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TYPES OF VERBS-TERMS IN THE TEXTS OF SCIENTIFIC TECHNICAL DISCOURSE (ON THE BASIS OF TEXT CORPUS “ACOUSTICS AND ULTRASONIC TECHNIQUE”)

ВИДИ ДІЄСЛІВ-ТЕРМІНІВ У ТЕКСТАХ НАУКОВО-ТЕХНІЧНОГО ДИСКУРСУ (НА МАТЕРІАЛІ ТЕКСТОВОГО КОРПУСУ «АКУСТИКА Й УЛЬТРАЗВУКОВА ТЕХНІКА»)

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The article presents the results of analysis of the verbs-terms highlighted in describing the text corpus “Acoustics and Ultrasonic Technique” (AUST). The list of verbs-terms contains 90 units with the total frequency 3629 word tokens. The terms are considered from the viewpoint of their terminological features, statistical and semantic characteristics. Four types of verb-terms are singled out: 1) highly specialized terms, related exclusively to the specialty “Acoustics and Ultrasound Technique” and being autonomous in this area, free from collateral associations; 2) verbs-terms that have parallel units in other lexical layers (common and general scientific ones); 3) verbs-terms, formed in most cases from nouns-terms denoting processes in the specialty AUST; 4) polysemous verbs-terms with several terminological meanings, all of which are included in the terminological system of AUST. Although the verbs-terms have differences in terminological nature and in statistical values of occurrence in the texts, the basic semantic features of the terms of all four groups are similar.

Key words: scientific and technical discourse, word token, term system, terminological unit, frequency of usage.

У статті подаються результати аналізу дієслів-термінів, виділених під час опису текстового корпусу «Акустика й ультразвукова техніка» (АУЗТ). Список дієслівних термінів склав 90 одиниць із сумарною частотою 3629 слововживань. Терміни розглядаються з погляду їх термінологічних особливостей, статистичних і семантичних характеристик. Було виділено чотири види дієслів-термінів: 1) вузькоспеціальні терміни, що стосуються виключно спеці-

альності «Акустика й ультразвукова техніка» й присутні в цій галузі автономними й вільними від побічних асоціацій одиницями; 2) дієслова-терміни, що мають паралелі в інших лексичних шарах (загальновживаному й загальнонауковому); 3) дієслова-терміни, утворені в більшості випадків від іменників-термінів, що позначають процеси в спеціальності АУЗТ; 4) багатозначні дієслова-терміни, що мають кілька термінологічних значень, які входять у терміносистему АУЗТ. Хоча дієслова-терміни мають відмінності в термінологічній природі й у статистиці використання в текстах, основні семантичні особливості термінів усіх чотирьох груп збігаються.

Ключові слова: науково-технічний дискурс, слововживання, терміносистема, термінологічна одиниця, частота використання.

В статье представлены результаты анализа глаголов-терминов, выделенных при описании текстового корпуса «Акустика и ультразвуковая техника» (АУЗТ). Список глагольных терминов составил 90 единиц с суммарной частотой 3629 словоупотреблений. Термины рассматривались с точки зрения их терминологических особенностей, статистических и семантических характеристик. Было выделено 4 вида глаголов-терминов: 1) узкоспециальные термины, относящиеся исключительно к специальности «Акустика и ультразвуковая техника» и являющиеся в данной области автономными, свободными от побочных ассоциаций единицами; 2) глаголы-термины, имеющие параллели в других лексических слоях (общеупотребительном и общенаучном); 3) глаголы-термины, образованные в большинстве случаев от существительных-терминов, обозначающих процессы в специальности АУЗТ; 4) многозначные глаголы-термины, имеющие несколько терминологических значений, которые вошли в терминосистему АУЗТ. Хотя глаголы-термины имеют различия в терминологической природе и в статистике использования в текстах, основные семантические особенности терминов всех четырех групп совпадают.

Ключевые слова: научно-технический дискурс, словоупотребление, терминосистема, терминологическая единица, частота использования.

A lot of attention has been paid to the forming of terminology lists in the most various areas by linguists in the recent past. It is possible to judge about it regarding an amount and a variety of lexicographic resources, which cover terminology of practically any type of discourse fixed in the internet and accessed on call by researchers performing their analysis on text material.

Along with compiling the terminology dictionaries the researches on their contents are simultaneously being carried out. A significant number of theses have been devoted to the researches which were presented to defend them [1; 2; 3; 4; 5; 6; 7; 8]. However, in none of them, even those which analysed the texts of scientific and technical discourse [1; 2; 4], no attention was paid to the types of terminology units different on the character, and, in particular – terms-verbs that come across in technical text corpora.

The given paper describes the types of verbs-terms that function in the area of technical knowledge "Acoustics and ultrasonic technique" (AUST).

The analysis was carried out on the material of text corpus based on the articles from the corresponding scientific magazines of the USA and Great Britain – Journal of Acoustic Society of America, Journal of the Audio Engineering Society, Applied Acoustics, IEEE Transactions of Antennae and Propagation, The Journal of the Society of America. The general volume of corpus makes up 200 thousand of word tokens.

The first stage of the research is devoted to the forming of AUST term system. In spite of the fact that as early as the last century, the description of terms were presented by scientists-theorists in detail enough in linguistic literature [9; 10] it remains problematic for the practical researchers to distinguish the list of terminology units. It takes place because to set up clear borders between the separate layers of vocabulary is sometimes impossible since the differentiation of lexical layers is mostly relative. The reason of this difficulty is – a permanent transition of polysemous lexical units from one layer into another. For example, commonly used verbs are very often the source of formation of general and terminological lexemes. The polysemous commonly used verbs can refer to both the layer of general and terminology lexemes depending upon what meaning they are used with in this or that context. Therefore, the verb *behave* in AUST texts acts as a commonly used verb with a meaning "To show a certain behaviour", e.g. *The tubes lens will behave according to the ray-theory description if the frequency is large enough.* However, functioning in the word-combination *behave logarithmically* with the meaning "to change by a logarithmic law" the verb *behave* acts as a term in the texts on mathematics. From the example above, it is evident how a transition of lexical units from one layer into another within a certain context occurs.

Here is another example that illustrates this phenomenon. While researching the AUST general verbs it was noticed that these verbal units were not specific like the strictly specialized lexemes and were not stylistically neutral like verbs that come across equally often in the different types of discourses. However, depending on an area they are used in they can function both as polysemous and a terminological units. If to examines their lexical meaning in a literary language and compares it with the usage in scientific and technical texts then it is possible to see that such verbs acquire a certain degree of terminology in the latter. Many existing dictionaries provide such verbs with the mark "technical term". For example, the verb *govern* in AUST and Motor Industry sublanguages activates the meaning "to manage, regulate (reac-

tions, composition, mixtures, details of machines)" *The boundary conditions are governed by the least square method*. In literary speech this verb is used with the meaning "to own (by itself); to influence on somebody" *Don't be governed by the opinion of others* [11]. The same verb in the mathematics sublanguage is a term with the meaning "to determine, serve as an argument".

Thus all above-mentioned facts require that while compiling a list of terms the especially accurate methods of analysis have to be used: contextual analysis taking into account an exact semantic variant; estimation of scientists specializing in the given area of science and engineering; statistical count of the results.

The verbs-terms are considered to be quite rare units in a term system as an accent is usually focused on its (system) nominal elements. Nevertheless, we suppose that verbs-terms make up a considerable part of content of AUST term system, and we can argue this coming from the statistical data obtained as a result of quantitative analysis. A count shows that 90 units (20,6% of the total of verbs occurring in AUST texts) whose total frequency makes up 3629 word tokens (10,6% of all AUST verbal word tokens) enter the list of verbs-terms.

The presence of verbal terms list possessing such statistically substantial characteristics shows that the verbs-terms, which are chosen as an object of the research, occupy their safe position in AUST terminology system.

The semantic analysis of the verbs-terms shows that they are variegated on their character and can be divided into a few categories:

1) the strictly specialized verbs-terms, their amount is 17 units, related entirely to the speciality "Acoustician and ultrasonic technique", and, being in this area autonomous, free of collateral associations, are distinguished as their use is conditioned by intentional, conscious activity of narrow circle of specialists: *shade (F = 65), echo-sonde (F = 46), scatter (F = 36), illuminate (F = 35), excite (F = 33), vibrate (F = 28), absorb (F = 27), truncate (F = 26), correlate (F = 22), decorrelate (F = 21), perfect-focus (F = 18), refract (F = 18), beam - steer (F = 16), aerate (F = 15), emit (F = 10), fade (F = 10), insonify (F = 10).*

The statistical characteristics of this group of verbs-terms are as follows: they make up 4,3% of all AUST verbal lexemes with a total volume of 447 word tokens. As we can see these values are modest enough, however as it is well-known in the circle of statistical linguists that such kind of terms occupy a low frequency area in frequency dictionaries [12].

Let us consider the semantic features of the strictly specialized verbs-terms:

– the verbs designating processes and actions related to the spreading and transformation of acoustic waves – ***excite***, etc.;

– actions related to noise direction finding by an echo-ranging – ***echo-sonde, refract, aerate, emit, vibrate, beam-steer,*** etc.;

– actions related to sound dispersion – ***absorb, fade, insonify***, etc.;

– actions related to measuring of sound – ***steer, perfect-focus***, etc.

The semantics of these verbal terms shows their strictly specialized use inherent to the exclusively AUST subject domain;

2) 46 verb terms are distinguished, which have parallel units in other lexical layers in the English system (e.g. in commonly used and general layers of lexis) and they function in literature and newspaper discourses as well as in the certain type of scientific technical discourse, which can be found in so-called scientific-popular literature. However in AUST texts they have a terminological meaning and enter the term system of this speciality and carry a terminological function along with other verbs-terms. Thus having semantic parallel units in everyday speech, in the texts "Acoustics and ultrasonic technique" they are used in a meaning determined by this very subject area. In this paper such verbs are conditionally named termed units. The following lexemes are referred to them: *process (F = 224), indicate (F = 99), transmit (F = 97), steer (F = 72), weight (F = 71), derive (F = 70), control (F = 64), close (F = 62), cancel (F = 57), back (F = 53), range (F = 53) constrain (F = 30), spread (F = 29), detect (F = 28), rear (F = 28), align (F = 27), propagate (F = 26), cuff (F = 25), sense (F = 22), aim (F = 21), dash), reflect (F = 41), transfer (F = 41), simulate (F = 34), start (F = 33), maintain (F = 32), (F = 21), restrict (F = 20), jam (F = 19), read (F =19), taper (F = 19), degenerate (F = 18), overlap (F = 18), corrupt (F = 17), synthesize (F = 17), cut (F = 16), entail (F = 16), encode (F = 15), modulate (F = 14), slot (F = 13), fasten (F = 12), attenuate (F = 11), assemble (F = 10), converge (F = 10), fold (F = 10), isolate (F = 10), strike (F = 10).*

We should mark the following statistical features of this group of the verbs-terms. The terms of this group have (as compared to the first group of verbs-terms) not only quantitative advantage but advantage in total frequency of their occurrence in the AUST text corpus – 1654 word tokens, and exceeds four times this statistical characteristics of the first group almost.

In these two groups of terms, it is possible to observe a direct (with some errors) dependence

of values of total frequency on the values of total amount of verbs-terms included in these groups.

We will give a few examples of the term system verbs, which confirm the validity of both attributing them to the units of AUST term system and taking them in the separate group of verbs-terms.

The verb *cancel* in the literary language functions as "to discard", "abolish": *Sports meeting was cancelled* [11]. In the AUST text corpus the verb *cancel* is specialized in the context of this area and used with the meaning "to extinguish", e.g. *Generally, the first few harmonics will be of similar order of magnitude unless cancelled by a suitable choice of W*. If in the fiction in the meaning "to abolish" we imply "not to take place, not carried out" then reading the AUST texts the specialist understand that when the harmonics are considered the verb *cancel* is used with the meaning "to extinguish (to lock) an electronic ray".

The next example of the usage of commonly used verb as a term in the AUST text corpus touches upon the verb *simulate*. Having the commonly used meaning in the semantic structure "to pretend" the verb *simulate* in the AUST texts means "to model", e.g. *He simulated innocence* [11]. The commonly used meaning of the investigated verb is actuated in the given sentence. But in the text corpus we have found such sentence – *It is interesting to look at the manner in which individual drive units combine to simulate a loudspeaker system.* From the given example, it is evident that the verb *simulate* within the framework of the system of concepts of this concrete area is specialized, and functions mainly with the meaning "to model". We should mark that the frequency of this verb is great enough in the researched text corpus and fixes 34 word tokens. The texts analysis of other areas of knowledge included in scientific and technical discourse has shown that at present the verb *simulate* is more frequently used than the verb *model*.

In the semantic aspect the verbs of this group practically repeat features of the strictly specialized verbs-terms considered earlier:

– the verbs designating the processes and actions related to the spreading and transformation of acoustic waves – *reflect, transfer, modulate, isolate, etc;*

– actions related to dispersion – *propagate, spread, scatter, degenerate, etc.*;

– actions related to measuring of sound – *weight, process, etc;*

3) the considerable part of the presented list of verbs-terms found in the AUST text corpus (concerning both amount and total frequency) is occupied by the verbal units formed in most cases from nouns-terms designating processes, which occur in the technical area "Acoustics and ultrasonic technique". The list of the third group of verbs-terms is as follows: *sample (F = 73), range (F = 53), water (F = 52), filter (F = 35), load (F = 30), shield (F = 29), phase (F = 28), centre (F = 26), segment (F = 20), monitor (F = 18), pulse (F = 17), rank (F = 17), screw (F = 17), tune (F = 17,) seal (F = 12), sandwich (F = 11), photograph (F = 10), plane (F = 10).*

Such lexemes as *water, sandwich, photograph* are included in the presented list with the following meanings "*To wet, moisten", "to interlay", "take pictures"*. They are exception and do not originate from nouns-terms but from nouns included in commonly used everyday vocabulary. Being transformed in the analysed texts they acquire the terminological meaning and become terms used for the description of phenomena of this specialty.

Their amount is 18 units and the total value of word tokens used in the AUST text corpus is 976. As we see this group occupies the third place on the amount of word tokens and on the total frequency of their usage in the texts;

4) the fourth group of verbal terminological units is lexemes, which in the opinion of many linguists cannot be met in a technical text corpus, and even more so – in term system of the technical specialty. Such verbs-terms are polysemous lexemes, thus all their meanings used in AUST specialty are terminological, and simultaneously are the part of AUST term system.

We found 9 polysemous verbs-terms of such kind: *plot* (F =119) to "put (size) aside; to build a chart"; *damp* (F = 114) "to muffle; to go out slowly"; *radiate* (F = 98) "to go away; to radiate(this)"; *focus* (F = 60) "to focus; to concentrate"; *scan* (F = 48) "to scan; to develop"; *suppress* (F = 37) "to repress; to lock (ray)"; *stagger* (F = 24)"to dispose zigzag; to hesitate"; *boar* (F = 23) "to support; to bear"; *decay* (F = 15) "to go out slowly; to disintegrate"; *extract* (F = 14) "to extract; to destroy (equalization)". The total amount of word tokens makes up 552 lexemes.

The polysemous verb-terms cause considerable difficulties in translating the texts from one language into another. Difficulty in this case consists in the choice of the correct translated equivalent of the polysemous term. Therefore, if during semantic research of commonly used verbs it is possible to go from both syntagmatics to paradigmatics and vice versa, then in the case of polysemous verbs-terms of AUST sublanguage one should come only from the facts of speech. If in the language there are a few meanings used to denote one object that is denoted, then the use of each of them can be set up only at

the level of speech utterances, as the selection of that or another meaning depends on extra linguistic factors. In this connection as we mentioned above to determine the meaning of polysemous units the following methods were used: contextual analysis and defining the keywords, in combination with which the realization of one or another meaning of a verb in AUST sublanguage takes place; expert estimation of specialists of this subject domain. For example, the verb *decay* depending on a context realizes two meanings in the researched sublanguage: 1) "to go out slowly", e.g. *The source decays since the input voltage applied to the source is not kept constant*; 2) to "disintegrate, decompose", e.g. *The procedure of dividing the array beam data by the beam width is currently being used to decay the horizontal directionality of the symmetric part of the ambient noise field*. Thus, we see that a context in relation to the polysemous verbs acts as a means of the necessary meaning selection.

However, the analysis of AUST text corpus shows that the basic part of verbs-terms is used only in a single meaning specific for the area "Acoustics and ultrasonic technique", e.g. *echo-sonde*, *scatter* – "to disperse", *perfect-focus* "to exactly focus", *beam-steer "*to manage a ray", *aerate* "to ventilate", *emit* "to radiate", *insonify* "to influence a sound". The narrow meaning of verbs of this group of AUST sublanguage is caused by the fact that designating the special processes or actions, these units mostly are within the boundaries of a narrow environment, i.e. areas of acoustics and ultrasonic technique. Naturally, their unambiguity is relative and can be determined only within the framework of this area of knowledge.

All above results of the research of verbs-terms functioning in the text corpus "Acoustician and ultrasonic equipment" allow to come to the following conclusions.

1. The amount of verbs-terms entering the AUST term system makes up 90 units that is 20,6% of the total of verbal lexemes found in the AUST text corpus. The general amount of word tokens is 3629, i.e. 10,6% of all word tokens of verbs. These values prove that verbs-terms make up a considerable part of content of AUST term system.

2. The semantic analysis of the verbs-terms was produced by means of the most exact methods – contextual analysis and the method of expert estimation of specialists in AUST area.

3. The semantic analysis of verbs-terms shows that being the most informative units of AUST specialty they are at the same time variegated on their character. The four types of verbs-terms were fixed in the AUST texts: the strictly specialized verbs; termed verbal units; verbs-terms formed in most cases from nouns-terms designating the AUST processes; polysemous verbs-terms.

The next stage of the research will be devoted to the consideration of terms included in other classes of words – adjectives and nouns.

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