VERBS-TERMS FORMED FROM LEXEMES OF OTHER LEXICAL LAYERS IN THE TEXTS OF THE SPECIALTY "ACOUSTICS"

ДІЄСЛОВА-ТЕРМІНИ, СФОРМОВАНІ ВІД ЛЕКСЕМ ІНШИХ ЛЕКСИЧНИХ ШАРІВ, У ТЕКСТАХ СПЕЦІАЛЬНОСТІ "ACOUSTICS"

Dyachenko G.F.,
orcid.org/0000-0002-1657-1698
Candidate of philological Sciences, PhD,
Associate Professor at the Foreign Languages Department
National University "Odesa Polytechnic"

Borisenko T.I.,
orcid.org/0000-0002-9839-1761
Candidate of philological Sciences, PhD,
Associate Professor at the Foreign Languages Department
National University "Odesa Polytechnic"

Yershova Yu.A.,
orcid.org/0009-0006-4251-6891
Senior Lecturer at the Foreign Languages Department
National University "Odesa Polytechnic"

The article describes the results of the analysis of verbal units that are formed from lexemes of other lexical layers – common and general scientific. The presence of a text corpus, as well as a probabilistic-statistical model (frequency dictionary) of the technical specialty "Acoustics" made it possible to use various methods of analysis. The text corpus was compiled on the basis of scientific articles in the corresponding field of knowledge, taken from journals published in the USA and UK: IEEE International Conference on Acoustics, Speech, and Signal Processing; The Journal of the Acoustical Society of America; Acoustics Letters; Journal of the Audio Engineering Society; Acustica. The total corpus size is 200 thousand tokens.

Verbs are a rather complex part of speech for the analysis of their lexical and semantic features, since they do not depend upon other parts of speech in a sentence and play the role of the core themselves. This determines the use of a large number of complex methods. The main methods for identifying terms of this type were the following: contextual analysis, conducting a survey of specialists in this field of technology, lexicographic studies, methods of linguistic statistics, methods of lexical stratification, etc.

The purpose of the article was not only to record the terminologized verbs in texts and then – to form a list including these units, but also to possibly determine the reasons for such a process, which are hidden, perhaps, in the interrelation and interdependence of statistical and lexical characteristics of these verbs. For this purpose, firstly, the frequency of use of verb terms was indicated, which was reflected in the quantitative values of tokens; secondly, lexical groups were identified that covered all verbal units of a given type. As a result of comparisons of statistical and lexical characteristics, it was discovered that there is a fairly high probability of their interaction and interdependence, which may have served as the reason for the process of terminologization of these words.

Key words: text corpus, word usage, frequency of use, lexical group, verbal unit.

У статті описано результати аналізу дієслівних одиниць, що утворені з лексем інших лексичних шарів – загальновживаних та загальнонаукових. Наявність текстового корпусу, а також ймовірнісно-статистичної моделі (частотного словника) технічної спеціальності «Акустика» дозволила використовувати різні методи аналізу. Текстовий корпус було складено на основі наукових статей у відповідній галузі знань, взятих з журналів, що публікуються в США та Великій Британії: IEEE International Conference on Acoustics, Speech, and Signal Processing; The Journal of the Acoustical Society of America; Acoustics Letters; Journal of the Audio Engineering Society; Acustica. Загальний обсяг корпусу становить 200 тисяч слововживань.

Дієслова є досить складною частиною мови для аналізу їх лексико-семантичних особливостей, оскільки вони не залежать від інших частин мови в реченні та самі відіграють роль ядра. Це зумовлює використання великої кількості складних методів. Основними методами ідентифікації термінів цього типу були наступні: контекстуальний аналіз, проведення опитування фахівців у цій галузі техніки, які змогли дати коректні відповіді, лексикографічні дослідження, методи лінгвістичної статистики, методи лексичної стратифікації тощо.

Метою статті було не лише зафіксувати термінологізовані дієслова в текстах, а потім – сформувати список, що включає ці одиниці, але й визначити причини такого процесу, які приховані, можливо, у взаємозв'язку та взаємозалежності статистичних та лексичних характеристик цих дієслів. Для цього, по-перше, було вказано частоту вживання дієслівних термінів, що відображалося в кількісних величинах слововживань, використаних у текстовому корпусі; по-друге, було визначено лексичні групи, які охоплювали всі дієслівні одиниці цього типу. В результаті порівняння статистичних та лексичних характеристик було виявлено, що існує досить

висока ймовірність їхньої взаємодії та взаємозалежності, що могло послужити причиною процесу термінологізації цих слів.

Ключові слова: текстовий корпус, слововживання, частота вживання, лексична група, дієслівна одиниця.

Problem statement. Recording the penetration of terms into the common vocabulary of users' language has long been a common place in linguistics. However, the reverse movement, when lexemes recorded as common become terms, is not so often, and therefore deserves a detailed description.

From the very beginning, the authors of the studies usually analyzed the phenomena of the transition of units from one lexical layer to another one based on the study of lexicographic sources reflecting the semantic structure of the word [1; 2]. With the development of computer linguistics [3], statistical lexicography, and later linguistic statistics and especially discourse studies, works based on real text corpora and providing statistically reliable results began to appear [4; 5; 6; 7; 8; 9].

The verbal units that the authors chose as an object of the study are a rather complex part of speech to analyze in this particular area of linguistics, since they themselves usually play the role of one of the core elements in a sentence, independent of other syntactic or lexical connections. We can give an example of the terminologization of adjectives [10], in which such transformations occurred quite easily, since the adjective is completely dependent on the noun that is connected with it. Here, the analysis was much easier.

In the case of verbal lexemes, to prove the completion of the process of transforming a commonly used (or general scientific) unit into a term, it is necessary to use a large part of the context, a method of interviewing specialists in this field of technology, a study of the corresponding dictionary definitions, i.e. to carry out a fairly complex procedurs.

In addition, simply recording the existence of terms of this type and listing them, in our opinion, is an insufficient act in such descriptions. In these exact cases, it is necessary to consider the reasons that could lead to the process of terminologization of verbs. Such a reason may very well be the interaction (or interdependence) of various characteristics of the selected terms. Therefore, in this work, the authors presented a description of an attempt to analyze the interaction of statistical and lexical characteristics of terminologized verbs.

Goal. The aim of the article is to describe the results of the analysis of verb-terms that were formed from lexemes of other lexical layers – common and general scientific, and functioning in the text corpus of the technical specialty "Acoustics".

Base Material. One of the main tasks that needed to be solved was the creation of a text corpus of the specialty "Acoustics", and then the compilation of a frequency dictionary (frequency list) of this specialty. The text corpus was created on the basis of scientific articles taken from the relevant journals of the USA and UK: IEEE International Conference on Acoustics, Speech, and Signal Processing; The Journal of the Acoustical Society of America; Acoustics Letters; Journal of the Audio Engineering Society; Acustica, etc. The total volume of the corpus was 200 thousand tokens.

All verb-terms were selected from the frequency list and a terminological layer of the vocabulary was created. Among the verb-terms of the frequency dictionary of the "Acoustics" specialty, 63 verbal lexemes (2,112 tokens) were found and selected that have parallels in other lexical layers, but in our case are the terms that name the main actions or processes of this branch of technology, which are included in the list of main concepts of this specialty. These verbs belong to the common or general scientific layer, however, in the texts of the "Acoustics" specialty they have a terminological meaning, carry a terminological function along with other verb-terms. Such verbs will be conventionally called terminologized units (see the list of words below).

The terminologized verbs in the texts of the "Acoustics" text corpus specialize their lexical meaning. Having semantic parallels in the dictionary, in the studied texts they are used in the meaning determined by the objects of "Acoustics" engineering area.

So, here is a list of such units arranged in the order of decreasing frequencies: process «обробляти» (F=224), plot «відкладати /величину/; будувати графік» (F=119), indicate «вказувати» (F=99), transmit «передавати» (97), sample «відбирати зразки» (F=73), steer «правити, керувати) (F=72), weight «навантажувати» (F=71), derive «виводити» (F=70), control «керувати» (F=64), close «замикати (ланцюг)» (F=62), cancel «гасити» (F=57), back «рухатися у зворотньому напрямку» (F=53), range «перебувати в межах» (F=53), reflect «відбивати» (F=41), transfer «передавати» (F=41), simulate «моделювати» (F=34), start «приводити у дію» (F=33), maintain «підтримувати» (F=32), constrain «стримувати» (F=30), load «навантажувати»(F=30), spread «поширюватися» (F=29), analyze «аналізувати» (F=28), detect «виявляти» (F=28), rear «споруджувати» (F=28), align «вирів-

нювати (ся)» (F=27), centre «вирівнювати (ся)» (F=26), propagate «розповсюджувати(ся)» (F=26), cuff «пробивати» (F=25), stagger «розташовувати зигзаподібно (коливатися)» (F=24), sense «сприймати» (F=22), aim «наводити на ціль» (F=21), dash «штрихувати» (F=21), restrict «обмежувати» (F=20), jam «заклинювати, затискати» (F=19), read «считувати» (F=19), taper «загострювати, звужувати у кінці» (F=19), degenerate «погіршуватися» (F=18), monitor «контролювати» (F=18), overlap «частково покрівати» (F=18), corrupt «псувати(ся)» (F=17), rank «розташовувати в порядку зростання або вбивання» (F=17), screw «нагвинчувати» (F=17), synthesize «синтизувати» (F=17), tune «налаштовувати(ся)» (F=16), cut «розрізати» (F=16), entail «тягнути за собою» (F=16), encode «кодувати» (F=15), extract «витягувати, виводити рівняння» (F=14), modulate «модулювати» (F=14), slot «прорізати» (F=13), fasten «закріплювати» (F=12), program «програмувати» (F=12), seal «впаювати» (F=12), attenuate «послаблювати(ся)» (F=11), assemble «монтувати (збирати)» (F=10), converge «зводитися» (F=10), deviate «відхиляти(ся)» (F=10), fold «згортати» (F=10), isolate «ізолювати» (F=10), photograph «фотографувати» (F=10), plane «вирівнювати» (F=10), strike «вдаряти(ся)» (F=10).

Let us give several examples in which the result of the transformation of the meaning in a commonly used lexeme, making it (the lexeme) a term, is quite clearly visible. The Hornby Standard Dictionary [11] was taken as a lexicographic source that presents the semantic structure of a word as a set of definitions. One of the most striking examples of the transformation of a commonly used lexeme into a term is the verb 'cancel'. Let us give the semantic structure of this verb: **1**. [transitive] a/ cancel something to decide that something that has been arranged will not now take place: All flights have been cancelled because of bad weather. The prime minister has abruptly cancelled a trip to Washington.

2. [transitive, intransitive] a/ to say that you no longer want to continue with an agreement, especially one that has been legally arranged: *No charge will be made if you cancel within 10 days*. b/ cancel something to cancel a contract/policy/subscription: *Is it too late to cancel my order? The US has agreed to cancel debts (= say that they no longer need to be paid) totalling $10 million*. c/ to cancel a meeting/a show/an event: *The Foreign Office is not advising people to cancel their travel plans. The wedding was cancelled at the last minute. The president fell ill and was forced to cancel all public engagements. When the war broke out all leave was cancelled. She*

abruptly cancelled a scheduled meeting. **3**. [transitive] cancel something to mark a ticket or stamp so that it cannot be used again; **4**. cancel somebody (disapproving) to exclude somebody from social or professional life by refusing to communicate with them online or in real life, because they have said or done something that you do not agree with: *Some campaigned to cancel the writer after she expressed her views on transgender rights*.

Having reviewed the set of definitions presented, we are unable to find a meaning that corresponds to the term denoting a concept included in the technical concepts of the specialty "Acoustics". An example of the lexical-semantic variant 'cancel', taken from the text corpus "Acoustics", demonstrates completely different lexical features of the word 'cancel', characterizing the described phenomenon in acoustics: "*The magnitude of these harmonics will depend upon the pulse rise and fall times and upon pulse width. So, the first harmonic will be cancelled soon*". (Величина цих гармонік залежатиме від збільшення пульсації, моментів спаду та тривалості імпульсу. Тому перша гармоніка буде погашена незабаром). If in the fiction discourse by the meaning "скасувати" the meaning "не відбутися, не здійснитися" is implied, then in "Acoustics" a specialist clearly understands that in this case the phenomenon of harmonics is described and the verb 'cancel' is used in the meaning "to cancel (close) electronic beam" (гасити (замикати) електронний промінь).

Let's look at another example with the verb 'simulate'. The set of definitions in the Hornby dictionary is as follows: **1**. simulate something to create particular conditions that exist in real life using computers, models, etc., usually for study or training purposes: *Computer software can be used to simulate conditions on the seabed. Role-playing is a useful way of simulating real-life situations. The device simulates conditions in space quite closely*; **2**. simulate something to be made to look like something else: *a gas heater that simulates a coal fire*; **3**. simulate something to pretend that you have a particular feeling: *I tried to simulate surprise at the news*.

We should note the following interesting fact. In the Hornby Standard Dictionary in the 1974 edition [12], the arrangement of definitions in the dictionary entry had a completely different hierarchy: in first place was definition **3** "simulate something to pretend that you have a particular feeling", definition **1** "simulate something to create particular conditions that exist in real life using computers, models, etc., usually for study or training purposes" was recorded in the last, third place. (As we can see, the time period here is almost equal to 50 years. It is considered by

many scientists involved in statistical calculations as a period sufficient for statistical comparisons, in which data changes are statistically reliable). Here, the influence of the frequency of use of the verb 'simulate' is quite obvious, namely in the meaning of "simulate something to create particular conditions that exist in real life using computers, models" under the influence of the development of technology, which (the verb) has reliably entered everyday life. In this case, the term ceased to be perceived as one of the elements of the terminology system, took on a commonly used meaning and became one of the lexemes of this layer of vocabulary.

However, in the present study we fix it as a verb-term, based on the situation proposed in the text on the specialty "Acoustics" "*Different units of the system were incorporated to simulate this device*".

Along with the statistical characteristics that were determined in the terminologized verbs of the specialty "Acoustics", the lexical features of this type of terms were investigated. In this regard, the entire list was divided into the following lexical groups:

1/ verbs describing the scattering/absorption of sound – propagate (F=26), spread (F=29), degenerate (F=18), stagger (F=24), attenuate (F=11), fold (F=10), plane (F=10);

2/ verbs with the meaning of controlling – indicate (F=119), control (F=64), start (F=33), detect (F-28), sense (F=22), aim (F=21), monitor (F=18), rank (F=17), tune (F=17);

3/ verbs denoting processes and actions associated with the propagation and transformation of acoustic waves – transmit (F=97), cancel (F=57), reflect (F=41), transfer (F=41), align (F=27), cuff (F=25), dash (F=21), overlap (F=18), modulate (F=14), deviate (F=10), strike (F=10);

4/ sound measurement – process (F=224), plot (F=119), steer (F=72), weight (F=71), range (F=53), centre (F=26), attenuate (F=11), converge (F=10);

5/ verbs describing procedures common to many areas of technology (therefore they could be called "terms with general scientific meaning") – sample (F=73), derive (F=70), close (F=62), simulate (F=34), maintain (F=32), constrain (F=30), load (F=30), analyze (F=28), restrict (F=20), read (F=19), corrupt (F=17), synthesize (F=17), encode (F=15), program (F=12), isolate (F=10), photograph (F=10);

6/ verbs describing the work of auxiliary devices – back (F=53), dash (F=21), screw (F=17), fasten (F=12), jam (F=19), taper (F=19), cut (F=16), entail (F=16), extract (F=14), slot (F=13), seal (F=12), assemble (F=10).

Having two parameters of the same object – verbal lexemes of a special type (verb-terms formed from commonly used or general scientific lexemes) – it is possible to determine their interaction and mutual influence with a certain degree of probability. So, let us try to describe the interaction and interdependence of statistical and lexical characteristics of the presented terminologized verbal units.

The first lexical group (verbs describing the scattering and absorption of sound) has a very small number of words – only 7 terms with a correspondingly small number of tokens – 128 units. The share of this group of terms from the entire list of terminologized units is 11.3%. The location in the frequency list is mainly in the mid- and low-frequency zones. Such low quantitative indicators of the frequency of use and the number of words are quite typical for the most necessary from the point of view of describing the basic concepts of any specialty, which was emphasized by many linguists. They confidently pointed out the fact that the main terms are always characterized by very low statistics. And the data of our analysis only support these conclusions.

The second group includes terms related to the control functions of devices. Their number is 9 words (almost 14.5% of the entire list), the total volume of tokens is 338. A characteristic feature of the location of these words in the frequency list: absolute absence in the low-frequency zone. And in general, both the position in the list and the frequency of use show almost average characteristics. This indicates a stable position of units of this lexical group in the text corpus of the specialty "Acoustics". Authors of engineering articles in this specialty quite often use these words when describing operating modes.

The third lexical group, which includes the verbs denoting processes and actions related to the propagation and transformation of acoustic waves, contains 11 verbal units, which is almost 17.5% of the entire list of terminologized verbs. The total volume of these terms includes 361 tokens. The number of words and the volume of tokens demonstrate fairly small values, which is natural for the main terms of any specialty, which are usually located in the middle and low-frequency zones of frequency lists.

The fourth group of verbs describing the sound dimension has 8 units, i.e. almost the same as in the second group of verbs (almost 13% of the entire list). However, the total volume of tokens, i.e. the frequency of use of these terms is much higher (1.5 times) – 586 tokens. In addition, according to the quantitative data obtained, these terms are located mainly in the high-frequency and mid-frequency zones of the list, and only two words are in the low-frequency zone (attenuate (F=11), converge (F=10). Thus, this group has the highest frequency of use of terms of this type.

The fifth group was composed of verbs used not only in the texts of "Acoustics". They can be found in almost any texts related to scientific and technical discourse. For this reason, as was indicated in the note in the name of this group, these words are often attributed to the general scientific layer of vocabulary. Nevertheless, they were included in the group of this type of verb-terms. Their number is greater than in other lexical groups – 16 units, almost 26% of the entire list of words described. The total frequency is 479 tokens, which is a fairly high value. High statistical values are more characteristic for the lexemes of the general scientific layer of vocabulary than for terms.

And finally, the sixth lexical group of terms describes the necessary work of auxiliary devices, whose contribution is undoubtedly very large in the overall activity of this area of knowledge. Their number is 11 units, i.e. 18% of the entire list under consideration. The total frequency of use is 220 tokens. The main part of these terms is concentrated mainly in the low-frequency zone of the list.

Conclusions. The results of the statistical calculation and lexical analysis allow us to draw the following conclusions.

The procedure for determining the possibility of interaction and interdependence of such characteristics as statistical and lexical ones makes it necessary to make preliminary corresponding quantitative calculations, as well as to divide the entire content of the lexical object under study into lexical groups.

If we plot a graph of the dependence of lexical meanings on statistical data (frequency of use and the number of words included in a particular group), we can notice the following dependence. The number of lexemes throughout the analysis of lexical groups remains virtually unchanged, and shows slight fluctuations from 7 to 11, with a sharp jump in the fifth group (16 words), i.e. practically at the end of the entire chain of lexical groups. It is worth recalling that the fifth group includes terminologized verbs formed from units of general scientific vocabulary and used in texts of almost any technical specialty. In the area of the sixth group, the number of words again decreases to 11 units.

As for the frequency of use of terms of this type in the texts of the specialty "Acoustics", the following relationship is observed between this statistical parameter and the lexical meaning of words. In the course of analyzing, there is a constant increase in the number of tokens, i.e. the frequency indicator. Somewhere it is quite sharp, for example, almost 2.5 times between the first and second groups (128 and 338), somewhere slower – between the second and third groups (338 and 361). And, finally, it manifests itself as a sharp jump in the fourth group, with fairly modest quantitative values of words (8 words with a frequency of 586 tokens). This group includes terms describing the processes of sound measurement, i.e. one of the main phenomena of acoustics.

Thus, it can be stated with some reservations that there is a certain dependence and interrelation between the statistical and lexical characteristics of terminologized verbs functioning in the texts of the specialty "Acoustics".

REFERENCES:

1. Мацюк Г. П. Про термінологізацію одиниць загальновживаної лексики. Мовознавство. 1984. № 5. С. 68–71.

2. Крижанівська А. В., Симоненко П. А. Актуальні проблеми упорядкування наукової термінології. К.: Наук. думка, 1987. 162 с.

3. Bourigault D., Condamines A. Terminology & Artificial Intelligence. Toulouse: Universite de Toulouse, 1993. 134 р.

4. Чорновол Г. В. Новітня економічна термінологія та її стилістичне вживання в сучасній українській мові (на матеріалі періодичних видань): Автореф. дис. …канд. філол. наук: 10.02.04. К., 2004. 23 с.

5. Томасевич Н. П. Термінологічна лексика англійської підмови автомобілебудування та її взаємодія з іншими лексичними шарами: автореф. дис. … канд. філол.наук: спец. 10.02.04 "Германські мови". Одеса, 1984. 16 с.

6. Струганець Л. В. Динаміка лексичних норм в українській лексикографії ХХ століття: автореф. дис. … канд. філол. наук: 10.02.01 НАН України; Ін-т укр. мови. К., 2002. 36 с.

7. Дьяченко Г. Ф. Дослідження семантики дієслова в англійських текстах підмов техніки: автореф. дис. … канд. філолог.наук: спец. 10.02.04 "Германські мови". Одеса, 1984.16 с.

8. Васковець Л. Термінологізація та детермінологізація в казначейській терміносистемі. Вісник Національного університету «Львівська політехніка». Проблеми української термінології. 2013. № 765. С. 87–90.

9. Борисенко Т.И. Англійські модальні дієслівні конструкції в підмовах техніки: дис. … канд. філол. наук: спец. 10.02.04 Германські мови. Одеса, 1989. 180 с.

10. Шапа Л.Н., Томасевич Н.П., Данцевич Л.Г. Термінологізація прикметників в текстах наукової комунікації (на матеріалі підмов електротехніки). Вісник Харківського національного унівеситету імені В.Н.Каразіна. Серія «Філологія». 2015. Вип. 73. С. 172–179.

11.Hornby A.S. Oxford Advanced Learner's Dictionary of Current English. Oxford: Oxford University Press. 2022.

12. Hornby A.S. Oxford Advanced Learner's Dictionary of Current English. Oxford: Oxford University Press. 1974. 1055 p.