COMPARISON OF IMPLEMENTATION INDICATORS OF THE SEMANTIC STRUCTURE OF THE WORD 'PLANT' IN TEXT CORPORA "AUTOMATION OF HEAT AND POWER PROCESSES, "CHEMICAL ENGINEERING" AND "ACOUSTICS AND ULTRASONIC TECHNOLOGY"

ПОРІВНЯННЯ ПОКАЗНИКІВ РЕАЛІЗАЦІЇ СЕМАНТИЧНОЇ СТРУКТУРИ СЛОВА 'PLANT' У ТЕКСТОВИХ КОРПУСАХ "AUTOMATION OF HEAT AND POWER PROCESSES, "CHEMICAL ENGINEERING" AND "ACOUSTICS AND ULTRASONIC TECHNOLOGY"

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The article considers one of the most complex issues of linguistics – the description of the semantic structure of the word and its implementation in speech (text). The study is based on Webster's normative dictionary, bilingual industry dictionaries and data obtained from the analysis of text corpora related to the scientific and technical type of discourse: "Automation of heat and power processes", "Chemical Engineering" and "Acoustics and Ultrasonic Technology". The texts were taken from scientific articles published in the journals of relevant specialties in the UK and the USA. The total size of text corpora amounted to 600 thousand tokens.

One of the most frequent words functioning in the indicated text corpora – 'plant' has been taken as an object of the study. The goal of the paper is to compare the dictionary entry definitions of the word 'plant' fixed in one of the normative dictionaries, with lexical-semantic variants (LSVs) of this word found in the text corpora "Automation of heat and power processes" (AHPP), "Chemical Engineering" (CE) and "Acoustics and Ultrasonic Technology" (AUST) by means of contextual analysis. The analysis carried out permits to indicate the extent, to which the semantic structure of the word 'plant' reflected in the system of language is implemented in speech, i.e. in texts. The presence of three text corpora allows, in addition, to carry out a comparative analysis of the LSVs that occur in the texts of various fields of engineering, although they belong to the same type of discourse.

The results of the study demonstrate that the semantic structure of the noun 'plant' in the text corpora of the ATP and HM specialties is quite branched, while the noun 'plants' is practically not used in the texts of the AUST specialty, which can be explained by the peculiarities of this scientific and technical area. The semantic structure of the noun 'plants' in the texts of the ATP specialty is represented by six, and in the texts of the XM specialty – by three lexical-semantic variants. The hierarchy of definitions in the semantic structure of the word 'plant' in Webster's normative dictionary and the LSV system implemented in text corpora do not match.

Key words: frequency, lexical-semantic variant, definition, specialty, scientific and technical discourse.

Стаття розглядає одне з найскладніших питань лінгвістики – опис семантичної структури слова та її реалізації у промові (тексті). Дослідження засноване на нормативному словнику Webster's, двомовних галузевих словниках та даних, отриманих при аналізі текстових корпусів, які відносяться до науково-технічного виду дискурсу: "Automation of heat and power processes", "Chemical Engineering" and "Acoustics and Ultrasonic Technology". Тексти бралися з наукових журналів відповідних спеціальностей Великої Британії та США. Загальний обсяг текстових корпусів становив 600 тис. слововжитків.

Як об'єкт дослідження було взято одне з найчастіших слів, що функціонують у зазначених текстових корпусах – 'plant'. Метою роботи є порівняння зафіксованих в одному з нормативних словників словникових значень слова 'plant' з лексико-семантичними варіантами (ЛСВ) цього слова, що містяться в текстових корпусах «Автоматизація теплоенергетичних процесів». (АНРР), «Хімічна інженерія» (CE) та «Акустика та ультразвукові технології» (AUST) за допомогою контекстного аналізу. Проведений аналіз дозволяє визначити, наскільки відображена в системі мови семантична структура слова 'plant' реалізована в мовленні, тобто в текстах. Наліченя трьох текстових корпусів дає змогу, крім того, провести загальний аналіз також і ЛСВ, які зустрічаються в текстах різних областей техніки, хоча вони й відносяться до одного виду дискурсу.

Результати дослідження показали, що семантична структура іменника 'plant' в текстових корпусах спеціальностей АТП і ХМ є досить розгалуженою, тоді як у текстах спеціальності АУЗТ іменник 'plant' практично не використовується, що можна пояснити особливостями цієї технічної області. Семантична структура іменник 'plants' в текстах спеціальності АТП представлена шістю, а в текстах спеціальності ХМ – трьома лексико-семантичними варіантами. Ієрархія значень в семантичній структурі слова 'plant' в нормативному словарі Webster's і системі ЛСВ, реалізованих в текстових корпусах, не збігаються.

Ключові слова: частота, лексико-семантичний варіант, дефініція, спеціальність, науково-технічний дискурс.

Problem statement and the latest research analysis. An analysis of literary sources containing a description of the semantic structures of polysemous words demonstrates that even now after successful studies in corpus linguistics, having the convincing results, the linguists in their research continue to rely mainly on the definitions presented in lexicographic resources [1]. This type of research is of great importance in terms of describing the final results that form the norm and are recorded in normative dictionaries, or other types of dictionaries.

Recently, however, in the works devoted to linguistic research, there are more and more descriptions of the results obtained in the course of analyzes carried out, which take into account the dichotomy "language-speech". The concept, according to which language and speech are considered different real objects, mutually supporting each other and interacting in the process of speech activity, has won and continues to win more and more supporters. To be convinced of this it is enough to analyze the works devoted to considering the main directions that were developed already at the end of the last century and continue to be developed now, when the meanings of dictionary definitions, through contextual analysis, were compared with their actualization in texts in order to determine their real use in speech [2; 3; 4; 5].

Such studies have become especially frequent at the present time with the development of corpus linguistics, when text corpora of various fields of knowledge are used as material [2; 6; 7; 8; 9].

What exactly do the results of study of lexemes functioning in text corpora provide for the formation of the semantic structure of a word? First of all, it is an opportunity not only to fix the implementation of the word semantics in text, but also to foresee the further development of the dictionary system of definitions since the frequency of using one or another lexical-semantic variant in polysemous words can become a determining factor for changing its (word) semantic structure.Thus, the semantic structure can be considered in several aspects – as a given, reflected in lexicographic sources, i.e. as a set of usual meanings of a word, connected by relations of semantic derivation; as a dynamic system, constantly experiencing the influence of intra-linguistic and extra-linguistic factors; and also as a representation of the potential possibilities of semantic variation of a word with a given initial meaning [10].

Although, at first glance, discourse studies have depleted their resources and have already been replaced by other areas of linguistics – cognitive linguistics, corpus linguistics, etc., it seems that the problem that considers the interaction and mutual influence of units of language and speech has not exhausted yet itself and requires further research. These concerns first of all such discourse objects as text corpora of scientific and technical fields of knowledge. The presence of a very small number of results reflecting the study of the semantic structure implementation of words in the texts of scientific and technical discourse can be explained by the fact that for the linguists, whose scientific interests lie commonly in the humanitarian field, their research is significantly obstructed by the lack of knowledge of technical specialties. However, for those who teach English at higher technical school institutions a great deal of practical experience as well as the opportunity to communicate with specialists in any scientific technical field allows performing the necessary contextual research quite correctly.

The task statement. The goal is to compare the dictionary entry definitions of the word 'plant' fixed in one of the normative dictionaries [11], with lexical-semantic variants (LSVs) of this word occurred in three scientific and technical text corpora "Automation of Heat and Power Processes" (AHPP), "Chemical Engineering" (CE) and "Acoustics and Ultrasonic Technology" (AUST) by means of contextual analysis. The analysis carried out permits to indicate the extent, to which the semantic structure of the word 'plant' reflected in the system of language is implemented in speech, i.e. in texts.

The presence of three text corpora allows, in addition, to carry out a comparative analysis of the LSVs that occur in the texts of various fields of technology, although they belong to the same type of discourse.

The base methods used in the course of the research are as follows: compilation of text corpus as a basis of future research; the usage of opinion of experts-specialists in the three technical fields mentioned above in order to understand the correlation of the dictionary definitions and lexical-semantic variants as correct as possible; contextual analysis to find

the lexical-semantic variants implemented in the texts which correspond to the dictionary definitions; quantitative methods of calculation, etc.

The basic material. As a material for compilation of the three text corpora presented in the given article the texts referred to these technical specialties have been taken from the corresponding US scientific journals: "Automation of heat and power processes" (AHPP) – from Power, Power Engineering, Process Engineering; Chemical Engineering – from Chemical Engineering Progress, Chemical and Process Engineering; "Acoustics and Ultrasonic Technology" (AUST) from – the journals of Acoustic Society of America, IEEE International Conference on Acoustics, Speech, and Signal Processing. The total size of each of the three text corpora is 200 thousand word tokens. So the total volume of the text corpus researched is 600 thousand word tokens. As one can see these three text corpora belong to completely different scientific areas. The authors suppose that such a study will make it possible to draw conclusions that can be correct for any (perhaps with some exceptions) technical and scientific field referred to this type of discourse.

The analysis of the semantic structure of the high-frequency English noun 'plant' was carried out on the basis of data recorded in the Webster's normative dictionary [10], bilingual industry dictionaries of the above subject areas, as well as the collected factual material. Based on the normative dictionary, a list of dictionary definitions of possible LSVs of the noun 'plant' was compiled. Particular attention was paid to the values associated with the technical areas of AHPP, CE and AUCT, i.e. highly specialized terminological character, because the tasks of the work include the study of this particular stylistic layer.

The analysis of the data of the bilingual branch dictionaries of the indicated specialties and the verification of their results by the indications of the textual analysis, carried out on the material of the text corpora of the specialties AHPP, CE and AUCT, made it possible to identify the lexical-semantic variants that are part of the semantic structure of the considered noun 'plant' and implemented in the text corpora.

In accordance with the data obtained during the study of text corpora, the frequency of the use of the word 'plant' in different text corpora is as follows: in the AHPP corpus – 519 tokens, in the CE corpus – 387 units, in the AUCT corpus – 0 units.

A summary list of dictionary definitions that correlate with possible lexical-semantic variants of the word 'plant' in text corpora was compiled on the basis of Webster's normative dictionary [11]. It (the

list) consists of the following eight definitions

1a: a young tree, vine, shrub, or herb planted or suitable for planting;

b: any of a kingdom (Plantae) of multicellular eukaryotic mostly photosynthetic organisms typically lacking locomotive movement or obvious nervous or sensory organs and possessing cellulose cell walls;

2a: the land, buildings, machinery, apparatus, and fixtures employed in carrying on a trade or an industrial business;

b: a factory or workshop for the manufacture of a particular product**: POWER PLANT**; **c**: the total facilities available for production or service;

d: the buildings and other physical equipment of an institution;

3: an act of planting;

4: something or someone planted.

The contextual analysis of the texts of the AUST specialty shows that the noun 'plant' is not typical for this technical specialty at all, which coincides with the opinion of experts in the field of acoustics and ultrasonic technology.

Upon careful examination of the semantic structure of the noun 'plant' in the language system, one can find that the dictionary definition (1a) represents the etymologically original meaning of this word, namely – "a young tree, vine, shrub, or herb planted or suitable for planting". Its (definition) implementation in the analyzed AHPP corpus is confirmed by the context. In the semantic space of this specialty there is a section – "Miscellaneous", in which such an LSV of the word 'plant' was mentioned.

However, this dictionary definition cannot be considered as LSV, characteristic for the field of engineering "Automation of heat and power processes" due to the lack of a highly specialized, technical, terminological meaning in it. Moreover, the dictionary definition (1a) is not confirmed by the context of other specialties – CE and AUST.

Meanings of dictionary definitions (1b) "any of a kingdom (Plantae) of multicellular eukaryotic mostly photosynthetic organisms typically lacking locomotive movement or obvious nervous or sensory organs and possessing cellulose cell walls"; (3) "an act of planting";(4) "something or someone planted" in a number of industry dictionaries are absent as an independent LSV and the context in the AHPP, HM and AUST corpora is also not confirmed.

It can be noted that the dictionary definitions (1a), (1b), (3) and (4) to some extent coincide in meaning. Therefore, with the help of lexical transformations these dictionary definitions can be reduced to one, namely: "something that grows or can be planted", which is an invariant that combines the meanings (1a),

(1b), (3) and (4) on options rights. The relationship between the invariant "something that grows or can be planted" and its variants-meanings (1b), (3) and (4) can be defined as a general-specific relationship. But it must be stated that in the texts of AHPP, HM and AUST lexical-semantic variants (1a), (1b), (3) and (4) are not implemented.

It is also necessary to present the system of LSVs functioning in the text corpora AHPP and CE. Lexical-semantic variants are given in descending order of the frequency of their use in the texts.

The LSV of the specialty AHPP are implemented in the following system of meanings: LSV1 "power station – electrical, thermal or nuclear"; LSV2 "installation, machinery, apparatus"; LSV3 "unit, reactor"; LSV4 "boiler"; LSV5 "factory"; LSV6 "plant".

The LSV system implemented in the texts of the CE specialty: LSV1 "factory"; LSV2 "installation, machinery, apparatus", LSV3 "station – electrical, thermal or nuclear".

As you can see, the number of LSVs that correspond to certain definitions of the word 'plant', fixed in Webster's normative dictionary [10], are updated differently in the texts of the described specialties.

It is interesting to note the complete correspondence of some LSVs of the noun 'plant' in the AHPP and CE text corpora with the dictionary definitions (2a), (2b), (2c) and (2d) of Webster's Dictionary. Thus, the dictionary definition (2a) "the land, buildings, machinery, apparatus, and fixtures employed in carrying on a trade or an industrial business" finds full compliance with both LSV2 of the specialty "Automation of thermal processes" and LSV2 of the specialty "Chemical engineering".

Dictionary definition (2b) of Webster's Dictionary "a factory or workshop for the manufacture of a particular product also: POWER PLANT" fully corresponds to LSV1 of the AHPP specialty and LSV3 of the CE specialty, being realized in the corresponding sentences, for example,

The SO2 is removed and processed to elemental sulphur in a chemical plant (specialty CE).

The new equipment will be installed in the central melting plant which houses three 50ton/hr. cold-blast cupolas (specialty AHPP).

Dictionary definition (2d) "the buildings and other physical equipment of an institution" in turn correlates with LSV5 of the AHPP specialty and LSV1 of the CE specialty and are implemented in such sentences, for example,

The complete student operator training program, lasting 112 weeks provides 70 weeks training at the POTC (simulator and classroom) and 42 weeks at the trainee's plant site (specialty AHPP).

To reduce environmental pollution even further the Stanton&Staveley Group of BSC's Tube division are to incorporate a 750,000 pounds of gas cleaning plant at their Stanton works in Derbyshire (specialty CE).

Dictionary definition (2c) "the total facilities available for production or service" of Webster's dictionary correlates with LSV3, LSV4 in the system of lexical-semantic variants of the AHPP specialty and finds its implementation in the context of this field of engineering, for example,

However, some auxiliary functions that can be performed on the operating consoles in the actual plant must be operated by hand in the simulator equipment (specialty AHPP).

The maintenance procedure in many plants is to replace the gage itself with a share, and to overhaul the original gage in a service area (specialty AHPP).

Conclusions. The conclusions drawn on the basis of the analysis of the system of definitions of the Webster's normative dictionary [11] and some industry dictionaries by the method of logical operations of generalization and verification of their results by indications of contextual analysis are as follows.

1. The semantic structure of the noun 'plant' in the text corpora AHPP and CE specialties is quite branched, while in the texts of the AUST specialty the noun 'plants' is practically not used, which can be explained by the peculiarities of this technical field, which does not deal with such objects as "the land, buildings, machinery, apparatus, and fixtures employed in carrying on a trade or an industrial business" or "factory or workshop for the manufacture of a particular product also:POWER PLANT" or "the total facilities available for production or service or the buildings and other physical equipment of an institution", which are reflected in the LSVs system, found in two other specialties. The technical area of AUST deals mainly with underwater and surface objects. Scientific research in this area is usually strictly classified, and in all countries with access to water resources.

2. Semantic structure of the noun 'plants' in the texts of the AHPP specialty is represented by six, and in the texts of the CE specialty – by three lexical-semantic variants.

3. Of the eight definitions that make up the semantic structure of the word 'plant', presented in Webster's normative dictionary [10], there are five functioning in the text corpus of the AHPP specialty. The first definition, as already mentioned, although included in the list of definitions that are found in the studied text corpora, refers to units of the

low-frequency zone and is not typical for the specialties described here:

PLANT (1a) "a young tree, vine, shrub, or herb planted or suitable for planting" corresponds to LSV6 'plant'

PLANT (2a) "the land, buildings, machinery, apparatus, and fixtures employed in carrying on a trade or an industrial business" corresponds to LSV2 "installation, machinery, apparatus"

PLANT (2b) "factory or workshop for the manufacture of a particular product also: POWER PLANT" is correlated with LSV1 "power station – electrical, thermal or nuclear"

PLANT (2c) "the total facilities available for production or service" corresponds to LSV3 "unit, reactor", LSV4 "boiler"

PLANT (2d) "the buildings and other physical equipment of an institution" –corresponds to LSV5 "factory".

In the texts of the CE specialty from the above LSVs of the words 'plant' there are only three that match the definitions: (2d) corresponds to LSV1 "factory"; (2a) corresponds to LSV2 "installation, machinery, apparatus"; (2b) corresponds to LSV3 "power station – electrical, thermal or nuclear".

4. As we see the hierarchy of definitions in the semantic structure of the word 'plant' in Webster's normative dictionary and the LSV system implemented in text corpora, do not match. If we approach this issue from the point of view of speech, i.e. text, then the hierarchical system looks like this: in the specialty AHPP

LSV1 "power station – electrical, thermal or nuclear" – (2b)

LSV2 "installation, machinery, apparatus" – (2a)

LSV3 "unit, reactor" – (2s)

LSV4 "boiler" – (2s)

LSV5 "factory" – (2d)

LSV6 "plant" – (1a);

in the specialty: CE LSV1 "factory" – (2d); LSV2 "installation, machinery, apparatus" – (2a); LSV3 "station – electrical, thermal or nuclear"– (2b).

In further studies the semantic structures of other most frequent words implemented in the texts of scientific and technical discourse will be considered.

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