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LEXICAL FEATURES OF SCIENTIFIC DISCOURSE

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Currently, a lot of emphasis is placed of the ability of a person to successfully communicate in any sphere of activity, which along with upbringing and education is among the factors that determine a person's culture. In the context of rapid scientific and technological progress, it is vital to constantly exchange relevant information. The effectiveness of this process relies not only on the proficient knowledge of the subject and the ability to make grammatically correct sentences, but to a large extent on the level of competence in scientific language. The present article attempts to consider the interaction of discourse and vocabulary, different types of cognitive phenomena responsible for the use of a language in real time and related to the language as a means of storing and organising information. Analysing and classifying some key elements of a scientific discourse lexicon contributes to the development of certain provisions of lexicology, functional stylistics, cognitive linguistics and terminology. The results of the analysis may be advantageous both to linguistics and teaching the language for specific purposes.

Keywords: scientific discourse, lexis, term, structural model, lexical-semantic category, nomination, system.

Introduction

The majority of researches define the modern society as an information society, because "theoretical knowledge occupies the central position, being the core of new equipment, technology, economic growth and social stratification organization" (Bell 1999). In such a society, science not only performs an epistemological but also innovation, socio-cultural and praxeological functions. Constant penetration of science into new social practices being realised through the use of information and computer technology, gradually leads to the need for understanding science as a form of public discourse. The unity of theoretical, pragmatic and socio-cultural aspects of modern scientific discourse defines the essence of information society innovation basis.

Human language is the basis and means of transformation in the post-modern society, which presupposes significant expansion in the scope of linguistic research and its consistent correlation with other areas of the humanities. The need to study both linguistic and communication problems through the perspective

of other fields of science, reframing the traditional language concepts and studying different aspects of verbal and cognitive activities has arisen in modern linguistics. A cognitive discourse approach rooted in traditional linguistic analysis with the use of other sciences methods has advanced linguistics to a qualitatively new level of cognition and discourse research on the basis of the complex cognitive concept. Cognitive discourse paradigm presupposes the study of language in action when the language is "an instrument, a tool, a means and a mechanism of reaching specific aims and realizing definite intentions of a person both in the sphere of the reality cognition and description and also in the act of communication and interaction by means of language" (Kubryakova 2002: 9). From this point of view, a discourse is defined as "a coherent text in conjunction with the extra linguistic, pragmatic, socio-cultural, psychological, and other factors; the text in event-driven aspect, speech, considered as a purposeful, social action, as a component involved in the interaction of people and their cognitive processes. Discourse is speech "immersed into life" (Arutyunova 1990: 136–137).

The *aim* of the present article is to overview general specific features of a scientific discourse from structural, semantic and morphological points of view to facilitate scientific discourse organisation.

The *material* for the analysis has been taken from the dictionaries "Oxford Collocations Dictionary" (2003); "Roget's Thesaurus of English Words & Phrases" (2000); K. Wales "A Dictionary of Stylistics" (2001) and electronic sources of specific synchronous term-oriented text corpus related to scientific discourse.

The research was performed within the framework of the *theory* of a discourse and different aspects of scientific style analysis (de Beaugrande 1997; Gee 1999; Giegerich 2004; Talmy 2000; van Deyk 2001; Gvishiani 2008; Danilenko 1975; Kubryakova 2000; Komarova 2004; Layonz 2003; Leychik 2007; Makarov 2003; Nikulina 2004; Prokhorov 2004; Ter-Minasova 2004; Ufimtseva 2002; Yudina 2006).

In the course of study, the following *methods* were used: logical methods of classification and systematisation, linguistic methods of compatibility, definition and contextual analysis, immediate constituents and word-building.

Scientific style lexicon is characterised by conceptuality, marked use of nouns and adjectives, use of terms with a clear and narrow denotation, absence of expressive lexemes, exclusiveness and, therefore, high repetitiveness of lexis, resulting in quite a stereotypical vocabulary and semantic condensation with preference to noun groups (Knittlová 1990).

A term is a dynamic phenomenon that is born, formulated and delves into the process of cognition, the transition from a concept (mental category) to a verbalised concept associated with some theory to conceptualise a particular field of knowledge or activity (Leychik 2007: 21–22). This understanding of the term is inextricably linked with the implementation of the main tasks of cognitive linguistics – explaining of connections between the structures of language and knowledge structures, as the term acts as a "carrier" of information about these relationships.

Discussion and results

Scientific discourse lexis can be divided into terms and non-terms. Non-term lexis may be of common use, general scientific and general technical one. The problem of scientific communication optimization primarily requires the analysis of non-term lexis because terms constitute no more than 20% of the total number of the text lexis.

The possibility to correlate a lexical unit with a strictly scientific definition allows to differentiate between the terms being special professional lexical units from the common-literary words. This is particularly important while dealing with consubstantial terms, the ones that are congruent in form to common-literary language words. They account for one-third of all terms.

The boundary between terminological and general vocabulary is unstable, its character being not historical but functional one. The process of term transformation into commonly used words and vice versa is constant. Common lexis item transition into a terminological one started with the use of the former in specific contexts.

Heterogeneous character of scientific discourse terminology may be explained by the fact that research and technology knowledge had been predominantly formed on the basis of experimental natural science.

Morphologically, the terms are mainly nouns, but they may also be verbs semantically correlated with nouns and adjectives most often derived from nouns, e.g. absorption (n) – absorb (v), activation (n) – activate (v); anion (n) – anionic (adj), corrosion (n) – corrosive (adj), circle (n) – circular (adj). It should be noted that rows of the same root word-terms function in a scientific discourse, e.g. *adsorb–adsorption–adsorbent–adsorptive*, *corrode–corrosion–corrosive, diffuse–diffusion–diffused–diffusible*.

Non-term lexis comprises polysemantic and polyfunctional words and phrases that are the term's lexical environment and may be of general, general scientific and general technical use. A word in a scientific discourse forms contextual relations marked by varying degree of binding. The lexical core of a scientific discourse is a chain of interconnected units, its elements being a word, morphosyntactically conditioned phrase, reproductive phrase, ultimate syntactic unit and a terminological unit.

The following verbs, used predominantly in the passive form in scientific discourse and having a morphosyntactically confined usage, may be grouped according to their semantics: a) prognosis, prospects – *be engaged in, be exposed to, be found, be stated*; b) knowledge acquisition – *be accompanied by, be confronted with, be devoted to, be derived from, be noted*; c) acquired knowledge systematization and organising – *be based on, be concerned with, be confined to, be connected with, be excluded from, be related to*; d) acquired knowledge testing – *be convinced, be mixed with, be opposed to*; e) findings and conclusions – *be concluded, be satisfied with*; f) knowledge transfer – *be mentioned, be referred to, be said*.

Verb lexemes functional peculiarities awareness allows minimizing grammar forms to be mastered. The verbs *to aim, to involve, to pertain* and some other function mainly in the form of present and past participles, e.g.: *aimed at smth., (problem) involved, pertaining to smth.*

Lexicalization of -ing and -ed verb forms and their transition into adjectives and prepositions is characteristic of a scientific discourse, e.g.: *given, preceding, underlying, unifying,* according to, concerning, provided, owing to.

The problem of defining the field of lexical combinability of general scientific words probably remains among the most difficult ones in mastering a foreign language. The flow of speech segmentation into functional units is instrumental in deeper understanding of the lexical combinability pertaining to a scientific discourse.

Ultimate syntagmatic units have an extremely high binding degree of their components. For example, "Information validity, accuracy" semantic group is presented by the following sequences: *It is proved to be true…; It is no longer true that…; It is still true that…; There is no doubt that…; It is clear that…; It is commonly assumed that…* .

Phrases with prop word idiomatically properly combining with a number of words also present a considerable difficulty. In this case, a speaker/writer is given a sufficient freedom of choice in coining a phrase. Thus, the verb *to cause* may be combined with the following words: *changes, effects, controversy, uncertainty, a rise in smth.* As a rule, the noun *case* functions in the following attributive phrases in a scientific discourse: *general case, obvious case, normal case, particular case, special case;* the noun *point* was found in such phrases as: *beginning point, central point, final point, further point, important point, limiting point, minor point, particular point, significant point, starting point.*

Numerous studies have shown a scientific discourse to possess a sufficiently high degree of predictability. Thus, scientific discourse as if automatically specifies a set of lexical means.

General scientific lexis constitutes the semantic basis of a scientific discourse. Universal character of the general scientific lexis is fully manifested in its interrelation with terminology. Lexical units that constitute the core of general scientific lexis are both the lexical-semantic basis of scientific communication in the broadest context and are also used in coining various terminological phrases. The verb *to accept* is the basis of reproductive collocations, such as: *to accept an idea/an approach/ a theory/a view/ conclusions,* and also the constituent of widely used ultimate syntagmatic units such as: *It seems to be generally accepted…; These principles are generally accepted…*

The amount of common lexis is relatively small in a scientific discourse. Nevertheless, common lexis is represented by all parts of speech, both notional and functional, e.g. verbs: *appear, begin, find, hold, see, etc.*; adjectives: *good, great, large, new, small, same, etc.*; nouns: *air, side, thing, month, wall, etc.*; adverbs: *along, already, always, often, very, just, suddenly*, *etc.*; prepositions: *of, in, to, for, on, at, etc.*

The problem of system character of word-formation is linked to the problems of morphological divisibility, word-formation derivation, word-building relations and potencies.

Word-building system is understood to be a peculiarly organised unity, which is different from other linguistic systems both in its composition from specific units and in the way of their structural organisation and distribution.

The system character in word-formation can be studied on the basis of terminology primarily because terminology is consistent and the system of terms defines interrelated concepts.

Due to intensive development of computer technologies, the possibility to consider terminological lexis from different points of view, namely to analyse its morpheme, word-building and semantic structure seems timely.

Computing terminology is an example of young terminology: being formed in the middle of the XX century it is still in the process of active development. The dynamic character of computing terminology makes it suitable for the study of means of linguistic nomination.

Keeping in mind that terminology is a subsystem of the overall lexical-semantic system of a language, it contains all structural word types, all means of nomination and all semantic processes that are characteristic of the lexis in general.

The system of computing terminology means of nomination can be considered from different points of view: terms structural types, ways of terms formation, distinguishing units of primary and secondary nomination. These approaches do not contradict but rather complement each other enabling to create a comprehensive pattern of computing terminology.

Analysis of linguistic literature on the subject made it possible to distinguish the following structural types of terms: underived, derived, compound, terminological word combinations, abbreviations.

Term's structural model is understood to be the total amount of term-elements and their system organisation (Danilenko 1975).

Structural model of a nominal radical morpheme type (e.g. *card, code, deck, file, etc.*) is the most productive one among underived English computing terms.

Terms-underived words are characterised by a developed semantic system, which in its turn allows concluding that semantic method of word-formation and is productive for the analysed terminology. Metaphoric change and restriction of meaning are two main types of semantic changes.

The number of derived terms by far outnumbers the underived ones; though the variability of their affixes is somewhat limited. This feature proves the regular character of computing term-formation system.

The word-building structure of terms-derived words contains a large number of word-building models, the most productive

ones consisting of verbal root morpheme and suffixes. The most widely used suffixes are: ***-er/-or, -ion/-tion, -ing, -ity***. Terms ending in **-er/-or** are the most recurrent ones. This may be explained by the very object of this realm of science and technology.

Compound terms are not numerous in computing terminology. Compound is close both to a word and to a word-combination. Compound terms are not structurally homogenous: simplex, derivative, compound stems, clipped first and second components, abbreviations and codificators may be components of compound terms. Compound terms formed according to the models **adj + n, n + n** are the most frequently used ones. In many cases the following tendency is true: the more productive is the word-building model, the more frequently it is used. Compound terms reflect computing notions in different ways. There exists a connection between the structure of a term and its lexical meaning.

Compound terms of **adj + n** type are recurrent in describing the principles of a computer structure, its parameters, hardware, software and programming languages: *higher-speed, mainframe, general-purpose, special-purpose, low-cost, small-system, single-board, high-performance, low-level, high-end, long-term, single-step, variable-point, single-precision, new-line, high-pass, low-byte, discrete-time, double-precision, double-length, deep-depletion, high-volume, high-density*; computer input-output control description: *double-density, hard-copy, high-quality, highest-quality, full-screen, single-rock, single-density, digital-readout, narrow-band, operational amplifier, small-input, full-duplex, parallel-data, serial-data, single-wire*; for naming computer elements, including the description of logical scheme, triggers, integral microcircuits: *single-input, open-collector, discrete-component, positive temperature, thin-film, single-chip, multiple-function, continuous-path, complementary-symmetry.*

Syntactic way of computing term formation is a productive one due to the complex logical-conceptual system of such terminology and the necessity to define the meaning of the notion most accurately.

Syntactic way of computing term formation comprises two-, three- and four-component word-combinations. The distinguishing feature of a word-combination as opposed to a compound is manifested above all in formal grammatical peculiarities of its composition, in its structural characteristics. Two-component attributive word combinations with a modifier in preposition that correspond to structural models **A + N** and **N + N** having the meaning "modifier-modified" are the most widely used types of terminological word-combinations. Nominal word-combinations are the most active ones, the right position component being their nucleus: *system, computer, device*, *program, control, storage, memory, unit, code, data, method, mode, set, etc*. In the left position the most active components are: *data program, control, system, disc, address, machine, file, etc.*

The presence of a large number of terminological word-combinations in computing terminology system brings about an opposite phenomenon, i.e. compression, which leads to the formation of a substantial number of abbreviations, being of syllable type, letter-syllable and clipped. Terminological units recurrent both in literature and discourse and denoting basic concepts of computing manifest the tendency to abbreviation.

There exist a large number of abbreviations connected with the terms "memory", "register", "unit", "system", "processor", etc.: *RW memory, RAM, USB-memory-stick., HAM; TBR, PR; CPU, NTU, ACU; DBS, ESS, HDBMS; HEP, ISP, GWP, etc.*

Semantics of computing terms is determined to a great extent by logical-conceptual system of this realm of science. Based on the semantics of a nuclear component, it is possible to distinguish lexical-semantic categories (LSC) particular to the lexical-semantic computing terminology system in general:

1. LSC "an object/material body" (terms that denote objects of reality: computers, details, elements, devices, etc.);

2. LSC "process/movement" (terms that denote process, action, state);

3. LSC "quality/feature" (terms that denote quality quantity, extent, characteristic features);

4. LSC "abstract logical notions" (terms that specify most general logical notions, mathematical notions, programming languages, etc.).

A definite set of structural models is mainly used in term-formation of a certain LSC. Terms that belong to LSC "object/physical body" are formed according to the models **N + N, A + N, PI + N, N + A + N**. Terms that constitute LSC "process/movement" have structural models

A + PI, PII + N.

Conclusions

1. Mutual consideration of a discourse and lexicon features enhances the study of linguistic phenomena: discourse for special purposes in any conceptual area is not just a body of texts together with all the linguistic and extra-linguistic factors, but a manifestation of their interrelation, interdependence and interactivity. Thus, a word is the unit of knowledge storage and actualisation.
2. Non-term lexis (both common and common scientific use) awareness as a functional-dynamic system improves language skills of students. Correlation of terminological units is manifested in the possibility to form structurally and semantically related derivatives from one root. Emphasis on this relation in teaching of English computing terminology will considerably facilitate its mastering and stimulate the academic performance.
3. Defining the field of general scientific lexis combinability presents the greatest difficulty in the process of language for specific purposes acquisition.
   Hence, the flow of speech segmentation into functionally tied up lexical groups is instrumental in the above process.
4. Terminological word-combinations fully express the idiosyncratic features of a notion and its numerous relations with other notions within the computing terminological system.
   Hence terminological word-combinations meet the requirements of terminological nomination in the full, and are widely used as means of linguistic nomination.
5. Identifying scientific terms functioning patterns through the analysis of the most common lexical collocations units, contributes both to identifying term coinage process and understanding some aspects of scientific knowledge production.

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MOKSLINIO DISKURSO LEKSINĖS SAVYBĖS

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Šiuo metu ypač akcentuojamas asmens gebėjimas sėkmingai bendrauti bet kurioje veiklos sferoje. Kartu su individo auklėjimu ir švietimu šis gebėjimas yra vienas iš svarbiausių asmenybės kultūrą lemiančių veiksnių. Sparčios mokslo ir technikos pažangos kontekste išryškėja informacijos pasikeitimo svarba. Šio proceso efektyvumas priklauso ne tiek nuo įgytų dalykinių žinių kiekio ir gebėjimo gramatiškai taisyklingai formuluoti mintis, kiek nuo individo mokslinės kalbos žinių lygmens. Šiame straipsnyje apžvelgiama kalbos diskurso ir žodyno sąveika, įvairių tipų kognityviniai reiškiniai, susiję su kalbos vartojimu realiu laiku ir gaunamos informacijos tvarkymu bei saugojimu. Straipsnyje analizuojami esminiai mokslinio diskurso leksikos elementai, lemiantys leksikologijos, funkcinės stilistikos, kognityvinės lingvistikos ir terminologijos raidą. Straipsnyje pateiktos mokslinės analizės rezultatai galėtų būti naudingi tiek kalbotyros specialistams, tiek ir užsienio kalbų dėstytojams.

Reikšminiai žodžiai: mokslinis diskursas, leksika, terminas, struktūrinis modelis, leksinė-semantinė kategorija, nominacija, sistema.