

## NOUN 'SYSTEM' COMPITABILITY MODELS IN THE TEXTS "AUTOMATION HEAT AND POWER PROCESSES"

### МОДЕЛІ СУМІСНОСТІ ІМЕННИКА «СИСТЕМА» В ТЕХАСІ «АВТОМАТИЗАЦІЯ ТЕПЛОЕНЕРГЕТИЧНИХ ПРОЦЕСІВ»

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The most important differential features of LSVs, characterizing their functioning in a specific area of scientific discourse and allowing a more complete description of the semantic structure as a whole is syntactic compatibility which is commonly understood as the ability of a word to be combined in a sentence with certain elements, both subordinate (kernel connection) and non-subordinate to it, and where it itself acts as a subordinate element (adjunct connection). In the article devoted to the formation of an inventory of lexical-semantic variants of the most frequent noun 'system', which are implemented in the texts of technical fields of knowledge, the corresponding LSVs are presented. They are studied in two aspect: the aspect of language and the one of speech, i.e. the lexical-semantic variants of the word 'system' identified in the texts are compared with the definitions fixed in the entry of the noun 'system' of the most authoritative standard dictionary of the English language – Webster's, and then their interaction is considered.

As the material for the study the text corpus of the specialty "Automation heat and power process" was chosen, which was compiled on the basis of the following scientific journals in the UK and the USA: Power; Power Engineering; Process Engineering. The total size of the AHPP text corpus was 200 thousand tokens.

The most frequent lexical-semantic variant of the noun 'system' is "installation". Its description of the syntactic compatibility of this LSV shows that this word has wide syntactic compatibility in the AHPP sublanguage since it is used in all constructions possible for a noun. The analysis of the less frequent lexical-semantic variant "computer" of the word 'system' also has quite wide combinative capabilities, can be used in almost all constructions inherent to nouns (excluding verb combinations, where it does not show its high frequency of use). The word 'system' in this meaning acts as a unit with a broad conceptual basis. The results of the study of LSV "station, system of stations" of the noun 'system' determine that the share of usage of this word with LSV "station, system of stations" in the total number of occurrence of the word 'system' is low, only 7%. The remaining seven LSVs of the noun 'system' fixed in entry of the Normative Webster's dictionary are not analyzed in this article, since their quantitative values are too small. So the affirmation of some linguists-theoreticians about the sharp reduction of semantic structures of words functioning in engineering texts may be considered fair.

**Key words:** lexical-semantic variant, frequency, share, syntactic model, concept.

Найважливішою диференціальною ознакою лексико-семантичних варіантів, що характеризує їх функціонування в певній сфері наукового дискурсу і дозволяє більш повно описати семантичну структуру в цілому, є синтаксична поєднаність, під якою прийнято розуміти здатність слова поєднуватися в реченні з певними елементами, як підлеглими (ядерний зв'язок), так і не підпорядкованими йому, де він сам виступає в якості підпорядкованого елемента (додатковий зв'язок). У статті, присвяченій формуванню переліку лексико-семантичних варіантів найчастотнішого іменника 'system', які реалізуються в текстах технічних галузей знань, подано відповідні ЛСВ. Вони досліджуються у двох аспектах: мовному та мовленнєвому, тобто виявлені в текстах лексико-семантичні варіанти порівнюються з визначеннями, зафіксованими в словниковій статті іменника 'system' у найавторитетнішому стандартному словнику англійської мови – Webster's, і далі розглядається їх взаємодія. В якості матеріалу для дослідження обрано текстовий корпус спеціальності «Автоматизація теплоенергетичних процесів», складений на основі наступних наукових журналів Великої Британії та США: Power; Енергетика; Інженерія процесів. Загальний розмір текстового корпусу АТП склав 200 тисяч токенів. Найчастішим лексико-семантичним варіантом іменника 'system' є «установка». Його опис синтаксичної сумісності цього ЛСВ показує, що це слово має широкую синтаксичну поєднаність у підмові АТП, оскільки воно використовується в усіх конструкціях, можливих для іменника. Найчастішим лексико-семантичним варіантом іменника система є «установка». Його опис синтаксичної сумісності цього ЛСВ показує, що це слово має широкую синтаксичну поєднаність у підмові АТП, оскільки воно використовується в усіх конструкціях, можливих для іменника. Аналіз менш частотного лексико-семантичного варіанта «комп'ютер»

слова 'system' також має досить широкі комбінаційні можливості, може вживатися практично в усіх конструкціях, притаманних іменникам (за винятком дієслівних сполучень, де не виявляється його висока частотність використання). Слово 'system' в цьому значенні виступає як одиниця з широкою концептуальною основою. Результати дослідження ЛСВ «станція, система станцій» іменника система встановлюють, що частка вживання цього слова з ЛСВ «станція, система станцій» у загальній кількості входжень слова система є низьким, лише 7%. Решта сім ЛСВ іменника 'system', зафіксованих у статті словника Webster's, у цій статті не аналізуються, оскільки їх кількісні значення занадто малі. Тож можна вважати справедливим твердження деяких лінгвістів-теоретиків про різке скорочення семантичних структур слів, що функціонують в технічних текстах.

**Ключові слова:** лексико-семантичний варіант, частотність, частка, синтаксична модель, поняття.

### State of the Problem and Literature review.

The semantic structure can be considered in several aspects – as a given, reflected in lexicographic sources, i.e. as a set of meanings of a word, connected by relations of semantic derivation; as a dynamic system, constantly experiencing the influence of intra-lingual and extra-linguistic factors; and as an idea of the potential possibilities of semantic variation of a word with a given initial meaning.

So the lexicography presenting the semantic structure of a word is based on contextual facts and, above all, on the nature of their compatibility. Various lexical and semantic variants (LSVs) of a particular word function in speech, in context and, as a rule, are unambiguously revealed only in a specific speech environment. Thus a lot of researcher argues that there is no doubt that objectivity in judgments about the use of relevant units cannot be achieved without reference to context [1; 2; 3; 4].

The most important differential features of LSVs, characterizing with their functioning in a specific area of scientific discourse and allowing a more complete description of the semantic structure as a whole, is syntactic and lexical compatibility. Syntactic compatibility is understood as the ability of a word to be combined in a sentence with certain elements, both subordinate (kernel connection) and non-subordinate to it, and where it itself acts as a subordinate element (adjunctive connection). Syntactic connections are usually expressed by compatibility patterns, which are formed as a result of distributive analysis of sentences. Lexical compatibility, in accordance with the interpretation of famous scientists [5], is the realized ability of a word to be selectively combined with other words in speech in accordance with their lexical-semantic content.

**Task statement.** In the article devoted to the formation of an inventory of lexical-semantic variants of the most frequent noun 'system', which are implemented in the texts of technical fields of knowledge, the corresponding LSVs are presented. They are studied in two aspects – the plane of language and the one of speech, i.e. the lexical-semantic variants of the word 'system' identified in the texts were compared with the definitions fixed in the entry of

the noun 'system' of the most authoritative standard dictionary of the English language – Webster's [6], and then their interaction is considered.

At the present stage of the description of LSVs of the noun 'system', their syntactic connections are analyzed, which clearly demonstrate the influence of certain definition on the structure and lexical content of a separate syntagm and, in particular – on the construction of the speech chain.

So the main goal of the article is as follows: on the basis of the context to describe the lexical-semantic variants of the most frequent noun 'system' functioning in the text corpus "Automation of heat and power processes" (AHPP) in terms of their syntactical compatibility.

The material for compilation the AHPP text corpus was the following scientific journals in the UK and the USA: Power; Power Engineering; Process Engineering. The total size of the AHPP text corpus was 200 thousand tokens.

**Base material.** The first step for achieving the goal set was the compilation of an inventory list of compatibility models which have been selected from the text corpus. In the article their components are expressed using generally accepted markers: N – noun; A – adjective; prp – preposition; Ving – participle I; Ven – participle II; d – numeral, pronoun.

The most frequently used LSV(1), which in the normative Webster's Dictionary is fixed as "the body considered as a functioning organism", corresponds to the engineering concept 'installation'. Its percentage is 60% of all uses of this word found in AHPP texts, which, in our opinion, requires a more detailed analysis to determine the characteristic features of this LSV from the standpoint of its syntactic and lexical compatibility.

As a result of the contextual analysis of the LSV "installation" of the noun 'system', the following most common models of syntactic compatibility, which are specific for the functioning of this LSV, were identified:

AN – the share in the total use of this LSV was 35%, for example, *protective system, alarm-reporting system;*

NN – the share is 34%, for example, *pump system, relay system, perimeter system;*

NprpN – the share is 10%, for example, *motion in a system, reliability of the system, model of the system*;

NN – the share is 5.5%, for example, *system components, system faults*;

NprpN – the share is 1.6%, for example, *system for equipment, system of plant, system of design*.

As one can see from the given syntactic models, the most typical and frequent for the this LSV of the noun ‘system’ are substantive and verbal word combinations. Substantive combinations are presented as nuclear and adjunct models with a dependent component in preposition and postposition.

The dependent component in preposition in the kernel models can be expressed by the following parts of speech: a) noun (37.2%); b) adjective (17.5%); c) pronoun (4.3%); d) numeral (1.9%).

Kernak and non-kernal models of word combinations in which the dependent component is often expressed by a complex word, such as:

NN, for example, *a 40MW system, SO2-removal system, the wastewater-recovery system*;

NN, for example, *the (key) system components, system characteristics, system analysis*;

VingN, for example, *an operating system, existing system, a parallel-metering system*;

VenN, for example, *the described system, designed system, the best-designed system*.

Thus, the most frequent LSV ‘installation’ of the noun ‘system’ in the AHPP texts has wide syntactic compatibility being used in almost all constructions possible for a noun.

Next we consider LSV(2), which also has the meaning “the body considered as a functioning organism” or its invariant “a group of related parts working together” in the AHPP texts. But in the texts in accordance with the situational conditions of this LSV the noun ‘system’ is interpreted as “computer”. As a result of the study of word combinations with this LSV we determined that its syntactic connections were realized in the following combinability models:

AN – the share is 50.8%, for example, *control system, complex system, the new system, an operating system, dedicated system*;

NN – share is 14.3%, for example, *control system, management system, memory system*;

NprpN – share is 9.4%, for example, *operation of the system, software of the system, elements of system*;

NN – share is 8.0%, for example, *system analysts, the systems engineer*;

VN – share is 4.8%, for example, *consider a system, to choose a system*;

dN – share is 3.2%, for example, *this system, both systems, many systems*.

The most typical for realization this LSV of the noun ‘system’ are kernel substantive word combinations like AN (50.8%) and NN (14.3%) with a dependent preposition element, which, as we see from the above examples, can be expressed: by adjectives (33.3%), verb forms (11%), nouns (6.3%), compound nouns (4.8%), pronouns (3.2%) and numerals (3.2%). It is also characterized by models with adjunctive (subordinate) connections such as NprpN (9.4%) and NN (8%), in which the noun ‘system’ itself acts as a dependent component.

Thus, this LSV of the noun ‘system’ also has no less ability for syntactic compatibility than LSV(1). But the verb combinations are not typical for the implementation of LSV(2) unlike LSV(1).

The next lexical-semantic version of the noun ‘system’ is LSV(3), which, just as in the previous analysis of the definitions of the Webster’s normative dictionary and their comparison with the meanings ‘system’ implemented in the considered text corpus AHPP, was fixed in the meaning “the body considered as a functioning organism” or its invariant “a group of related parts working together”. In the terminological system of the technical specialty “Automation of Heat and power Processes” this meaning takes the place of the terminological concept “station, system of stations”. The analysis of the words combinations of this LSV showed that the share of all uses of the word ‘system’ in this meaning was 7%. For realization of LSV(3) in the texts the most common models of syntactic compatibility is as follows:

NN – share of participation in the total use of LSV(3) is 33.3%, for example, *system engineers, system unit, system voltage*;

AN – share is 26.3%, for example, *overall system, district-heating system, existing system*;

NprpN – share is 14.0%, for example, *type of system, the performance of the system, study for the system*;

NN – share is 10.5%, for example, *plant system, utility system, distribution system*.

As we can see from the results of the analysis, the most common for this LSV of the noun ‘system’ are non-kernal substantive models with adjunct connections of the NN and NprpN type, as well as the kernel substantive models of the AN and NN types with a dependent preposition component, expressed by: a) verbal form 14%; b) adjective 10.5%; c) nouns 8.8%; d) pronoun 3.5%.

Although LSV(3) is not characterized by all the distributional models which are common for nouns, nevertheless, in this case we can speak of a fairly wide syntactic compatibility, because the noun ‘sys-

tem' possessing this LSV is a part of the main substantive models.

The remaining LSVs of the noun 'system' fixed in Webster's entry of this noun are used quite rarely in the text corpus under consideration. The examples of actualization of these lexical-semantic variants of the noun 'system' are very few in number, so it is difficult to observe a certain pattern in their use and determine the predominance of certain distributional models and semantic groups combined with these LSVs. Nevertheless, they exist, and we can give examples that characterize these LSVs: LSV(4) "block" – *non-linear system, data-acquisition system, analog system*; LSV(5) "electrical circuit, diagram" – *electrical system, commercial system*; LSV(6) "set, combination, unit" – *mechanical system*; LSV(7) "device," – *cable system, delay system*.

So the affirmation of some linguists-theoreticians about the sharp reduction of semantic structures of words functioning in engineering texts may be considered fair since in our article only three LSVs of seven possess quite high magnitudes of usage, the values of the rest LSVs can be negligible.

The results of the analysis allow us to draw the following conclusions.

1. In the text corpus of one of the areas of scientific discourse "Automation of heat and power processes" the functioning of words with LSV with a broad conceptual basis, which are characterized by a high level of syntactic compatibility. Typically these include words used in the texts with the highest frequency of occurrence. In our case, it is the noun 'system'.

2. The most frequent lexical-semantic variant of the noun 'system' is "installation". Its description of the syntactic compatibility of this LSV shows that this word has wide syntactic compatibility in the

AHPP sublanguage since it is used in all constructions possible for a noun.

3. The analysis of the lexical-semantic variant (2) "computer" of the word 'system' shows that LSV (1) is not the only indicator of the high rating of 'system' in terms of syntactic compatibility. It also has quite wide combinative capabilities, can be used in almost all constructions inherent to nouns (excluding verb combinations, where it does not show its high frequency of use). The word 'system' in this meaning acts as a unit with a broad conceptual basis.

4. The results of the study of LSV(3) "station, system of stations" of the noun 'system' determine the following. The share of the usage of this word with LSV(3) in the total number of occurrence of the word 'system' is low, only 7%. However, its syntactic combinatory capabilities in terms of diversity are actually not inferior to the first two most frequent LSVs of the word 'system', and it is used in most substantive distributive models. However, LSV(3) aggravates the characteristic of LSV(2) and does not form a single word combination with a verb form.

5. The remaining LSVs of the noun 'system' though are not analyzed and presented in this article, since their quantitative values are small, and this fact does not allow us to trace any of patterns and draw correct conclusions, nevertheless, they function in the studied texts of the specialty "Automation of heat and Power Processes," which is confirmed by relevant examples.

The results of the study demonstrates the broad prospects for the future research. It concerns first of all the lexical compatibility of the most frequent nouns functioning in text corpora, identification of their thematic groups of different parts of speech with which these nouns are combined.

#### REFERENCES:

1. Flowerdew J. Concordancing as a tool of course design. *System*. Vol. 21, Issue 2, May 1993, P. 231–244.
2. Barnbrook G. Language and computer. A practical introduction to the computer analysis of language. Edinburgh: Edinburgh University press, 1998. 209 p.
3. Benson M., Benson E & Ilson R. The BBI combinatory dictionary of English: a guide to word combinations, Amsterdam-Philadelphia, 1997.
4. Shapa L. N., Kudinova T. I. Kernel Models of Verbal Subordinating Word-Phrases in the Text Corpus "Radio-Electronics" *Науковий часопис Національного педагогічного університету ім. М.П. Драгоманова*. Київ, вид-во НПУ ім. М.П. Драгоманова. Сер. 9 «Сучасні тенденції розвитку мов». Вип. 15. 2017. С. 211–221.
5. Перебийніс В.І. Закономірності структурної організації науково-реферативного тексту. Київ: Наукова думка, 1982. 312 с.
6. Webster's Third New International Dictionary. N-Y: Publisher Merriam Webster, Inc., June 2002. 2662 p.