

Отже, можна зробити висновок, що ветеринарна термінологія включає в себе термінологію, яка використовується у сфері ветеринарної практики та наукових досліджень,

пов'язаних з ветеринарною медициною. Сучасні лінгвісти вважають, що особливостями ветеринарної термінології є, насамперед, її різноманітність.

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## IMPLEMENTATION OF VERB FORMS IN THE TEXTS OF SCIENTIFIC AND TECHNICAL DISCOURSE

### РЕАЛІЗАЦІЯ ДІЄСЛІВНИХ ФОРМ У ТЕКСТАХ НАУКОВО-ТЕХНІЧНОГО ДИСКУРСУ

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The goal of the article is to perform and describe a comparative analysis of verb units functioning in the text corpora “Heat engineering” and “Acoustics” in various aspectual and voice forms at the statistical level and determine the degree of implementation of the aspectual verbal paradigm in the texts of the two engineering specialties. As a material the text corpora of the specialties relating to scientific and technical discourse, namely – “Heating Engineering” and “Acoustics” –

are used. They were compiled on the basis of the texts taken from British and American scientific and technical journals: IEEE Transactions on Power Apparatus and Systems, IEEE International Conference on Acoustics, Speech and Signal Processing, The Journal of the Acoustic society of America, and others. To achieve the goal mentioned it was necessary to complete the following tasks: to create frequency lists (probabilistic and statistical models) of the linguistic units used in the texts "Heating Engineering" and "Acoustics"; to extract from the probabilistic and statistical models of the two specialties mentioned all verbal word forms and organize them into two lists, corresponding to each sublanguage. The following methods are used in the course of research: the method of continuous sampling to generate probabilistic and statistical models of the two sublanguages; the method of quantitative calculations of speech units to determine the frequency of their usage and the level of their occurrence in the texts; the method of the comparative analysis. Comparative description of tense, aspect and voice categories of the verbs extracted from the probabilistic and statistical models of "Heating Engineering" and "Acoustics" subject areas in which they function, allows us to determine the integral and differential characteristics of two different text corpora as to the degree of verbal paradigm implementation. Despite the fact that both specialties belong to scientific and technical discourse they have significant differences in grammar and statistics which depends on the field of knowledge they describe.

**Key words:** finite verb form, frequency list, quantitative calculation, specialty, synthetic and analytical forms, text corpus.

Метою статті є здійснити та описати на статистичному рівні порівняльний аналіз дієслівних одиниць, що функціонують у текстових корпусах «Теплотехніка» та «Акустика» в різних видових і заставних формах, а також визначити ступінь реалізації видової дієслівної парадигми у текстах двох технічних спеціальностей. В якості матеріалів були використані текстові корпуси за спеціальностями, які відносяться до науково-технічного дискурсу, зокрема – «Heating Engineering» та «Acoustics». Вони були складені на основі текстів за спеціальностями з Британських та Американських наукових журналів: IEEE Transactions on Power Apparatus and Systems, IEEE International Conference on Acoustics, Speech and Signal Processing, The Journal of Acoustic Society of America та ін. Щоб досягти запланованих результатів, було необхідно виконати наступні завдання: створити частотний список (ймовірно-статистичну модель) мовних одиниць які використовуються у текстах спеціальностей «Heating Engineering» та «Acoustics»; вилучити з ймовірно-статистичних моделей двох спеціальностей всі дієслівні форми і організувати їх в двох частотних списках для кожної спеціальності. Наступні методи використовуються в ході досліджень: методи суцільної вибірки, щоб створити ймовірно-статистичні моделі двох спеціальностей; метод кількісного розрахунку частоти функціонування, щоб визначити величину їх використання і рівень їхньої зустрічальності у текстах; метод порівняльного аналізу. Порівняльні характеристики часових, видових і залогових категорій дієслів, виділених із ймовірно-статистичних моделей предметних галузей «Теплотехніка» та «Акустика», у яких вони функціонують, дозволяє визначити інтегральні та диференційні характеристики двох різних текстових корпусів що відносяться до ступеня реалізації вербальної парадигми. Як приклад можна згадати той факт, що текстовий корпус «Теплотехніка» та текстовий корпус «Акустика» демонструють домінування синтетичних форм і в обох випадках найуживанішими виявилися форми Present Indefinite Active. Незважаючи на те, що обидві спеціальності належать до науково-технічного дискурсу, вони мають значні відмінності в граматиці та статистиці, які залежить від галузі знань, яку вони описують.

**Ключові слова:** фінитна форма дієслова, частотний список, кількісний розрахунок, спеціальність, синтетичні та аналітичні форми, текстовий корпус.

#### **Analysis of the latest research and articles.**

The verb and its linguistic properties are described in sufficient detail in the literature on theoretical grammar (Curm, Fromkin, all theorists). It may seem that further research is not necessary. But the consideration of the most diverse aspects of English verbs continues, certainly from the modern positions. For example, the development of corpus linguistics [4; 5; 6; 7; 8] and its directions – theoretical and applied linguistics – allows to carry the following research: problems of describing the semantic structure of verbal lexicon [9], the issue of studying grammatical and semantic characteristics of the modal verb constructions in the texts of scientific and technical discourse [10; 11; 12], comparative analysis of verbal word forms in three types of different discourses involving linguistic-statistical methods [13]. We can also mention the area of linguistic cognitive science [14] with its conceptual frame approach to the description of verbal phenomena in language and speech as well as a fairly large number of works devoted to the comparative analysis of verbs and created on the basis of several languages [15; 16].

**Formulation of the problem.** Despite the wide variety of research topics of verbal word units represented in these works, some peculiarities of their functioning in the text corpus were not touched. First of all, it can be applied to the factors that appear when comparing the verbal forms. In one of the works mentioned [13] a comparative analysis of the verbal word forms in three functional styles – scientific, fiction and journalistic – is carried out on a statistical, semantic and grammatical levels.

The purpose of this work is to compare verbal forms that occur in different text corpora of exclusively scientific and technical discourse. This approach provides the following possibilities: 1) to analyze the grammatical phenomenon "in breadth", to build a more specific, detailed picture of the implementation of the verb forms paradigms in the texts of scientific communication; 2) due to the results of the analyses of technical text corpora to determine if the realization of the verb forms paradigms depends on the topics of the analyzed areas. This is the novelty and topicality of this article.

As a material the authors use the text corpora of the specialties relating to scientific and technical discourse,

namely – “Heating Engineering” and “Acoustics”. They are formed on the basis of the texts taken from British and American scientific and technical journals: IEEE Transactions on Power Apparatus and Systems, IEEE International Conference on Acoustics, Speech and Signal Processing, The Journal of the Acoustic society of America, and others.

The selection of text corpora areas of knowledge, which belong to the same scientific style, but based on different scientific subjects not connected with each other, depended on necessity to determine the possible correlation between the complex of the verb forms used in the texts and the subject area of the text corpora.

The subject of the article is the verbs functioning in the texts of scientific communication “Heating Engineering” and “Acoustics”; the object is word forms of verbs studied. Word forms are seen here as speech units used in the text corpora with the characteristics of different grammatical categories (set of homogeneous grammatical phenomena) – form, tense, voice.

**Goal of the article** is to perform and describe a comparative analysis of verb units functioning in the text corpora “Heat engineering” and “Acoustics” in various aspectual and voice forms at the statistical level and determine the degree of implementation of the aspectual verbal paradigm in the texts of the two specialties.

To achieve the goal mentioned it was necessary to complete the following tasks:

– to create frequency lists (probabilistic and statistical models) of the language units used in the texts “Heating Engineering” and “Acoustics”;

– to extract from the probabilistic and statistical models of the two specialties mentioned all verbal word forms and organize them into two lists, corresponding to each specialty.

The following methods are used in the course of research: the method of continuous sampling to generate probabilistic and statistical models of the two sublanguages; the method of quantitative calculations of speech units to determine the frequency of their usage and the level of their occurrence in the texts; the method of the comparative analysis.

**Base material.** In accordance with the list of tasks the first step was to make up frequency lists of the word forms found in the text corpora of “Heating Engineering” and “Acoustics” specialties. Then they were brought to a common dictionary unit, and so-called basic lists were formed, which included two thousand most frequently used words of the named sublanguages. The verbal units that operate in the texts of the sublanguages with the highest frequency were picked out, and the verbal lexemes frequency list was compiled. All tense and voice verbal forms of the most frequently used verbs were picked out from the initial lists of word forms and a basic frequency list was organized.

The following table shows the number and percentage of each of the finite verb forms functioning in the text corpora “Heating Engineering” and “Acoustics”.

**Statistical characteristics of voice and tense forms of verbs found in the text corpora “Heating Engineering” and “Acoustics”**

№	Finite Verb Form	Heating Engineering		Acoustics	
		Absolute frequency, F	Percentage of the whole verb list, %	Absolute frequency, F	Percentage of the whole verb list, %
1	Present Indefinite Active	2070	41.4 %	3457	53.4 %
2	Present Indefinite Passive	930	19 %	1669	26 %
3	Past Indefinite Active	570	11.1 %	298	4.6 %
4	Present Perfect Active	420	8.3 %	281	4.3 %
5	Past Indefinite Passive	330	7 %	211	3.2 %
6	Present Perfect Passive	270	5.4 %	491	8 %
7	Present Continuous Active	150	3 %	18	0.36 %
8	Future Indefinite Active	120	2.2 %		
9	Future Indefinite Passive	62	1 %	88	0.14 %
10	Present Continuous Passive	58	1.1 %	–	–
11	Past Perfect Active	19	0.2 %	–	–
12	Past Continuous Active	9	0.1 %	–	–
13	Present Perfect Continuous Active	5	0.09 %	–	–
14	Future Continuous Active	4	0.08 %	–	–
15	Past Perfect Passive	4	0.08 %	–	–
16	Future Perfect Active	–	–	–	–
17	Past Continuous Passive	–	–	–	–
		5021		6513	

2640 finite verb forms formed synthetically were found in the texts of “Heating Engineering”, which makes 52.6% of all word forms of verbal corpus. Present Indefinite dominates among the synthetic Indefinite forms. Their quantity is 2.070 word forms, that is 78% of all Indefinite forms, for example: *responds, enables, allow*. Only 570 units function in the form of the Past Indefinite of the verbal text, that is only 22% of all Indefinite forms, for example: *used, compared, required*.

The domination of synthetic Present forms over Past ones can be explained with the help of general tendency of scientific communication texts, in which the past tense is rarely used when a phenomenon, a research object or a device and its functioning are presented or described, for example: *Equation 21 describes a noncoherent detection process ...*

The quantity of finite verb forms of analytical type in “Heating Engineering” corpus makes 2393 units, that is 48% of all verbal word forms. The Present Indefinite Passive group turned to be the most quantitative among the analytical forms. This group includes 930 units, nearly 39% of all analytical forms of the verbs, for example: *are determined, is followed, is discussed*, etc. The considerable quantity of cases with the passive forms can be based on absolutely natural for scientific texts orientation on the object and lack of the description of the doer.

The second place as to the frequency of usage are occupied by the verbal Present Perfect Active word forms. This group has 420 units, that is 18% of all analytical forms of “Heating Engineering” corpus, for example: *have produced, has accomplished, has provided*, etc. They are followed by Past Indefinite Passive forms (330 units, i. e. 14% of all analytical forms, such as: *was described, were shifted, was increased*, etc. Present Perfect Passive forms are represented by 270 units (11%), for example: *have been shown, has been implemented, have been developed*, etc.; Present Continuous Active has 150 word forms (6%), for example: *is remaining, are operating, is causing*; Future Indefinite Active has 120 word forms (5%), such as: *will lead, will support, will change*, etc.

The rest 6.8% of the analytical verbal words include the following:

- Future Indefinite Passive, only 62 units, i. e., 3%, for example: *will be employed, will be taken, will be achieved*;
- Present Continuous Passive, 58 units, i. e., 2%, for example: *are being brought, are being made, are being used*;
- Past Continuous Active, 9 units, i. e., 0.4%, for example: *was coming, was operating, were heating*;

- Future Continuous Active, 4 units, 0.2%, for example: *will be rising*;

- Past Perfect Active, 19 units, 0.8%, for example: *had become, had increased, had taken*;

- Past Perfect Passive, 4 units, 0.2%, for example: *had been developed*;

- Present Perfect Continuous Active, 5 units, 0.2%, for example: *has been coming*.

Thus, quantitative calculations showed that the most frequently used finite verb form in the texts of “Heating Engineering” is a form of active voice of both synthetic and analytical type, that is 3348 verbal word forms. They include the verbs possessing the following characteristics: Present Indefinite Active, Past Indefinite Active, Future Indefinite Active, Present Continuous Active, Past Continuous Active, Future Continuous Active, Present Perfect Active, Past Perfect Active, Present Perfect Continuous Active. The verbs in the passive form are used two times less (1654 units): Present Indefinite Passive, Past Indefinite Passive, Present Perfect Passive, Past Perfect Passive.

If we distribute the word forms analyzed due to the temporal criteria we will get the following. Most word forms are used in the present tense: Present Indefinite Active, Present Indefinite Passive, Present Continuous Active, Present Perfect Active, Present Perfect Passive, Present Perfect Continuous Active. Their total number is 3903 verbal word forms. The next group of most frequently used verbs includes the forms of the past tense: Past Indefinite, Past Indefinite Passive, Past Continuous Active, Past Perfect Active, Past Perfect Passive. They can be found 913 times in the text corpus of “Heating Engineering” specialty. Finally, the verbs in the future tenses forms were use in the Future Indefinite Active, Future Indefinite Passive, Future Continuous Active for 186 times.

If to speak about aspectual characteristics of a verb we can mention that all three types are represented in the texts on “Heating Engineering”. The most frequently used are Indefinite forms – there are 4082 units. Less common forms of verbs are Perfect – there are 713 units. The least frequently used forms are Continuous – there are only 221 units. The form of the Present Perfect Continuous Active was also found, it was used only 5 times.

As it has already been mentioned the dominance of the Indefinite forms is a common feature of the scientific and technical type of discourse as this type states the facts in the narration. This is the most comfortable and natural form of the description of scientific and technological objects. A significant amount of Perfect Forms may seem rather surprising, as they are often used in colloquial speech style. The

same can be said about the forms of Continuous. Nevertheless, the facts accumulated in the course of a continuous survey of the text corpora certainly indicate the presence in the texts of linguistic phenomena that are represented by Perfect and Continuous verb forms.

The description of finite verb forms functioning in the text corpus “Acoustics” shows the dominance of synthetic type forms as well; there are 3755 units, which make 54% of all verb forms. Text corpus “Acoustics” shows dominance of the Present Indefinite forms among other synthetic Indefinite forms; there are 3457 units, which make 92%, for example: *The generalization involves a description of target impulse response that includes dedifferentiated and integrated impulses*. As to the Past Indefinite only 298 items were found, that is, 8% of all synthetic forms, for example: *laid down, increased, agreed*.

The units of the analytical type can be found not so often; there are 3194 of them and they make 46%. The most frequently used units of this type are forms of the Present Indefinite Passive; there are 1669 of them, i. e. a little bit more than a half of all analytical verb forms, for example: *is selected, are concerned, is made*. Then we can observe a sharp decrease in the quantitative markers and the Present Perfect Passive forms are coming next; there are 491 units, i. e. 15%, for example: *have been developed, has been recognized, has been heard*; the Present Perfect Active follows them; there are 281 units, i. e. 9% of all analytical forms, for example: *has led, has contributed, have facilitated*; then the Past Indefinite Passive presents 211 units (7%), for example: *were commenced, was set up, were assimilated*; the Future Indefinite Passive is represented by 88 units (3%): *will be achieved, will be controlled, will be remained*; the Present Continuous Active comes the last in the list with 18 units, 0.6%, for example: *is becoming*.

The analysis of word forms which can be met in “Acoustics” texts, revealed the most frequently used units. They turned to be the active voice verb forms of both structural types – synthetic and analytical: Present Indefinite Active, Past Indefinite Active, Present Perfect Active, Present Continuous Active. They were met in the text corpora for 4054 times. The units which have a form of the passive voice – Present Indefinite Passive, Present Perfect Passive, Past Indefinite Passive, Future Indefinite Passive – are used 2459 times, which is, almost two times less than the active voice word forms.

Speaking about the temporal characteristics of the verbs functioning in “Acoustics” texts, then, as can be seen from the submitted forms, the majority of them relates to the present tenses: Present Indefinite

Active, Present Indefinite Passive, Present Perfect Passive, Present Perfect Active, Present Continuous Active. These forms are used 5916 times. Speaking about the past tenses we can say that Past Indefinite Active, Past Indefinite Passive are used 509 times. The forms of the Future Indefinite Passive are used only 88 times.

The final point of the research is the analysis of word forms of “Acoustics” as to their aspect. The largest number of verb forms is realized in the form of Indefinite – 5723; a much smaller number of them in the form of Perfect – 772, and the lowest position is occupied by the Continuous verb forms – only 18.

**Conclusions.** Comparative description of tense, aspect and voice categories of the verbs extracted from the probabilistic and statistical models of “Heating Engineering” and “Acoustics” subject areas in which they function, allows us to determine the integral and differential characteristics of two different text corpora as to the degree of verbal paradigm implementation.

The integral characteristics include the following.

1. The text corpus “Heating Engineering” and the text corpus “Acoustics” show the dominance of synthetic forms and the most frequently used in both cases turned out to be forms of the Present Indefinite Active.

2. As the obvious peculiarity of the texts of scientific communication is the focus on the object and the absence of the doer of the action, quantitative calculations of voice forms in both text corpora show that the most frequently used form is the active voice, as the devices described in the texts (turbine systems, computers) are able to operate themselves and to be not only the objects but also the subjects of the production processes.

3. An analysis of word forms as to their tense criteria determines the most frequently used tense forms. They turned out to be the forms of the present tenses. They made the majority of the units in both text corpora. The second place is occupied by the past tense forms, and the third by the future tense forms.

4. Quantitative analysis of different types of verb forms shows that in both cases the majority of the verb forms belong to the Indefinite group, a much smaller number of verb forms refers to the Perfect group, and the third place is taken by the Continuous group.

Despite the fact that both specialties belong to scientific and technical discourse they have significant differences in grammar and statistics.

1. There are significant differences in the implementation of the tense and voice paradigms in both cases. If “Heating Engineering” texts uses almost

all possible verb forms (14 units), the “Acoustics” texts uses only 8 of them.

2. As to the statistics, both text corpora reveal the difference in the numerical values. As the number of tokens in both cases is the same, the lack of grammatical forms in text corpus “Acoustics” is compensated by large numerical quantity in the analyzed text corpus. Compare: synthetic forms in “Heating Engineering” texts contain 2640, and 3755 word forms can be found in the “Acoustics” texts; analytical forms of “Heating Engineering” corpus make 2393 units, and there are 3194 of them in “Acoustics” texts. Word forms that are part of synthetic and analytical verb units have, respectively, lower (in “Heating Engineering” text corpus) and higher (in “Acoustics”) frequency of usage.

The results of the comparative analysis leads us to the conclusion that the texts which belong to the same type of discourse have not only common but also the distinctive characteristics that depend on the field of knowledge, which they describe.

Observations of the text corpora in the area of scientific communication [8; 9; 10; 11; 12] have showed that all text elements are interrelated and dependent on each other, and grammatical features can be explained from the standpoint of lexical meanings of the text units under research. It determines the next stage of the analysis of the verb forms described in the article where it will be possible to trace the dependence of the integral and differential parameters from the lexical peculiarities of verb forms in the text corpora of “Heating Engineering” and “Acoustics” specialties.

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