METAPHORS IN COMPUTER VIROLOGY DISCOURSE

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This work is performed as part of the cognitive-discursive paradigm of modern linguistics. The object of the investigation is the concept "computer virus" and its linguistic representation in a computer virology discourse. The research is based on the texts from the Corpus of Contemporary American English.

The first stage of the linguistic and conceptual investigation of "computer virus" is based on Metaphor Investigation Process (MIPVU) developed by the Metaphor Lab at VU University Amsterdam. The identification procedure includes the following main steps: reading the text/discourse, acquiring a general understanding of its meaning, selecting lexical units from the text/discourse, and establishing their contextual and contemporary meanings. If the contextual meaning contrasts with the basic meaning but can be understood in comparison with it, the lexical unit is marked as metaphorical (Pragglejaz Group 2007).

The second stage of the investigation is based on the method of metaphorical modeling, which implies taxonomic categorization, developed by S. Mishlanova (Mishlanova 2002). On the basis of corpus analysis a metaphorical model "computer virus" was constructed. The model represents a taxonomic structure, which includes the basic taxons "man as a social subject," "man as a biological creature," and "animal." The most representative areas of source domains included, "military operation" (represented by such linguistic metaphors as *attack, strike, defeat*), "diseases" (*crippling, succumb, infected*), and "interpersonal relations" (*be angry at, enter into, want*).

At the current stage of computer virology development, metaphor plays a very important role as a universal tool for conceptualization and categorization of new

knowledge that relies on the preceding experience of the person participating in the cognitive process. The structure of the concept "computer virus" is a hierarchical system, fixing the unscientific notion of a computer virus, the peculiarities of its functioning, and the ways to combat this malicious program.

Keywords: computer virology discourse, metaphors.

МЕТАФОРЫ В ДИСКУРСЕ КОМПЬЮТЕРНОЙ ВИРУСОЛОГИИ

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Представленное в статье исследование выполнено в рамках когнитивно-дискурсивного направления современной лингвистики. Цель исследования – сравнить особенности метафоризации в различных типах дискурса компьютерной вирусологии. Материалом исследования послужили тексты газетного и журнального подкорпусов лингвистического корпуса COCA.

Исследование проводилось в три этапа: составление конкордансов, отражающих полисемию значений слова «virus», идентификация метафоры в текстах дискурса компьютерной вирусологии, категоризация выявленных метафор.

Результатом исследования является построение метафорической модели «компьютерный вирус» в научном и научно-популярном типах дискурса компьютерной вирусологии. Сопоставление структур метафорических моделей позволило сделать выводы о зависимости процесса концептуализации от типа дискурса.

Результаты исследования могут быть использованы в разработке языкового планирования для оптимизации процесса коммуникации пользователей и специалистов в области информационных компьютерных технологий и для составления словаря-тезауруса по компьютерной вирусологии. Описание методики исследования может быть использовано как

руководство для идентификации метафорических единиц в тексте и метафорического моделирования.

Ключевые слова: дискурс компьютерной вирусологии, метафоры.

The current stage of development of modern society requires paying special attention to the process of knowledge transfer and knowledge acquisition. Timely receipt of valuable information and systematic updating of the content of personal encyclopedias is the condition of individual competitiveness and the recipe for success. The growing tendency of deep specification of certain scientific branches on the one hand correlates with increasing research in the field of complementary sciences. The outcome of fusion of separate disciplines is the challenge of adequate knowledge acquisition of specialists in allied subjects. One of the main components of the problem that should be highlighted in the context of the paper is the complexity of mastering specific terminology that might be even intensified by occurring ambiguity including homonymy and polysemy in the meaning of terms initially belonging to isolated scientific domains. In the light of existing trends of scientific development the role of applied linguistics in the process of special knowledge transfer and acquisition should be underlined. The present stage of development of applied linguistics, characterized as anthropocentric, puts forward a new approach to interpretation of the phenomenon of metaphor and its significance for perception and reproduction proceeding within specific scientific areas.

The first observations of scientific metaphor are associated with the period of demolition of conception of metaphor as a conventional trope. The initial steps towards the study of scientific metaphor were made by A. Richardson and M. Black who pointed to the capability of some metaphors to be used as cognitive instruments that help to interpret some aspects of reality. Further interpretation of the theory of scientific metaphor was worked out by such Russian terminologists as V.N. Telia, V.G. Gack, N.D. Arutyunova, E.O. Oparina and others, who modified an assumption that comprehensive study of metaphor should be based on the interpretation of

interacting descriptors with reference to the subject and the addressee of metaphor, appealing to their scope, language proficiency and the content of personal mental thesaurus i.e. taking into account anthropometric factor and cognition . E. McCormack made a significant contribution to the study of semantic and cognitive processes, suggesting a hypothesis that scientific metaphors set analogy with our experience to express new knowledge, link old and new concepts and originate novel meanings in new theories (Алексеева 1998).

The new approach to the investigation of scientific metaphors is represented by cognitive-discursive researches on political, law, medical and other types of discourse (Bulatova 1999, Vershinina 2002, Gubernatorova 2003, Demenskiy 2000, Mishlanova 1998, 2002, Fedoseev 2003, Chudinov 2000, Shuvalov 2005, Erdem, Satir 2006, Fadeeva 2002, Hibbits 2006, Libert 1997, etc). Within this framework discourse understood as a verbally-mediated activity in a special sphere, which determines the formation of a concept, that corresponds to a mental structure, which can be expressed via various language forms, one of which is metaphor (Mishlanova 2002). As a result of numerous studies sufficient data was obtained that prove the hypothesis that cognitive-discursive approach allows to explain the principles of metaphorization and discourse on the basis of Conceptual Metaphor Theory. In the present paper metaphor is defined as a cognitive mechanism of representation of knowledge at any level (from naive to professional and scientific knowledge), based on mapping from a conceptual source domain to a conceptual target domain (Lakoff 1980), actualized in discourse and representing the stages of development of a linguistic sign. Metaphor implies a number of strategies of verbalization and popularization of scientific information. Procession of special knowledge relies on background knowledge of an addressee and provides for mapping of this knowledge into the conceptual sphere of interpreting discourse thereby contributing to categorization of new knowledge. Metaphor being a universal tool of special knowledge acquisition is thoroughly investigated in political, news, poetical, philosophical, medical, and other types of discourse, however there have practically

been no attempts to evaluate the role of metaphor in conceptualization of special knowledge in computer virology domain.

Over the past few years the interest in exploring peculiarities of metaphor in computer virology discourse has arisen due to the fact that computer security has become an irrefutable condition for full-fledged development of all spheres of economics ranging from personal issues to governmental and even world-wide services. Rapid development of various spheres of economics and industry requires involving qualitative and highly competitive specialists, possessing professional competences, the ability to adapt to changes and ensuring constant increase in the production. In this context professional communication has become an integral part of individual's life in the modern society experiencing the period of post industrial development. Due to the fact that global informatization of all the spheres of social life has reached a considerable level and has vital impact on the economy, IT proficiency, i.e. the capability to process different types of data and implement professional communication in digital environment, has become an indispensable quality for professional competitiveness. As a result high standards of communicative process in professional sphere can be achieved only on the basis of background knowledge of information computer technologies. Another outcome of global informatization is the occurrence of the new kinds of computer crimes, such as stealing data, unauthorized manipulation and other types of criminal activity involving computer security breach. Thus computer security becomes a condition of paramount importance for effective professional communication. Consequently acquisition of special knowledge in the sphere of computer security and computer virology in particular plays a pivotal role in the process of professional development.

All the mentioned factors lead to an increasing interest in the study of peculiarities of metaphorization process in the sphere of computer security and computer virology in particular. The key term of computer virology discourse is a computer virus, a program that enters your computer and damages or destroys information that you have stored (Macmillan Dictionary). The first step of this

investigation is to compare computer virus metaphors in different types of texts in order to establish concepts and metaphorical models. This is achieved by means of reconstructing conceptual structures on the basis of linguistic units encountered in computer virology discourse. The research executed as a corpus-driven analysis of linguistic usage is carried out on the texts extracted from the Corpus of Contemporary American English (COCA) of the Brigham Young University of the USA. COCA contains 450 million words and it consists of a collection of authentic and commonly occurring texts in electronic format. The texts belong to the period from 1990 till 2012. The corpus is composed of the following sub corpora: Spoken: (95 million words), including transcripts of unscripted conversation from more than 150 different TV and radio programs; Fiction: (90 million words), including short stories and plays from literary magazines, children's magazines, popular magazines, first chapters of first edition books 1990-present, and movie scripts; Popular Magazines: (95 million words) including nearly 100 different magazines, with a good mix (overall, and by year) between specific domains (news, health, home and gardening, women, financial, religion, sports, etc); Newspapers: (92 million words [91,680,966]) including ten newspapers from across the US, such as USA Today, New York Times, Atlanta Journal Constitution, San Francisco Chronicle, etc. In most cases, there is a good mix between different sections of the newspaper, such as local news, opinion, sports, financial, etc.; Academic Journals: (91 million words) including nearly 100 different peer-reviewed journals. These were selected to cover the entire range of the Library of Congress classification system (e.g. a certain percentage from B (philosophy, psychology, religion), D (world history), K (education), T (technology), etc.), both overall and by number of words per year. Corpus analysis is a rather new method of linguistic investigation that allows covering a large number of texts in search of linguistic data limited by established parameters in a relatively short period of time. For the present investigation 2 types of texts were chosen, Newspapers and Magazines. With the help of COCA search engine approximately 5000 entries of the word "virus" were selected limited by newspaper and magazine types of texts. The

reason for the choice of these kinds of texts is connected with considerably different genre specifics including different participants, goals and functions and domains, which make up a context pattern of a cognitive-psychological model of genre (Steen 2011).

The texts were distributed into 3 concordances according to the definition of the word "virus" in American Heritage Dictionary that reveals the polysemous nature of the word virus.

For the analytical purposes the concordances were entitled "biological virus", implying "any of various submicroscopic agents that infect living organisms, often causing disease, and that consist of a single or double strand of RNA or DNA surrounded by a protein coat. Unable to replicate without a host cell, viruses are typically not considered living organisms" (American Heritage Dictionary) or "a disease caused by a virus" (American Heritage Dictionary), "computer virus" denoting "a computer program or series of commands that can replicate itself and that spreads by inserting copies of itself into other files or programs which users later transfer to other computers. Viruses usually have a harmful effect, as in erasing all the data on a disk" (American Heritage Dictionary) and "social virus" standing for "a harmful or destructive influence" (American Heritage Dictionary). Despite the expectations the distribution of texts into 3 concordances has revealed that the amount of texts belonging to the list "computer virus" makes up only 9% of the whole scope of entries with the keyword virus.

The further work is carried out on the material of the concordance "computer virus" with the implementation of 2 strategies of metaphor studies adapted according to the aims of the research. They are Metaphor Identification Procedure (MIPVU) worked out by Metaphor Lab at VU Amsterdam and the method of metaphorical thesaurus modeling with the exploitation of taxonomic categorization, developed by S. Mishlanova (2008).

MIPVU was adapted with slight changes according to the purposes of the current research and included the following four steps.

1. Read the entire text–discourse to establish a general understanding of the meaning.

2. Determine the lexical units in the text–discourse [enabled in conceptualization of a computer virus]. (This deviation is possible due to the general top-down knowledge-oriented ontological approach of the first stage of the research turning to the second stage involving a down-top text oriented approach of metaphor modeling)

3. (a) For each lexical unit in the text, establish its contextual meaning.

(b) For each lexical unit, determine if it has a more basic contemporary meaning in other contexts than the one in the given context. For our purposes, basic meanings tend to be

- More concrete (what they evoke is easier to imagine, see, hear, feel, smell, and taste);

- Related to bodily action;

- More precise (as opposed to vague);

Basic meanings are not necessarily the most frequent meanings of a lexical unit.

(c) If the lexical unit has a more basic contemporary meaning in other contexts than in the given context, decide whether the contextual meaning contrasts with the basic meaning but can be understood in comparison with it.

4. If yes, mark the lexical unit as metaphorical (Steen 2010).

Macmillan Dictionary, Longman Dictionary of Contemporary English and the American Heritage Dictionary have been used as information and reference tools for identifying contextual and basic meanings of lexical units.

Metaphorical thesaurus modeling based on taxonomic categorization of special knowledge involves background knowledge and represents a hierarchical list which is made up of individual Taxons. It includes two source domains, human and nature, bringing to four basic metaphorical models, man as a human being, man as a social subject, animate nature and inanimate nature. The models have been analyzed as

complex taxonomic constructions including such specific taxons as landscape and environment, natural phenomena, plant, animal, anatomy, physiology, psychology, professional activities, politics and war, mechanisms, way of life, culture. Each taxon can contain many (or no) sub / child taxons.

According to these procedures metaphor related words (MRW) in computer virology discourse in newspaper and magazine texts were determined and categorized in compliance with their basic meaning. The investigation has revealed 4 main areas of conceptualization of a computer virus: medicine, war, linguistics and crime/punishment. Consequently, in order to construct a metaphorical model of a computer virus, corresponding taxons were marked out and compared.

The taxon medicine includes subspecific taxons pathogen, diseased organism, disease and therapy. The following examples show the procedure of identification of MRWs and establishment of taxonomic affiliation of lexical units in the metaphorical model.

e.g.1. *Each time you start your PC with an infected floppy in the drive, the virus can spread* (COCA 1999, MAG, PCWorld). In this entry the focus of our attention is the word *spread*. The search for the contextual meaning of the verb in the mentioned dictionaries has not provided any positive results, which witnesses to the novelty of the meaning of the linguistic unit *spread*. According to a newly generated definition the verb *spread* stands for *to affect a lot of digital devices*. The basic meaning extracted from Macmillan dictionary defines the verb *spread* as *to move your arms, legs, or hands so that they are far apart*. Since the contextual meaning contrasts with the basic meaning but can be understood in comparison with it the lexical unit *spread* is tagged as MRW. Another entry in Macmillan dictionary defines the verb *spread* in the following way *if a disease spreads, or if something spreads it, it affects more people as it is passed from one person to another* (Macmillan Dictionary). This meaning considered to be more basic than contextual suggests that the MRW *spread* refers to the taxon "pathogen"

e.g.2. *Who wants their favorite book to suddenly run out of batteries, or succumb to a computer virus?* (COCA, 2009, NEWS, CSMonitor)

In this example the linguistic unit under consideration is the verb *succumb* with the contextual meaning *to lose your ability to fight against someone or something, and to allow them to control or persuade you* (Macmillan Dictionary). The basic meaning is "to become very sick or to die from a disease" (Macmillan Dictionary). Judging from to the basic meaning the MRW succumb refers to the taxon "diseased organism".

e.g.3. *He may have accidentally released the " Love Bug " virus that crippled computer e-mail systems worldwide* (COCA, 2000, AssocPress)

In this pattern the focus of the analysis is the verb *cripple*. The conventional contextual meaning fixed in Macmillan Dictionary is *to damage something severely, or to prevent it from working properly* (Macmillan Dictionary). The basic meaning is "to make someone physically disabled, especially unable to walk" (Macmillan Dictionary). On the basis of this definition it can be observed that the MRW cripple is to be related to the taxon "disease".

e.g.4. *Uninfected computers will also be "vaccinated," as the IBM team puts it, against infections with this new virus as soon as they check the updated database.*

The novel meaning *to install special software for preventing unauthorized installation of malware* was modified in compliance with the context. The basic meaning *to treat a person or an animal with a vaccine to protect them against a disease*, extracted from Macmillan Dictionary, suggests that the MRW vaccinate refers to the taxon "therapy".

The distributive analysis of these elements in newspaper and magazine texts shows the difference in the organization of the taxon "medicine". In newspaper texts 44,4% of linguistic units represent the taxon "pathogen organism", 22,2% represent the taxon "disease", 16,7 % represent the taxon "diseased organism" and 16,7% represent the taxon "therapy".

In magazine texts 39,5% of linguistic units represent the taxon "therapy", 30,2% represent the taxon "pathogen", 25,6% represent the taxon "diseased organism" and 4,7% represent the taxon "disease".

The taxon "war" is mostly homogeneous representation of the taxon "military operations" in both types of texts. The taxon includes such linguistic units as *defend*, *hit*, l*aunch*, *plant*, *attack*, etc. and can be exemplified by the following COCA entries:

e.g.5. *An attack spread by a virus could change a vote without the voter's knowledge* (COCA, NEWS, AssocPress).

e.g.6. *If your antivirus software is a few years old, it may not be able to defend against this onslaught effectively, even if you faithfully download new virus definitions* (COCA, 2011, MAG, PCWorld).

The taxon "linguistics" is represented by such metaphors as *code*, *write*, *author* and *signature* and can be exemplified in the following way:

e.g.7. *The name GRAMMERSoft reportedly appears in the computer code in the Love Bug virus* (COCA, NEWS, AssocPress).

The taxon crime and punishment contains such linguistic units as *steal*, *detect*, *clue*, *evade*, *release*, *suspect* etc. and can be exemplified in the following way:

e.g.8. *The attackers intended for the onslaught to evade traditional signature-based virus detection* (COCA, 2007, MAG, PCWorld).

e.g.9. *One proactive approach uses a method called heuristics to examine a virus's programming for suspect commands or segments of code* (COCA, 2007, MAG, PCWorld).

The results of comparative analysis of the metaphorical model "computer virus" with the most representative taxons "medicine", "war", "linguistics" and "crime/punishment" in newspaper and magazine texts have indicated significant qualitative difference between the way of conceptualization of a computer virus by IT specialists and nonexpert readers. The results of the analysis might be explained by different context models of genre in news and magazine texts. The news type of discourse, being an addressee oriented, represents non-professional, naive knowledge

about a computer virus from the perspective of potential victims of a malware program with the domineering taxon "medicine" (21,1%), mostly containing linguistic units describing a computer virus as a pathogen organism and disease. The informative function of the genre is realized in the form of an alert message to be "in fighting trim" in case a malware agent "strikes". This genre peculiarity is represented by the taxon "war" (15,3%). The taxon "crime and punishment" (11,8%) as well as the taxon "linguistics" (15,3%) (The latter introducing the "author" or the "writer" of a malicious "code") demonstrate the persuasive function of the genre. The entries from magazine texts, representing more professional, popular scientific overview of the problem of computer security and vulnerability, express an expert approach with the domineering taxon "medicine" (30,3%), mostly containing linguistic units describing a computer virus as an object of medical therapy and a pathogen organism. The next in size are the taxons "crime and punishment" (14%), "linguistics" (12%) and "war" (7,4%), which unequivocally reflect the goals of the discourse including informative, instructional and persuasive functions.

This research has attempted to represent peculiarities of metaphorization in computer virology discourse. A polysemous structure of the word "virus" has been examined. The findings of corpus analysis suggest that only 9% of entries containing the word "virus" represent a virus as a computer program. The special attention is paid to a metaphorical model "computer virus". In the present investigation we have examined the most representative taxons: medicine, war, linguistics and crime/punishment in newspaper and magazine texts with reference to their genre specifics. Detailed understanding of the entire organization of computer virology discourse is achieved with the application of MIPVU and thesaurus taxonomic categorization that have lead to construction of the metaphorical model "computer virus". The findings prove that metaphor plays a key role in verbalization of computer virology discourse and can be successfully used as a universal tool for acquisition and transmission of special knowledge.

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