

Syntactic Complexity of Russian Unified State Exam Texts in English: A Study on Reliability and Validity

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Abstract

In this study we analyze texts used in Russian Unified State Exam on English language. Texts that formed small research corpora were retrieved from 2 resources: official USE database as a reference point, and popular website used by pupils for USE training “Neznaika” (<https://neznaika.pro/>). The size of two corpora is balanced: USE has 11934 tokens and “Neznaika” - 11918 tokens. We share Biber’s point of view that linguistic tendencies are quite stable with ten text samples per genre or register (Biber 2007). We retrieved 20 texts from each resource. This research takes into consideration analysis on syntactic complexity, the main subject of research is the syntactic type of the sentence. The present study focuses on two research questions: RQ1: What sentence types pattern is typical for USE texts? RQ2: Are the materials of the training sites reliable and valid? The methods employed in the study are the identification and manual counting of the sentence types, absolute and normalized frequency calculation. While analyzing the texts, we witnessed greater range of tokens per text (tpt) in unofficial texts for training. For “Neznaika” database the range was 490 - 790 (tpt), while an official USE database texts demonstrated lower variance: 539 – 686 tpt. The number of sentences in “Neznaika” (664) and official USE texts database (670) is almost equal. The number of sentence types in “Neznaika” and official USE texts database also does not extend correlation limits.

Keywords: Syntactic Complexity; Unified State Exam; Syntactic Pattern; Text Complexity; Quantitative Linguistics.

1. Introduction

Unified National (State) Exam (USE) is an all-Russia exam taken by school-leavers at the end of their secondary school. First experimental studies taken in 2001 influenced the whole procedure of exam material selection and training. In 2009 this test has become compulsory for secondary school leavers in order to enter Higher Educational Institutions (Federal law on USE 2007) USE in English is expected to

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become obligatory for all secondary school graduates across Russia in 2022 by the Minister of Education and Sciences of the Russian Federation (Kommersant, 2014). That means that to obtain the Secondary School Certificate every pupil will have an option to take basic or an advanced test. USE in English is equivalent to ESL standards of A2+ to B2 (Specification on exam materials 2018). Exam tests the following skills written (Listening, Reading, Writing and Use of English) and oral (Speaking), which makes five parts of the test in total. Tasks presented in the following forms: short answer, multiple choice, multiple matching, gap-filling and others (Specification on exam materials 2019). The Test Specification describes the requirements for text selection in terms of the correspondence to the age of the test takers, their background experience, no discrimination policy and so on.

The search of research topics on such platform as Elibrary (Russian scientific electronic library, integrated with the Russian Science Citation Index), provided the following results around 20,000 articles provided analysis of USE test taking procedure, papers evaluating the results of USE is about 40,000. Articles discussing readability of the USE texts in English is within the range of 25-30.

Even though international scholars have conducted a number of research on the linguistic patterns that affect the readability, in Russian linguistics this area is rather new and unexplored (Feng, 2011; Gabdrakhmanova et al., 2018; Kohl, 1999; Mc Namara et al., 2010). The syntactic readability of the texts used in USE in English has never been the target of linguistic research. Therefore, there are only a few studies on the content of the examination materials. Among them, for example, the research conducted by the scholars of Research Laboratory of Intellectual Technologies for Text Management, Kazan Federal University, Russia. Its researchers, M. Solnyshkina, V. Solovyev, A. Kiselnikov, E. Harkova, O. Safonkina, E. Varlamova, I. Guryanov, D. Sungatullina, etc, consider readability as one of the most important parameters of the text, in particular, from the point of view of the syntactic analysis and its implementation in teaching purposes as well as in other languages (Solnyshkina et al., 2014; Guryanov et al., 2017; Subich et al., 2016).

To check the following number of texts selected, adapted for state exam we used text complexity formulas. Most part of these formulae were developed in the XX century, when the level of the complexity is shown by a certain index [4]. Such formulae become widespread due to the problem of an objective assessment that is of great importance when selecting texts for language skills assessment.

However, in Russian linguistics, readability has not yet found wide application in the national educational paradigm. Russian researcher I. Oboroneva made a great contribution to readability formulae in application to the Russian

language. Nevertheless, the question of determining this index for texts in English as a foreign language remains open (Oborneva, 2006).

The use of formulas for determining the readability and text complexity in relation to the texts used in the USE is of particular relevance. Solnyshkina & Kiselnikov (2014) in their work “The complexity parameters of exam texts” note the relevance of using these formulas in exam texts due to the fact that a text is the basis of any language test, regardless of its type and nature, and its complexity largely determines the perception of the test. In this regard, the texts used in USE in English are an important topic for research, as for the test purposes they are transformed due to the testing purposes of exams.

Vast number of texts in English used both for the test papers and for various teaching manuals, issued by various publishers, gives us reasons for critical assessment of such texts as there need to be a common ground for text complexity evaluation. This process, aimed at the increasing validity and reliability of examination materials and materials for USE preparing, is possible only with the use of formulas for determining the text readability index. The test can be considered as reliable and valid for its purposes, but it is still very important to study the quality of the input texts.

Text proficiency levels are distinguished by many different linguistic features, and syntactic complexity can be one of the elements for grade level distinctions.

For this purpose, the team at Kazan Federal University (Ivanov et al. 2018). compiled a corpus of textbooks on Social Studies by Bogolubov and Nikitin for the 5th–11th Grades, the size of the Corpus being 525,748. Both sets of textbooks are from the “Federal List of Textbooks Recommended by the Ministry of Education and Science of the Russian Federation to Use in Secondary and High Schools”. The team is aimed at understanding the proficiency level of each grade, reflected in such 5 principal Coh-Metrix components as narrativity, deep cohesion, referential cohesion, syntactic simplicity, and word concreteness (Dowell et al. 2014), as well distinguishing the main points of difference between the grades.

2. Method

In our case, the aim differs to a certain degree, as we are led by the idea of identifying the syntactic parameters of the texts from the official USE as basic and comparing them with the parameters of the texts from neznaika.com.

The choice of this particular website was caused by a number of reasons:

- (a) the fact that the schoolteachers of English recommend this website to their pupils for preparation to the USE;
- (b) 20 variants of the text tasks;
- (c) open access to the database of the tasks.

The size of the corpus is 23 852 tokens. Information for corpus was retrieved from three main sources official USE texts for Reading – 11934 tokens, popular website that is used by school-leavers for self-check tests “Neznaika” 11918 tokens. A token is viewed in the work as an instance of a sequence of characters in some particular document that are grouped together as a useful semantic unit for processing. Usually it refers to the total number of words in a text, corpus etc, regardless of how often they are repeated (Tokenization 2008).

Though the size of the official and “Neznaika” corpus is almost the same as variation of tokens number per one text is greater among the “Neznaika” texts, as presented in Table 1 (below).

Table 1. *Range of Token Number Per one Text*

	Neznaika texts	Official USE texts
Number of tokens per one text	490 – 790	539 - 686

As our study sets the main target of a research into the syntactic complexity of the texts, our main subject of research is the sentence types: simple and composite (complex, compound, complex+compound). The total number of sentences in each text was counted without text complexity formulae. Identification of the sentence type was made without automated tools such as syntactic sentence analyser.

3. Results

As it was mentioned above, the present study investigates two research questions:

RQ1: What sentence types pattern is typical for USE texts?

RQ2: Is the syntactic of official texts different from the pattern of “Neznaika” texts?

The following tables provide the information about the results of analyzed corpora. Researchers retrieved 20 exam texts for USE reading task from every source.

Table 2. *Percent Correlation to the Total Number of Sentences in the Neznaika Texts*

Text number	Simple %	Complex %	Compound %	Complex+ compound %
1.	42,9	31,4	11,4	14,3
2.	46,7	38,3	10,0	5,0
3.	47,1	20,6	20,6	11,8
4.	25,0	29,2	25,0	20,8
5.	71,4	17,9	3,6	7,1
6.	17,9	28,6	35,7	17,9
7.	60,0	23,3	13,3	3,3
8.	51,1	21,3	21,3	6,4
9.	50,0	32,4	11,8	5,9
10.	25,0	33,3	16,7	25,0
11.	20,7	48,3	3,4	27,6
12.	23,3	33,3	23,3	20,0
13.	47,8	15,2	26,1	10,9
14.	25,0	45,8	12,5	16,7
15.	54,3	22,9	20,0	2,9
16.	45,7	42,9	2,9	8,6
17.	37,1	37,1	8,6	11,4
18.	36,4	42,4	12,1	9,1
19.	21,4	35,7	28,6	14,3
20.	36,0	28,0	12,0	24,0

According to the Table 2:

- The correlation of complex sentences to total number of sentences ranges from 15,2% (text 13) to 48,3% (text 11). Great number of complex sentences indirectly implies that higher level of such constructions leads to higher complexity.
- The correlation of compound sentences to total number of sentences ranges from 2,9% (text 16) to 35,7% (text 6). Critical difference between the lowest number of compound sentences can dramatically result on comprehension of exam text.

- Number of complex+compound sentences to total number of sentences ranges from 2,9% (text 15) to 27,6% (text 11). These compound constructions can result on misinterpretation of the main ideas in the text, as these constructions claimed to combine two or three ideas.

Table 3. *Percent Correlation to the Total Number of Sentences in the Official USE Texts*

Text number	Simple %	Complex %	Compound %	Complex+ compound%
1.	50,0	27,5	12,5	10,0
2.	28,6	42,9	10,7	17,9
3.	41,4	48,3	0,0	10,3
4.	50,0	32,4	0,0	17,6
5.	32,1	25,0	25,0	17,9
6.	47,4	31,6	7,9	13,2
7.	48,6	24,3	21,6	5,4
8.	44,1	23,5	20,6	11,8
9.	18,5	51,9	11,1	18,5
10.	42,9	17,1	31,4	8,6
11.	34,6	46,2	11,5	7,7
12.	38,5	34,6	23,1	3,8
13.	53,1	31,3	0,0	15,6
14.	32,0	24,0	20,0	24,0
15.	31,1	28,9	24,4	15,6
16.	42,4	39,4	12,1	6,1
17.	50,0	29,4	8,8	11,8
18.	33,3	15,2	27,3	24,2
19.	48,6	45,9	2,7	2,7
20.	55,1	24,5	12,2	8,2

According to the Table 3:

- The correlation of complex sentences to total number of sentences from 15,2% (text 18) to 51,9% (text 9). Great number of complex sentences

indirectly implies that higher level of such constructions leads to higher complexity.

- The correlation of compound sentences to total number of sentences from 2,7% (text 19) to 31,4% (text 10). It should be mentioned that 3 texts out of 20 did not have any compound sentences (texts 3,4,13). Text without compound sentences should be less difficult to comprehend. Critical difference between the lowest number of compound sentences can dramatically result on comprehension of exam text.
- Number of complex+compound sentences to total number of sentences ranges from 2,7% (text 19) to 24,2% (text 18). These compound constructions can result on misinterpretation of the main ideas in the text, as these constructions claimed to combine two or three ideas.

4. Discussion

The following two Tables 4 and 5 demonstrate correlations between total number of sentences withdrawn from the texts. Here we can observe individual correlations of simple sentences to complex and compound ones in every text. Total diversity of texts under study is relatively higher in “Neznaika” texts comparing with official texts.

Table 4. *Sentence Types in the Neznaika Texts*

Text number	Number of sentences	Number of simple sentences	Number of complex sentences	Number of compound sentences	Number of complex+compound sentences
1	35	15	11	4	5
2	60	28	23	6	3
3	34	16	7	7	4
4	24	6	7	6	5
5	28	20	5	1	2
6	28	5	8	10	5
7	30	18	7	4	1
8	47	24	10	10	3
9	34	17	11	4	2
10	24	6	8	4	6
11	29	6	14	1	8

12	30	7	10	7	6
13	46	22	7	12	5
14	24	6	11	3	4
15	35	19	8	7	1
16	35	16	15	1	3
17	35	13	13	3	4
18	33	12	14	4	3
19	28	6	10	8	4
20	25	9	7	3	6
TOTAL	664	271	207	106	80

According to the Table 4:

- the following criteria the number of sentences in each text ranges from 24 sentences per text to 60 sentences;
- total number of sentences per text is 33,2;
- the text 2 with 60 sentences contains almost half of simple sentences – 28;
- the second largest text 8 contains 47 sentences, 24 of them are simple ones;
- texts with least number of sentences 24 (texts 4, 10, 14) have 6 simple sentences that is one fourth of the total amount of sentences;
- the number of simple sentences to the total amount of sentences is 40%, complex sentences is 31%, compound sentences - 14%, complex+ compound sentences is 12%.

The aforementioned numbers and correlations demonstrate certain dependence on sentence type to the total amount of sentences in text. Texts with less sentences have the more complex and compound sentences will be in its structure due to compression of clusters of information presented in the text. The same dependence on sentence amount and its length and structural analysis can be witnessed in the dataset with official USE texts.

Table 5. *Sentence Types in the Official Texts*

Text number	Number of sentences	Number of simple sentences	Number of complex sentences	Number of compound sentences	Number of complex+ compound sentences
1	40	20	11	5	4

2	28	8	12	3	5
3	29	12	14	0	3
4	34	17	11	0	6
5	28	9	7	7	5
6	38	18	12	3	5
7	37	18	9	8	2
8	34	15	8	7	4
9	27	5	14	3	5
10	35	15	6	11	3
11	26	9	12	3	2
12	26	10	9	6	1
13	32	17	10	0	5
14	25	8	6	5	6
15	45	14	13	11	7
16	33	14	13	4	2
17	34	17	10	3	4
18	33	11	5	9	8
19	37	18	17	1	1
20	49	27	12	6	4
TOTAL	670	282	211	94	82

According to the Table 5:

- total number of sentences per text is 33,5;
- the number of sentences in each text ranges from 25 sentences per text to 49 sentences that is slightly less diverse comparing to dataset of “Neznaika” collection;
- the largest (text 20) with 49 sentences contains 27 simple sentences;
- second largest (text 1) contains 40 sentences, 20 of them are simple ones;
- texts with least number of sentences 25 - 26 (texts 11, 12, 14) have range of 8 - 10 simple sentences that also demonstrates the dependence of syntactic complexity on the sentence number;
- the number of simple sentences to the total amount of sentences is 42%, complex sentences is 31%, compound sentences -14%, complex+ compound sentences is 12%.

The same dependence on sentence amount and its length and structural analysis can be witnessed in the dataset with official USE texts.

5. Conclusion

The problem of exam text academic equivalence has undergone a certain transformation. The results of our research demonstrated that USE exam texts are less diverse in syntactic patterns comparing to unofficial website “Neznaika” database. These results demonstrate the high level of expertise in text selection for exams. Thus, indirectly we can suppose that texts in the official collection of USE exam texts meet one of the main requirements of exam texts – equivalence and the same level of difficulty. Although, cannot rely on results of syntactic simplicity.

Answering to research question number1: What sentence types pattern is typical for USE texts? According to the analysis of our research material we presume that simple sentences predominate in USE reading texts 41% (Neznaika) and 42% (official USE texts) of total number of sentences. Among other types of sentences, we outline domination of complex sentences 31% of total number of sentences in 20 texts from each database.

Concerning research question number 2: Is the syntactic of official texts different from the pattern of “Neznaika” texts? The difference in syntactic patterns of both databases is irrelevant and can be considered as statistical deviation. Though we noticed greater fluctuation in sentences correlation in “Neznaika” texts (from 24 sentences per text to 60 sentences) comparing with the official USE texts (from 25 sentences per text to 49 sentences).

Although we cannot make our assumptions relying on the syntactic quantitative analysis of the exam texts. The problem of readability and text complexity provides opportunity for further thorough study of qualitative parameters of the text such as various types of cohesion, narrativity, stylistic register of the text. Although quantitative analysis of sentences can help in further selection of texts under study. Thus, further study of text complexity should start from texts 9,10,18 from USE official database and texts 6, 11 as they demonstrated the highest level of compound and complex sentences. In our further research we would focus on qualitative aspects of texts under study. The next stage is to estimate the validity of qualitative results and its predictive potential on text complexity comparing with quantitative.

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