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LEXICAL STRATIFICATION OF VERBS IN THE TEXTS OF SCIENTIFIC STYLE (ON THE BASIS OF THE ENGLISH SUBLANGUAGE «ACOUSTICS AND ULTRASONIC ENGINEERING»)

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The article is devoted to the description of the lexical features of verbal units functioning in the text corpora of scientific style. The texts, which are referred to «Acoustics and Ultrasonic Engineering» were taken as a material. All the verb list was divided into three lexical layers of vocabularies: common, general and terminological ones. Their (verbs) lexical and statistical characteristics were indicated. The statistical data allowed coming to the generalized conclusions about the dissimilarity, which can be observed in using the units of different lexical layers.
Keywords: frequency dictionary, lexeme, lexical stratification, probabilistic and statistical model, verb.

In modern linguistics one of the most attractive directions for researchers is corpus linguistics. Except for forming the corpora of national languages [11; 18], the corpus linguistics analyses the features of texts of various functional styles [9], including scientific functional style [3; 4; 24; 25].

The vocabulary of scientific texts was investigated at various levels: syntactic [20], morphological [13; 15], lexical [24], aspectual-temporal forms of the verb [23], etc. The works devoted to the description of statistical characteristics of scientific text corpora and their units are of special value. In recent years publishing of a number of branch frequency dictionaries has been the result of considerable achievements in this direction [8; 10; 12; 14; 16; 17; 19]. Formation of probabilistic and statistical models (frequency dictionaries) provides the way to create some preliminary concept about the functioning of various fragments of scientific and technical texts. Therefore compilation of new models, which was not analyzed earlier, promotes confirming the hypotheses about the peculiarities of units of the scientific functional style.

So in the present article the probabilistic and statistical model of technical area of knowledge «Acoustics and ultrasonic Engineering» (AUSE), which has not been created by linguists, who study linguostatistics, is used for the first time. It is founded on the basis of scientific and technical journals of Great Britain and the USA: 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.

As the *object* of the research, one of the basic parts of speech functioning in AUSE text corpus – the verb has been chosen, and the list of these units has been taken from AUSE frequency dictionaries. The *goal* of the article is to present the description of lexical layers of verbal units. The basic *methods* which were used in the paper are as follows: the method of expert assessment, one of statistical methods of rank correlation, a number of methods of text corpora comparison.

In spite of the fact that all researchers admit that the vocabulary of the language of science is heterogeneous [5; 7], among linguists there is no consensus concerning classification of vocabulary of scientific and technical texts, and especially the quantity of stratification layers into which it is possible to divide all probabilistic statistical models. In this research we adhered to the point of view, according to which in the structure of a text corpus of any area of science one can distinguish more or less clearly three relatively independent

groups of vocabulary: common, general scientific and terminological vocabulary [2; 5].

A lot of researchers suppose that it is possible to select units of common and terminological layers of vocabulary practically accurately [19; 21; 24]. So, the lexemes of the common layer differ by their common meanings which are used in daily usage. As to the terms, they are included usually into the system of scientific concepts of this or that area of knowledge (in our case – AUSE), and can be easily detected by means of an expert assessment, i.e. interrogation of experts in «Acoustics and Ultrasonic Engineering». The units of the general scientific layer are very complex for detection because it is necessary to prove the degree of their termhood. It usually occurs as follows. Firstly, as these lexemes are usually common for many sublanguages of engineering, one should compare their usage in other areas of knowledge, which are not closely connected with its (AUSE) systems of scientific concepts, and to indicate the common units [17, c. 213]. That is why the list of the lexemes of general scientific AUSE layer was compared to the appropriating lists taken from the text corpora of «Motor Industry» [19], «Chemical Mechanical Engineering» [14] and «Electrical Engineering». Secondly, we can carry out the creation of the general scientific layer of the vocabulary by a statistical method formally, i.e. comparing ranked lists of the verbal units taken from the above mentioned frequency dictionaries and «The Teacher's Word book» by Thorndike E. and Lorge I. [22]. In this case the measure of termhood of verbs in AUSE sublanguage is the value of difference of numbers (ranks), between the verbal units of AUST frequency dictionary and ones of Thorndike E. and Lorge I. dictionary, in other words – the difference in the positions of verbs in these two compared dictionaries. The rank correlation was calculated by the formula $r_s = 1 - 6 \sum d^2 / N (N^2 - 1)$. We also would like to add, that if to consider stratification layers from the point of view of the arrangement of their units in lexical-statistical model, common lexemes are concentrated mainly in the high-frequency area of the model, the lexemes of the general scientific layer – in the next to the high-frequency area of the frequency dictionary, i.e. lower in the frequency list than common lexemes, and finally the units of the terminological layer are situated practically everywhere in the model (the frequency dictionary).

Verbal lexeme corpus is presented by 465 units. The common layer includes 202 words. As an example we give the most frequent verbs of this lexical layer: they are presented in the order of decreasing frequencies: be (F=9956), can (F=1115), hare (F=1040), use (F=905), show (F=620), give (F=536), receive (F=405), obtain (F=365), will (F=345), may (F=292), make (F=261), follow (F=254), require (F=223), would (F=199), do (F=192), consider (F=191), find (F=186), see (F=183), correspond (F=178), study (F=159), describe (F=152), represent (F=152), must (F=151), present (F=138), support (F=137), note (F=131), take (F=131), become (F=130), express (F=116), know (F=102), shall (F=99), develop (F=95), write (F=90), apply (F=88), desire (F=87), include (F=85), result (F=84), achieve (F=82), say (F=73), associate (F=71), appear (F=70), observe (F=70), occur (F-70), should (F=69), form (F=68), choose (F=67), employ (F=67), satisfy (F=67), illustrate (F=65), vary (F=64), need (F=62), depend (F=59), lot (F=58), discuss (F=56), display (F=55), perform (F=54), consist (F=53), predict (F=53), allow (F=52), utilize (F=52), resolve (F=49), place (F=47), cause (F=46), concern (F=46), report (F=46), exist (F=44), improve (F=44), refer (F=44), remain (F=44), demonstrate (F=43), avoid (F=42), expect (F=42), involve (F=42), arise (F=41), generalize (F=39), introduce, (F=39), arrive (F=36), differ (F=36), position (F=35), examine (F=34), lie (F=34), accomplish (F=33), effect (F=32), change (F=32), state (F=32), approach (F=31), regard (F=31), reach (F=30).

The group of general scientific verbs is presented by the units taking up an intermediate position between the common and terminological verbal lexemes. While investigating the lexical meaning of the units of this vocabulary layer it was revealed that the considerable part is made with the verbs which passed from the common layer and received other lexical status in the AUSE text corpus. General scientific verbs form the basis of the scientific text, since with their help the various phenomena, actions, processes in sublanguages of science and engineering are described and characterized. As a result of comparison of verbal unit lists of the mentioned-above text corpora in the aspect of definition of their (verbal units) belonging to various lexical layers, we has revealed that under interaction of sciences and penetration of separate areas of one sciences into others, the layer of general scientific verbs tends to widening. In the AUSE frequency dictionary 167 units have been selected in the group of general scientific verbs. The verbs are presented below in the order of decreasing their absolute frequencies. For example: provide (F=253), measure (F= 227), determine (F=222), increase (F=208), assume (F=190), transform (F=175), define (F=169), set (F=159), compare (F=157), evaluate (F=127), operate (F=124), space (F=117), denote (F=113), reduce (F=107). F=92), delay (F=89), estimate (F=81), normalize (F=73), coordinate (F=72), match (F=69), specify (F=66), contain (F=65), design (F=65), substitute (F=65), yield (F=63), record (F=62), generate (F=61), lead (F=59), relate (F=58), decrease (F=57), couple (F=55), separate (F=54), connect (F=53), toot (F=53), limit (F=51), locate (F=51), drive (F=50), fix (F=50), approximate (F=49), odd (F=48), investigate (F=48), average (F=47), mini-mize (F=47), move (F=47), multiply (F=47), solve (F=47), combine (F=46), construct (F=46), simplify (F=42), adjust (F=40), comprise (F=40), replace (F=38), sum (F=38), carry (F=37), complicate (F=37), extend (F=37), integrate (F=37), depict (F=36), hold (F=36), select (F=36), mismatch (F=35), modify (F=35), mount (F=35), switch (F=34), bound (F=33), divide (F=33), maximize (F=33), distribute (F=31), equal (F=31), implement (F=31), adapt (F=30), expend (F=30). The terminological layer contains the fewest number of units – just 56 words. Verbs-terms, as well as nouns-terms, express scientific concepts about subjects and phenomena of the environmental reality, but on the other level – the one of move-

ment, dynamics, process which follows from the verb function to denote the process. Especially, it can be noticed when terminological verbs function in concrete implementation. There are the following verbal terminological units in AUSE sublanguage (in the order of decreasing their absolute frequencies): process (F=224), compute (F=119), plot (F=119), damp (F=114), calculate (F=103), indicate (F=99), radiate (F=98), transmit (F=97), sample (F=73), steer (F=72), weight (F=71), derive (F=70), shade (F=65), control (F=64), close (F=62), focus (F=60), cancel (F=57), back (F=53), range (F=53), water (F=52), scan (F=48), echo-send (F=46), reflect (F=41), transfer (F=41), suppress (F=37), scatter (F=36), filter (F=35), illuminate (F=35), simulate (F=34), excite (F=33), start (F=33), maintain (F=32), constrain (F=30), load (F=30), shield (F=29), spread (F=29), analyze (F=28), detect (F=28), phase (F=28), rear (F=28), vibrato (F=28), absorb (F=27), align (F=27), center (F=26), propagate (F=26), truncate (F=26), cuff (F=25), stagger (F=24), vanish (F=24), bear (F=23), correlate (F=22), sense (F=22), aim (F=21), dash (F=21), decorrelate (F=21), restrict (F=20), segment (F=20), jam (F=19), read (F=19), taper (F=19), degenerate (F=18), monitor (F=18), overlap (F=18), perfect-focus (F=18), refract (F=18), corrupt (F=17), pulse (F=17), rank (F=17), screw (F=17), synthesize (F=17), tune (F=17), beam steer (F=16), cut (F=16), entail (F=16), aerate (F=15), decay (F=15), encode (F=15), extract (F=14), modulate (F=14), slot (F=13), fasten (F=12), program (F=12), seal (F=12), attenuate (F=11), sandwich (F=11), assemble (F=10), converge (F=10), deviate (F=10), emit (F=10), fade (F=10), fold (F=10), insonify (F=10), isolate (F=10), photograph (F=10), plane (F=10), strike (F=10).

The data on verb stratification layers of the scientific field «Acoustics and Ultrasonic Engineering» are tabulated. The information on the number of word usage, which belongs to this or that lexical layer, giving the chance to calculate their percentage, is presented in the table.

№	Lexical layers	Verb number	Word usage number	Verb percentage, %
1	Common verbs	202	24324	43,44
2	General science verbs	167	7003	35,91
3	Terminological verbs	96	3360	20,64
	Total	465	34687	99,99~100

As indicated in the table, the basic quantity of the verbs in the simulated AUSE sublanguage is not presented by only terminological vocabulary, which is characteristic for the given area and serves a medium for only professional communication, but by common and general scientific units which provide the means for description of phenomena of communicative orientation. This can be explained by the fact that the distinctive feature of the texts on Acoustics and Ultrasonic Engineering, as well as the majority of scientific and technical texts of other fields of knowledge, is the orientation to accomplish special tasks with the help of summarizing description of generalizing character.

On the basis of the foregoing we can draw the following conclusions. The verbal units of AUSE probabilistic and statistical model (frequency dictionary) can be divided into three lexical layers: common, general scientific and terminological. They are presented by various numerical values. The largest group makes common vocabulary verbs, the second place occupies the general scientific vocabulary, the least group are the terms. The quantitative data confirm the results of lexical descriptions received by other researchers during statistical calculations considering lexical features of scientific text corpus units [21; 23-25].

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ЛЕКСИЧНА СТРАТИФІКАЦІЯ ДІЄСЛІВ В ТЕКСТАХ НАУКОВОГО СТИЛЮ (НА МАТЕРІАЛІ АНГЛІЙСЬКОЇ ПІДМОВИ «АКУСТИКА ТА УЛЬТРАЗВУКОВА ТЕХНІКА»)

Анотація
Стаття присвячена опису лексичних особливостей дієслівних одиниць, які функціонують у текстових корпусах наукового стилю. В якості матеріалу були використані тексти, які відносяться до акустики і ультразвукової техніки. Весь список дієслів був розділений на три лексичних шару: загальновживаний, загальнонауковий та термінологічний. Визначені їхні (дієслів) лексичні та статистичні характеристики. Статистичні дані дозволили зробити узагальнюючі висновки про відмінності, які спостерігаються при використанні одиниць різних лексичних шарів.
Ключові слова: дієслово, ймовірнісно-статистична модель, лексична стратифікація, лексема, частотний словник.

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ЛЕКСИЧЕСКАЯ СТРАТИФИКАЦИЯ ГЛАГОЛОВ В ТЕКСТАХ НАУЧНОГО СТИЛЯ (НА МАТЕРИАЛЕ АНГЛИЙСКОГО ПОДЪЯЗЫКА «АКУСТИКА И УЛЬТРАЗВУКОВАЯ ТЕХНИКА»

Аннотация
Статья посвящена описанию лексических особенностей глагольных единиц, функционирующих в текстовых корпусах научного стиля. В качестве материала были использованы тексты, которые относятся к акустике и ультразвуковой технике. Весь список глаголов разделен на три лексических слоя: общеупотребительный, общенаучный и терминологический. Определены их (глаголов) лексические и статистические характеристики. Статистические данные позволили сделать обобщающие выводы об отличиях, которые наблюдаются при использовании единиц различных лексических слоев.
Ключевые слова: глагол, вероятностно-статистическая модель, лексическая стратификация, лексема, частотный словарь.