

ADJECTIVES-TERMS IN THE SPECIALTY “ELECTRICAL ENGINEERING” TEXTS

ПРИКМЕТНИКИ-ТЕРМІНИ В ТЕКСТАХ
ЗА СПЕЦІАЛЬНІСТЮ «ЕЛЕКТРОТЕХНІКА»

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The purpose of the work is to describe the adjectives that function in the text corpus “Electrical Engineering” from the perspective of the process of their terminologization. The material for the study was a text corpus based on one of the technical fields of knowledge – “Electrical Engineering”. The text corpus was compiled on scientific articles taken from the journals “Electrical Engineering”, IEEE Transactions on Power Apparatus and Systems and other foreign English-language publications on the subject of “Electrical Engineering”, and processed using the continuous sampling method. On the basis of this corpus a probabilistic-statistical model of this technical specialty was formed from which the list of adjectives-terms analyzed in this work was extracted. The results of the research demonstrate that adjectives which were affected by the process of terminologization initially belonged in almost equal quantities to both the commonly used and general scientific layers of lexis. Grammatical analysis showed that of the studied lexemes 6 can form the degrees of comparison (three in each lexical layer) before the process of terminologization occurred, and only 2 units ‘low’ and ‘high’ retained this ability, becoming the part of the terminological combination. Along with the adjectives, the type of meaning of which could more or less likely be attributed to a certain degree of terminology, in the text corpus “Electrical Engineering” there are adjectives-terms that cannot be attributed to any type of meaning mentioned in the generally accepted classification of terminology meanings: ‘direct, transient, symmetrical, short’. Adjectives of this group have no functional and semantic dependence on the nouns associated with them. On the contrary, it is they that determine the degree of terminology of the entire combination denoting the scientific concept of electrical engineering. Determining the type of meaning of the formed adjectives-terms gave the following results. The first type of meaning which represents the adjective-term as an intersystem homonym certainly included 7 adjectives. The adjective ‘short’ which could be attributed to the same type of meaning has a characteristic that shows that in the terminological combination ‘short’ lost its dependence on the noun, i. e. a feature inherent mainly in intersystem homonym adjectives.

Key words: probabilistic-statistical model, polysemy, semantic structure, lexical layer, word combinations.

Мета роботи – описати прикметники, що функціонують у текстовому корпусі «Електротехніка», в аспекті процесу їх термінологізації. Матеріалом для дослідження послужив текстовий корпус за однією з технічних галузей знань – «Електротехніка». Текстовий корпус складено на основі наукових статей, взятих із журналів «Electrical Engineering», IEEE Transactions on Power Apparatus and Systems та інших зарубіжних англомовних видань з теми «Electrical Engineering», та оброблених методом суцільної вибірки. На основі цього корпусу сформовано ймовірно-статистичну модель даної технічної спеціальності, з якої виділено перелік прикметників-термінів, які аналізуються в цій роботі. Результати дослідження свідчать, що прикметники, яких торкнувся процес термінологізації, спочатку майже в однаковій кількості належали як до загальнонавчального, так і до загальнонаукового шарів лексики. Граматичний аналіз показав, що з досліджуваних лексем 6 можуть утворювати ступені порівняння (по три в кожному лексичному шарі) до того, як відбувся процес термінологізації, і лише 2 одиниці «низький» і «високий» зберегли цю здатність, увійшовши до складу термінологічного поєднання. Поряд із прикметниками, тип значення яких з більшою чи меншою вірогідністю можна було б віднести до певної міри термінології, у текстовому корпусі «Електротехніка» є прикметники-терміни, які не можна віднести до жодного типу значення, зазначеного в загальноприйнятій класифікації термінологічних значень: «прямий, перехідний, симетричний, короткий». Прикметники цієї групи не мають функціонально-семантичної залежності від пов’язаних із ними іменників. Навпаки, саме вони визначають ступінь термінології всієї сукупності, що позначає наукове поняття електротехніки. Визначення типу значення утворених прикметників-термінів дало такі результати. Перший тип значень, що репрезентує прикметник-термін як міжсистемний омонім, безперечно включав 7 прикметників. Прикметник «короткий», який можна було б віднести до такого ж типу значення, має ознаку, яка свідчить про те, що в термінологічному сполученні «короткий» втрачено залежність від іменника, тобто ознаку, притаманну переважно міжсистемним прикметникам-омонімам.

Ключові слова: ймовірно-статистична модель, полісемія, семантична структура, лексичний шар, словосполучення.

Formulation of the problem. Review of the latest research. The description of terms that function in scientific and technical texts has long become one of the topics most often presented in linguistic literature since firstly, specialized lexis makes up the majority of the lexical contents of languages of various specialties and its description has serious practical significance, and, secondly, it is the most dynamically developing part of this type of discourse.

A review of the literature on terminology has showed that the process of studying terminological units can be divided into certain stages: from the very beginning in scientific articles they were presented as units of one of the lexical layers – a terminological layer formed on the basis of expert assessment or comparative analysis of various frequency dictionaries [1; 2; 3; 4]. At the same time, promising studies of term systems in various fields of knowledge were carried out with the widespread use of a system-structural approach and field theory or the theory of kernel construction of thematic groups of term systems [5].

However in all these works we were talking about the final result of terminology, about the meaning of already formed terminological units. The study of modern scientific literature demonstrates that a new task facing linguists is to study the mechanism for transforming the commonly used (or general scientific) meaning of a lexeme into a terminological one or determinologization of terms [6; 7; 8; 9; 10]. Its solution lies, first of all, in the analysis of the underlying processes occurring in the semantic structure of a word. Thus, the semantics of terms becomes one of the leading research issues.

However despite the extremely representative list of works devoted to the most diverse areas in which the process of terminologization of lexis is present, and the aspects from the standpoint of which this process is described, terminological units are described in a general group, without highlighting individual parts of speech, and grammatical analysis, i. e. the description of units of specific parts of speech undergoing the process of terminology is presented rather poorly. The practical absence of such studies thus explains the appearing of this article in which adjectives are an object of analysis.

The main reason why adjectives are used here as the object of study is the special ability of units of this part of speech for lexical transformation, which they possess to a much greater extent than any other part of speech, due, first of all, to their semantic dependence on the nouns that are connected with them.

The purpose of the work is to describe the adjectives that function in the text corpus “Electrical

Engineering” from the perspective of the process of their terminologization.

Base material. The material for the study was a text corpus based on one of the technical fields of knowledge – “Electrical Engineering”. The text corpus was compiled on scientific articles taken from the journals “Electrical Engineering”, IEEE Transactions on Power Apparatus and Systems and other foreign English-language publications on the subject of “Electrical Engineering”, and processed using the continuous sampling method. On the basis of this corpus, a probabilistic-statistical model of this technical sublanguage was formed, from which the list of adjectives analyzed in this work was extracted.

The linguists note that the determining factor that underlies the phenomenon of terminologization is polysemy, polyfunctionality of lexical units, which makes it possible to express several meanings at once with one and the same word. At the same time scientists proceed from the fact that in order to remove the linguistic ambiguity of a word, one should rely on the context (in our case, on nouns combining with the adjectives being described), since an important factor for the study is the differentiation of such concepts as the semantic structure of word that has developed in the language system, and the semantic structure of the word form functioning in the context. The presence of the text corpus “Electrical Engineering” in the work allows, when analyzing terminologized adjectives, to turn directly to speech and determine both the reasons for converting them into terms and the typology of semantic changes occurring in the process of terminologization.

The analysis of adjectives-terms will be carried out in this article at the following levels: lexical (determining the original lexical layer to which the terminologized adjective belonged), grammatical (determining the ability of the original and terminologized units to form), semantic (to determine the types of semantic changes of adjectives in the process of terminologization). At the same time the authors used differential analysis as the main principle when analyzing terms, when a term is contrasted with a commonly used (or general scientific) word.

Here are the examples of the parallel use of adjectives in free word combinations functioning in the language system and terminological combinations found in the text corpus “Electrical Engineering” and originally related to the general scientific or commonly used layers of lexis (information about the frequency of occurrence of adjectives in the text corpus is given in brackets):

1) commonly used adjectives: *high* ($A=744$) *high building* – *high voltage* “; *low* ($A=500$) *low*

structure – low voltage; direct (F=281) direct effect – direct current; transient (F=178) transient event – transient resistance; total (F=144) total loss – total current; open (F=46) open window – open circuit; characteristic (F=45) characteristic data – characteristic impedance short (F=638) – short bar – short circuit;

2) general scientific adjectives (met practically in any field of knowledge of scientific and technical discourse): **electric (electrical)**(F=304) *electric iron – electric current; critical (F=111) critical conditions – critical flashover (voltage); primary (F=90) primary analysis – primary coil; practical (F=84) practical consideration – practical circuit; negative (F=78) negative viewpoint – negative charge; positive (F=105) positive viewpoint – positive charge; natural (F=56) – natural growth – natural frequency; neutral (F=50) neutral position – neutral cable; symmetrical (F=43) symmetrical system – symmetrical transistor; secondary (F=34) secondary method – secondary coil.*

The grammatical analysis of the characteristics of adjectives-terms is devoted to the classification of commonly used and general scientific adjectives from which they originated into qualitative and relative, i. e. into those capable of forming or not having forms of degrees of comparison, as well as the description of terminologized adjectives that have retained their original ability to form degrees of comparison even after the process of terminologization.

So among the adjectives of the commonly used layer of lexis there is a slight predominance of lexemes that are unable to create the forms of degrees: ‘total, transient, direct, open, characteristic’, over those that are capable of forming: ‘low, high, short’. In the process of terminology of commonly used qualitative adjectives, two of them ‘low’ and ‘high’ retain their formative potential after joining the noun term ‘voltage’, since voltage can change in magnitude and be less or more. As for the adjective ‘short’, as a result of terminology its ability to form in the phrase ‘short circuit’ is not preserved.

From the list of adjectives included in the general scientific layer of lexis, 7 relative adjectives are identified: ‘electric (electrical), primary, symmetrical, secondary, practical, negative, positive’ and 3 qualitative adjectives: ‘natural, neutral, critical’. From the above examples it is clear that qualitative adjectives of this lexical layer can create forms of degrees of comparison in combination with nouns of common or general scientific vocabulary but with term nouns their ability to form is lost.

The following analysis determines the degree of development of the terminological meaning of

adjectives of common and general scientific layers under the influence of terminology. Here we are making an attempt to identify using a generally accepted scale that determines the degree of terminologization of a meaning [Васковец], what the meaning of a terminologized adjective is, whether it is: 1) the meaning of an intersystem homonym when the same adjectives are used in different lexical layers, i. e. the formation of a new synonymous meaning, but the use of the word in another area of the language takes place; 2) a special terminological meaning or a special lexical-semantic variant, in which the synonymous relations of the adjective that have developed within the framework of the original lexical-semantic group are realized, and at the same time, in the semantic structure of commonly used (general scientific) words and terms there are integrating features and characteristics that distinguish these meanings; 3) meaning formed through metaphorical or metonymic transfers.

Strictly speaking the dependent nature of adjectives predetermines their functioning in parallel in two or more lexical layers, as demonstrated by the examples given above and which allows them to be immediately classified as intersystem homonyms. However, the process of terminologization has so complicated their nominative-definitive function that terminologized adjectives have acquired the characteristics of independent units capable of influencing the nouns combined with them.

Contextual analysis and consultations with electrical specialists helped determine the similarities and differences in the semantics of adjectives used in the common language and in the scientific text of the “Electrical Engineering” specialty, i. e. in the so-called “free phrases” and terminological combinations denoting concepts included in the system of scientific concepts of electrical engineering. Moreover, discussions with experts showed that the above generally accepted classification system for assessing the degree of terminology of a word and determining the type of meaning is not sufficient to describe adjective terms of the sublanguage “Electrical Engineering”, because they have intermediate meaning types or types not specified in the semantic system.

And one more note that needs to be presented in advance. Since in addition to the nominative function the term also has a definitional function, it can represent a replacement for a definition, which, in turn, consists (both explicit and implicit) of a set of statements. Indeed, both the types of terminological meanings indicated in the system and the intermediate types identified by the authors showed that the more

terminological the meaning of an adjective is, the more it requires a special description or explanation of the electrical concept that it (the adjective) denotes, i. e. all adjectives-terms contain the hidden or unexpressed descriptions of objects and processes.

So the first point which, in accordance with the type of meaning, defines the adjective as an intersystem homonym, includes 5 adjectives: 'low (low voltage)', 'high (high voltage)', 'short (short circuit)', 'negative (negative charge)', 'positive (positive charge)', 'primary (primary coil)', 'secondary (secondary coil)'. Adjectives 'low, high, short' function freely as commonly used lexemes and are not perceived as special terms, i. e. they are used both in colloquial speech and in scientific texts. The point of view by A.V. Kryzhanovskaya and L.O. Simonenko is confirmed here: "Regardless of all the diversity of methods used to create new terms the most important internal regularity is the long-standing tradition of creating new terms based on words that exist in literary language. The essence of terminology lies in the semantic change already evident in our results from the method of creating a new term" [7].

In the adjectives 'negative' and 'positive' one can detect the nature of intersystem homonyms functioning simultaneously in the commonly used and terminological lexical layers since, according to electrical specialists, the names 'negative' and 'positive' were given to these electrical concepts by chance to designate something opposite in nature to simply differentiate them. Similarly they could be called "white" and "black".

The adjective 'electric (electrical) (electric current)' stands out separately. Although this adjective may well be called an intersystem homonym since it is widely used in both scientific and everyday speech, it, at one time, went through the process of determinologization, i. e. came into colloquial speech from scientific prose and not vice versa.

The terminological combinations 'primary coil', 'secondary coil' contain adjectives that can be attributed to units with a more terminological meaning, i. e. to an intermediate type of meaning. The adjectives 'primary' and 'secondary', when attached to noun terms, form combinations used to describe the operation of transformers that convert voltage of one value into voltage of another value, and in them (transformers) there is a coil to which the converted voltage is connected – it is called 'primary', and from which the converted voltage is removed – 'secondary'. These adjectives can certainly be classified as intersystem homonyms. However they function simultaneously not in everyday and scientific

speech (like the previous three adjective terms), but mainly in scientific speech – the general scientific and terminological layers of vocabulary, i. e. they are used to describe abstract objects and phenomena found in almost any area of scientific communication (and quite rarely in everyday speech) – 'primary analysis', 'secondary method', and at the same time denote concepts that are included in the system of scientific concepts of electrical engineering science.

The second type of meaning terminologization is observed in adjectives in which, in combination with noun terms, they realize, though terminological but synonymous in nature, meanings included in the semantic structure of the original, non-terminologized units within the framework of polysemy. Often in such phrases a common categorical-lexical seme is preserved. Below there are examples of terminological phrases that function in the text corpus "Electrical Engineering": 'total current' – in this combination the general seme "summation" is preserved since the total current forms the geometric sum of the active and reactive components of the current; 'characteristic impedance' is a resistance, the very value of which determines (characterizes) the properties of a four-terminal network or line, i. e. the adjective 'characteristic' certainly expresses its synonymous meaning in combination with the term 'impedance' (compare with the example already given, where it is used with the commonly used adjective 'characteristic data'); 'critical flashover (voltage)' – this is the maximum possible voltage for the circuit, above which, as a rule, something burns out in the circuit, thus the general categorical lexical seme "condition" is preserved; 'practical circuit' – an actually existing, "real" circuit, as opposed to an "ideal" circuit, which uses "idealized" elements necessary to simplify the analysis, i. e. in this adjective attached to a noun-term, the synonymous meaning taken into account in its (adjective) semantic structure is realized; 'natural frequency' – frequency of oscillations physically inherent in a given electrical circuit since each circuit with a certain set of elements has only its own frequency, therefore the use in this terminological combination of this precise adjective, which has the meaning "inherent", which is included in the semantic structure of the word 'natural' is quite justified.

The meanings of adjectives-terms in the terminological combinations 'direct current', 'transient resistance' and 'symmetrical transistor' can be attributed to a type of meaning that is not taken into account at all in the classification presented above. They do not contain synonymous relations of the adjective that have developed within the framework

of the original lexical-semantic group which are mandatory in meanings of the second type, or metaphorical (metonymic) shift, characteristic for the meanings of the third type. Thus in the combination ‘direct current’ the adjective ‘direct’ joining the term ‘current’ forms a terminological combination that expresses one of the basic concepts of electrical engineering – ‘direct current’.

Although the combination contains the word ‘current’ and the combination itself denotes a certain type of current (direct current), the adjective ‘direct’ does not refer to the electrical phenomenon itself but to a graph that shows that type of current and which is represented by a straight line unchanged in magnitude and direction. This explains the presence of the adjective ‘direct’ in the combination. The second combination – ‘transient resistance’ – denotes the ratio of the voltage at the circuit input to its current in transient mode (the resistance value is determined by the ratio of voltage to current). It has the dimension of resistance, which explains the name. In this electrical engineering concept there is no direct indication of resistance but only of the ratio of voltage to current, as a result of which a sharply increasing active resistance is obtained. That is, one adjective term ‘transient’ denotes an entire electrical engineering process for the formation of the electrical engineering concept of resistance of a certain type. In these two combinations it is the adjectives that contribute to the formation of scientific concepts included in the system of electrical engineering concepts, because they are the ones that point to hidden, implicit processes or objects. And finally, ‘symmetrical transistor’ – this phrase is used to describe a semiconductor device with three zones, the central one is called the “base”, and the other two, located symmetrically on the sides of the base, respectively the “emitter” and “collector”, and namely because of the symmetrical arrangement of these two zones the transistor is called symmetrical, here also the adjective ‘symmetrical’ takes on the description of almost the entire device and explains the reason for its name.

Although the adjective ‘short’ was already mentioned in the article in the list of intersystem homonym adjectives, because it is used both in everyday speech and in terminological combinations (‘short circuit’), its terminological meaning does not seem so evident. The fact is that the phenomenon of a short circuit (known to everyone for its destructive properties) is explained by electrical specialists as a rather complex process in which the adjective ‘short’ carries the main semantic load. It (adjective) denotes a short path for the action of current, i. e. in

the event of a short circuit, the current flows along the shortest path through the least resistance which is dictated by physical laws. Thus it is the adjective-term that includes the entire explanation of this electrical phenomenon. The role of the adjective ‘short’ in the terminological combination ‘short circuit’ allows it to be added, in addition to the group of intersystem homonyms, also to the group of adjectives-terms ‘direct, transient, symmetrical’.

And finally, a group of adjectives in the meaning of which during terminologization a certain semantic shift has occurred and they are used in a figurative, metaphorical or metonymic meanings: ‘neutral cable’ (‘linear cable’) – these are the terms with which the transmission of electrical energy is described. At present it is carried out via a cable with four wires, three of which transmit current (linear cables), and the fourth, which plays an auxiliary, passive role in the transmission process, since it does not take part in the process of energy transfer, is conventionally called ‘neutral’, which demonstrates in this context the metaphorical nature of the meaning of the adjective ‘neutral’; ‘open circuit’ is an electrical circuit that has a break that prevents the flow of current, electricians imagine such a circuit as a loop from which a piece has been cut out, conditionally an “open” ring is obtained, here the adjective term ‘open’ has a connotation of a metaphorical figurative meaning describing a circuit through which no current flows.

Conclusions. Having considered examples of terminological adjectives in the text corpus “Electrical Engineering” we can come to the following conclusion.

1. Adjectives which were affected by the process of terminologization initially belonged in almost equal quantities to both the commonly used and general scientific layers of lexis.

2. Grammatical analysis showed that of the studied lexemes 6 can form the degrees of comparison (three in each lexical layer) before the process of terminologization occurred, and only 2 units ‘low’ and ‘high’ retained this ability, becoming the part of the terminological combination.

3. Determining the type of meaning of the formed adjectives-terms gave the following results. The first type of meaning which represents the adjective-term as an intersystem homonym certainly included 7 adjectives – ‘low, high, negative, positive, electric (electrical), primary, secondary’. The adjective ‘short’ which could be attributed to the same type of meaning has a characteristic that shows that in the terminological combination ‘short’ lost its dependence on the noun, i. e. a feature inherent

mainly in intersystem homonym adjectives. The second type of meaning is found in 5 adjectives-terms that have synonymous meanings within the framework of polysemy with the original common or general scientific lexemes and form a common seme with nouns included in the general terminological combination. The third type of meaning which involves the emergence of a metaphorical or homonymous shift in the meaning of an adjective term during the process of terminology, is noted in 2 adjectives – ‘neutral’ and ‘open’.

4. Along with the adjectives, the type of meaning of which could more or less likely be attributed to a certain degree of terminology, in the text corpus “Electrical Engineering” there are adjectives-terms

that cannot be attributed to any type of meaning mentioned in the generally accepted classification of terminology meanings: ‘direct, transient, symmetrical, short’. Adjectives of this group have no functional and semantic dependence on the nouns associated with them. On the contrary, it is they that determine the degree of terminology of the entire combination denoting the scientific concept of electrical engineering.

Limitations in the size of the article did not allow us to analyze the problem of the possible interaction of lexical, grammatical and semantic features of adjectives before, during and after the process of terminologization which requires continuation of the research described in this article.

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