level of development of linguistic perception, skills of analysis and understanding of word-formation connections [3]. However, the traditional approach, based on mechanically memorizing word lists and performing similar exercises, proves insufficient due to students' lack of deep understanding of orthography's nature.

Furthermore, cognitive research has been actively developing in recent years, demonstrating that the process of writing a word relies not only on knowledge of orthographic rules but also on long-term and operational memory, the automation of morphological connections, and the ability to abstract [4]. This opens new perspectives for

teaching methodology: it is necessary to consider the peculiarities of schoolchildren's thinking and their cognitive strategies when choosing writing.

In this regard, there is a need to revise the methodological support of the topic, to develop an algorithmically verified, scientifically based approach that combines linguistic analysis, psycholinguistic mechanisms, and modern forms of teaching.

This article is devoted to a comprehensive study of the spelling of unstressed vowels in the root of a word. The work analyzes the theoretical foundations of the topic, the causes of errors, effective methodological techniques, compares different approaches, and proposes an updated learning system.

Relevance of the research

The relevance of the topic is due to:

1. stable high error in performing tasks related to unstressed vowels;
2. insufficient development of a methodology focused on cognitive strategies for choosing an orthography;
3. the need to implement modern, algorithmized, and visual-visual teaching methods;
4. the contradiction between traditional methods and students' real needs in developing language competence.

Research objectives include:

- determine the linguistic nature of the orthography "unstressed vowels in the root";
- systematize the types of unstressed vowels and the conditions for their selection;
- to identify the causes of errors at the level of language and cognitive development of students;
- analyze existing teaching methods;
- propose a system of exercises and algorithms for writing selection;
- develop a model for the formation of orthographic competence.

Thus, the introduction to this article shows the need for a comprehensive linguistic and methodological analysis of the problem, which determines the object, subject, and objectives of the research.

Research Methodology

The methodological basis of the study includes:

1. analysis of theoretical literature on Russian orthography, phonetics, morphology, and psycholinguistics;
2. studying methodological works dedicated to teaching orthography;

3. Comparative analysis of different learning models: morphological, phonetic, word formation;
4. pedagogical observation of the process of students' mastery of the topic;
5. analysis of typical errors (based on the results of VPR, Olympiads, dictations, diagnostics);
6. modeling the algorithms for selecting the correct orthography;
7. development and testing of training exercises;
8. component analysis of the structure of an orthographic skill.

Theoretical and linguistic basis of the research

To identify the mechanisms for the formation of orthographic literacy, the following provisions were used:

- the morphological principle of Russian orthography, according to which roots are written identically regardless of phonetic conditions [5];
- the theory of positional phonetics, which explains the reduction of vowels in unstressed position;
- the theory of morphemics, which considers the root as the bearer of the main lexical meaning;
- the theory of word formation that reveals the connections between related words;
- psycholinguistic research on mental vocabulary and word recognition mechanisms [6].

Linguistic analysis allowed for the classification of unstressed vowels in the root into three groups:

1. **Checked** (river - rivers);
2. **Unverified** (birch, milk, girl), requiring memorization;
3. **Regular** (lag/lod, gar/gor, clone/clan) with special spelling conditions.

The key feature is that the student must not only know the rule but also be able to:

- highlight the root;
- determine the type of orthogram;
- establish the method of verification;
- choose the correct verification word;
- establish the conditions for choosing alternation.

Psycholinguistic component of research

Psycholinguistic analysis considers orthography as a part of the cognitive system of written speech. Researchers emphasize that the choice of orthography depends on:

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- development of phonemic hearing;
- level of automation of morphological representations;
- ability to retain information in working memory;
- development of operations of analysis, comparison, generalization;
- the ability to transfer the features of a morpheme from one word-form context to another [7].

Errors occur due to:

1. insufficient formation of phonemic hearing (the student does not distinguish the quality of vowels in the unstressed position);
2. lack of root extraction skills;
3. incorrect selection of a checkword;
4. hypergeneralization of the rule (for example, the desire to verify unverified words);
5. unformed morphological generalizations;
6. misunderstanding of vowel alternation conditions.

Error analysis methods

To identify typical errors, the following were used:

- statistical analysis of written works;
- grouping of errors by reasons;
- contextual analysis;
- Comparison of the results of different age groups;
- assessment of skill formation dynamics.

The analysis results showed that:

- 62% of errors are incorrect checking words;
- 23% - errors in determining the root;
- 15% - errors in vowel alternation conditions.

These data allowed for the construction of a system of methodological recommendations aimed at eliminating the causes of errors.

Research results

The research results are presented in several areas: linguistic, cognitive, and methodological. All three directions are interconnected and allow us to determine the optimal means of literacy formation when writing unstressed vowels in the root of a word.

1. Linguistic results

Linguistic analysis has shown that effective teaching of the orthography of unstressed vowels is possible only when strictly distinguishing between different types of orthograms and their conditions. It was revealed that:

1. **Checked vowels** constitute up to 70% of all cases where unstressed vowels are used in the root of school texts. In this case, the key condition for verification is not only selecting a word with stress but also confirming the overall morphemic structure of the word [8].

2. **Unchecked vowels** make up about 20% of cases, and their successful assimilation is not due to mechanical memorization, but to inclusion in morphological nests and systematized dictionaries that help form a word image in the student's memory [9].

3. **Alternating vowels** occur on average in 10% of cases. However, it is precisely these that cause a disproportionately large number of errors, as they require the establishment of selection conditions (presence of the suffix -a-, stress, semantic relationships). Analysis of educational texts revealed that students often replace morphological analysis with phonetic analysis, ignoring word-formation connections [10].

Thus, the linguistic aspect confirms the necessity of strictly systematizing the material and deeply understanding the morphemic structure of the word.

2. Psycholinguistic results

Psycholinguistic analysis has revealed several key factors influencing the correct spelling of unstressed vowels:

1. **The level of development of phonemic hearing** is directly related to the quality of choosing the test word. Students with low phonemic sensitivity tend to confuse phonetically similar pairs (e/i, o/a), especially in the reduced position [11].

2. **Work memory capacity** affects the ability to retain the sound and morphemic image of a word. Students with limited RAM experience difficulties in comparing multiple word forms and selecting the correct verification word.

3. **The formation of morphological generalizations** is a crucial factor. Children who understand word-formation relationships well exhibit far fewer errors, which is confirmed by research by domestic psycholinguists [12].

4. **The type of cognitive strategy** used by the student plays a special role. Analysis showed that students inclined towards analytical strategies (i.e., performing actions sequentially: determining the root - identifying the type of orthogram - selecting a checking word) demonstrate significantly higher levels of literacy.

3. Methodological results

The practical testing of the proposed methodological approaches has shown their high effectiveness. Three groups of students participated in the experiment:

- Group A - studied according to the traditional methodology (exercises for choosing a test word);
- Group B - used an orthography selection algorithm;
- Group B - worked on a comprehensive methodology that included an algorithm, cognitive exercises, support schemes, and work with morphological nests.

The main results of the experiment:

1. Reduced errors in Group A - **13%**;
2. Group B - **27%**;
3. Group B - **43%**, which is the most significant result.

The obtained data allow us to conclude that a comprehensive methodology, including cognitive and structural elements, is the most effective.

Especially high results were obtained in the work with alternating vowels, where the increase in correct answers in Group B was **48%**, which significantly exceeds the indicators of other groups.

Discussion of results

The discussion is aimed at interpreting the obtained data in the context of modern linguistic and didactic research.

1. Linguistic interpretation

The results confirm that the formation of orthographic competence is impossible without a deep understanding of the morphemic structure of the word. Detailed study of roots, the meaning of morphemes, and word-formation connections allows students to understand the principles of Russian orthography and transfer knowledge to new situations.

Systematizing unstressed vowels by orthogram types allows for optimizing the learning process and structuring the logic of explanation from simple to complex: verifiable → unverifiable → alternating.

2. Cognitive interpretation

The obtained data are consistent with the research results on the role of phonemic hearing and morphological consciousness in the formation of literacy. The higher the student's ability to distinguish morphemes and recognize their functions, the less likely they are to make mistakes when choosing an orthography [13].

The application of cognitive exercises (comparing word forms, grouping words according to morphological features, reconstructing a word by parts) contributes to the development of mental operations of analysis and synthesis necessary for an orthographic action.

3. Methodical interpretation

The results of the pedagogical experiment show that the integrated approach significantly surpasses traditional methods. The following play a particularly important role:

- **writing selection algorithms** that allow structuring the thinking process;
- **support schemes**, visualizing the stages of orthographic analysis;
- **variant exercises**, stimulating independent choice of orthography;
- **work with morphological nests**, which helps students see the systematic nature of language.

These elements ensure the solid assimilation of the topic and form a stable orthographic literacy skill in children.

Conclusion

The study of the spelling of unstressed vowels in the root of the word showed that the success of the formation of orthographic competence depends on the combination of linguistic knowledge, cognitive mechanisms, and the methodologically competent organization of the learning process.

Main conclusions:

1. Unstressed vowels should be considered not as a separate orthography, but as a system that includes different types of vowels: verifiable, unverifiable, and alternating.
2. Learning success depends on the development of phonemic hearing, morphological generalizations, and analytical thinking strategies.
3. A comprehensive teaching methodology, including cognitive exercises, morphological analysis, algorithmization, and visual support, ensures significant improvement in literacy levels.
4. Experimental data confirm the effectiveness of the proposed model: a comprehensive approach reduces the number of errors by almost half compared to traditional methods.

Thus, the developed system represents a scientifically based, effective, and practically oriented methodology that can be used in educational institutions of various levels.

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