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Marharyta HELETKA,
orcid.org/0000-0003-1249-9139
PhD of Philology,
Associate Professor of Applied Linguistics
National Aerospace University "Kharkiv Aviation Institute"
(Kharkiv, Ukraine) mattta2015@gmail.com

Yevhen LEVIN,
orcid.org/0000-0001-9009-0246
Senior Lecturer at the Department of Foreign Languages
National Technical university "Kharkiv Polytechnic Institute"
(Kharkiv, Ukraine) jevhen.levin@gmail.com

THE ONTOLOGY OF METAPHORS IN AEROSPACE TECHNOLOGY DISCOURSE (CASE STUDY: AVIATION WEEK AND SPACE TECHNOLOGY JOURNAL)

The article focuses on the use of metaphors in non-fictional discourse related to aerospace technology sector of human activity. Metaphors are no more the phenomena of rhetoric science and linguistics; they are explored from the point of view of cognitive science. Metaphors are present in conceptual structures of human mind. They structure the images and beliefs, as well as determine the way people think.

Discourse is a complex process materially represented as a text which is interpreted by the recipient, who while interpreting, gets an access to the thoughts and positions of the author of the text itself. This interaction fills the language signs with their meanings. And metaphors appear a very practical and useful tool to support the process of this interaction.

As for the discourse genres, which is clearly a disputable problem, the material analyzed can be solidified under the domain of aerospace technology, subdivided into such semantic fields as business, marketing, international politics, military defense, national security, all connected with the flying vehicles and their parts – aircraft, aircraft engines, helicopters, rocket carriers, missiles, drones etc.

Therefore, the material representation of the discourse under study proves it to be a scientific and business discourse at the same time. Of great interest is the functioning of metaphors in this non-fictional genre of discourse.

Metaphor is a tool used to conceptualize the reality through interpreting the elements of certain domain in terms of the elements of another domain. It is the ontological mapping across conceptual domains, from a certain source domain to some target domain.

The authors admit that there are new or creative metaphors and conventional metaphors divided into ontological, structural and orientational. The analysis showed that the discourse contains rather conventional than creative metaphors and is heavily loaded with metonymies.

Key words: *discourse, discourse genre, metaphor, metonymy, source domain, target domain, mapping, new or creative metaphor, conventional metaphors, ontological, structural and orientational metaphors.*

Маргарита ГЕЛЕТКА,

orcid.org/0000-0003-1249-9139

кандидат філологічних наук,

доцент кафедри прикладної лінгвістики

Національного аерокосмічного університету імені М.С. Жуковського

«Харківський авіаційний інститут»

(Харків, Україна) *mathta2015@gmail.com*

Євген ЛЕВІН,

orcid.org/0000-0001-9009-0246

старший викладач кафедри іноземних мов

Національного технічного університету «Харківський політехнічний інститут»

(Харків, Україна) *jevhen.levin@gmail.com*

ОНТОЛОГІЯ МЕТАФОР У АЕРОКОСМІЧНОМУ ДИСКУРСІ (НА МАТЕРІАЛІ ЩОТИЖНЕВИКА «АВІЕЙШН УК ЕНД СПЕЙС ТЕКНОЛОДЖІ»)

Стаття присвячена використанню метафор у нехудожньому дискурсі, пов'язаному з аерокосмічним сектором промисловості. Метафори більше не є виключно феноменом риторики та лінгвістики; вони становлять об'єкт дослідження когнітивних наук. Метафори присутні в концептуальних структурах людської свідомості. Вони структурують образні уявлення і світогляд носіїв мови, а також визначають їхній спосіб мислення.

Дискурс – це складний процес, матеріально представлений у вигляді тексту, за рахунок інтерпретації якого реципієнти отримують доступ до мислення і позицій самого автора тексту. Ця взаємодія надає мовним знакам їх значення. І метафори виявляються дуже практичним і корисним інструментом для підтримки процесу цієї взаємодії.

Щодо дискурсивних жанрів, проаналізований дискурс належить до концептосфери аерокосмічних технологій, до складових концептів якої можна залучити бізнес, маркетинг, міжнародну політику, військову оборону, національну безпеку. Усі зазначені концепти завжди пов'язані з концептами на позначення польотів, літальних засобів та їх частин – літаки, авіаційні двигуни, гелікоптери, ракетноносії, ракети, безпілотники тощо.

Отже, матеріальна репрезентація досліджуваного дискурсу свідчить про те, що він є науковим і діловим водночас. Значний інтерес викликає функціонування метафор у цьому нехудожньому жанрі дискурсу.

Метафора – це інструмент, який використовують для концептуалізації реальності через інтерпретацію сутностей певної сфери (царина джерела) в термінах сутностей іншої сфери (царина цілі).

В рамках когнітивного підходу виокремлюють нові або креативні метафори та конвенційні метафори, які поділяються на онтологічні, структурні та орієнтаційні. У ході дослідження було встановлено, що зазначений дискурс містить більше конвенційних метафор та метонімії. Креативні метафори властиві лише заголовкам і підзаголовкам статей, а також рекламним текстам, розміщеним на сторінках журналу.

Ключові слова: *дискурс, дискурсивний жанр, метафора, метонімія, царина джерела, царина цілі, нова або творча метафора, конвенційні метафори, онтологічні, структурні та орієнтаційні метафори.*

Since ancient rhetoric and philosophy, metaphor has attracted the linguists, philosophers and psychologists, because it is one of the main ways of learning reality through transferring concepts from one sphere to another: from sensitive perception to abstract, from material objects to spiritual ones. A metaphor can be called a visualization tool, as it can very accurately convey the sense of a given phenomenon, provide an image of some complex notion.

Metaphors are present everywhere: in science, culture, and education. In the early times of information technologies and intensive development of advertising, when a short, clear, but capacious and figurative verbal text is required, which would be quickly remembered, assimilated and «awakening

reason in people relatively to the advertised thing, the role of metaphor in language communication cannot be underestimated.

At the current stage of the development of science, metaphor has gone beyond rhetoric and linguistics and moved into the field of disciplines related to human cognition – theory of cognition, cognitive psychology, logic, etc. The phenomenon of metaphor, whose nature and mechanisms are still not fully revealed, is now interpreted in a new way, taking into account the cognitive approach to the analysis of linguistic phenomena.

A large number of metaphors appear in the spheres of communication, which are of great interest to philologists, speechwriters, influencers, politicians, economists etc. since the format of knowledge

exchange has been greatly affected by the processes of digitalization and easy access to the Internet.

Modern linguistic researchers, treating metaphor as a thinking and cognitive phenomenon, admit the universality of the metaphor, its presence in the conceptual structures of human thinking. It is metaphors that help structure images and ideas and determine a person's way of thinking.

Problem Statement. Today, English is a dominating intermediary language in the field of science, technology and cross-cultural communications. Despite the considerable meaning of fiction literature as a factor for spiritual development of mankind, modern society has focused on and is rapidly mastering the spheres of business communication, innovative developments, science and technology. Metaphor is a procedural mechanism of cognitive processing of information that modern humans are flooded with in large volumes and at a fast pace. Therefore, the question arises about the nature and peculiarities of the functioning of metaphor in «non-characteristic» genres, which fulfill the cognitive and informative needs of society in the field of science, technology and business and are not intended to exert an aesthetic influence on the readers with the help of artistic images.

The **relevance** of the research is determined by its cognitive perspective, which is consonant with the priority anthropocentric trends of modern linguistics, focused on the study of the English language in the field of scientific, technical and business communication, as well as publicism and journalism.

The **novelty** of the work consists in the comprehensive approach to the analysis of metaphorization processes in marginal genres of scientific discourse that serve the business sphere in such fields as aircraft construction, aerospace technologies, and military affairs.

The **purpose** of the study is to analyze the peculiarities of the functioning of metaphors in the discourse, which is not related to art and fiction and mostly represented by scientific, business and journalistic genres.

To achieve this purpose, a number of specific **tasks** should be solved:

- to analyze and systematize theoretical material in such areas of linguistics as cognitive linguistics and discourse studies
- to systematize the accumulated knowledge about metaphors and metonymies relying upon the principles of cognitive linguistics
- conduct a structural and functional analysis of metaphors and metonyms in the marginal genre of discourse.

The **research material** includes three hundred articles in the weekly journal *Aviation Week and Space Technology*, issues from 2012 to 2022, which are available online. The journal publishes scientific and technical information as well as issues of economics, finance, management and statistics, which are directly related to the fields of aerospace technologies, rocketry, space exploration, aircraft construction, avionics, military engineering and defense systems etc.

Previous research. Metaphors have been studied by the following scientists, including J. Lakoff, M. Johnson, Z. Kövecses, V.M. Teliya, N.D. Arutiunova, A.P. Martyniuk and others.

Materials and Methods. Any sphere of human activity is accompanied by a certain type of discourse, which has specific linguistic features and sets of rules to be followed. In the study of discursive genres, one of the main tasks is to describe the structures most desirable or typical for the respective discourse. Taking into account numerous cognitive and linguistic studies, discourse can be interpreted as a kind of verbal and mental activity determined by the situational context and functioning both in ordinary and professional life of people, the interaction of which takes place through giving semiotic meaning to the units of language and speech (Martyniuk 2011: 12–13). Discourse as a mental-communicative activity appears as a combination of process and result and involves extralinguistic and proper linguistic aspects; the latter focus on the text format, as well as the pragmatic, social and cognitive context that determines the choice of language units and tools (Shevchenko 2004: 37).

The term «scientific discourse» was introduced by P. Bizzell in 1999 to denote the integration of non-scientific and scientific discourse (Barcelona 2002: 7). Scientific discourse is a complex and multi-level type of discourse, which at the text level can be factual (empirical), where certain scientific phenomena and processes are presented and described in the form of a narration, and theoretical, where the presentation of information is based on logical explanation and prediction of scientific phenomena, etc. According to the communicative intention, scientific discourse includes assertions and statements (contributing to the understanding of a certain scientific phenomenon), argumentation (convincing as for a certain scientific position of the author) and prescriptive (motivating to perform certain actions, influence on the behavior of members of the scientific community) (Krotkov 2012: 18). So, the main forms of linguistic verbalization of scientific discourse include argumentation,

explanation, forecasting, qualification and identification of scientific reality.

From the point of view of text organization, scientific discourse is characterized by categorical features of intertextuality and dialogicity. All texts within scientific discourse are retrospectively and prospectively connected with other texts, which together form a scientific discursive space for the interaction of all participants of the discourse.

Regarding the genre classification of scientific discourse, scientists distinguish the **primary** ones that determine the specifics of the discourse (scientific articles, monographs, dissertations, scientific and technical reports, etc.); **secondary** ones, which arise indirectly, on the basis of primary genres (reviews, abstracts, annotations, theses, and textbooks) and **marginal** ones, which are characterized by the features of scientific discourse in combination with other genres or types of discourses (reports, messages, scientific conversations, patents, instructions, lectures, etc.). Marginal genres of scientific discourse are directly related to the professional sphere of a person's activity, and therefore they can combine both the features of the truly scientific discourse and the features of other types, namely business, journalistic ones, and even colloquial style of speech.

The purpose of scientific discourse is the accumulation and transmission of scientific and technical information, disclosure of solutions to scientific problems, and, accordingly, they evoke the interest of the addressees in solving theoretical and applied scientific problems. The authors creating scientific discourse are scientists, researchers, specialists and experts in certain scientific fields, and the addressees can be both other scientists, researchers and specialists with the appropriate level of qualification, scientific status and professional thesaurus, as well as non-professional readers (students, teachers, translators, journalists etc.), who are in some way related to the relevant scientific field, or are interested in the provided information.

The presented research focuses on *Aviation Week and Space Technology* – a weekly journal of the BBC, founded in 1916. The publishing house is located in New York. The journal publishes scientific and technical information and materials on issues of economics, finance, management and statistics, which are directly related to the fields of aerospace technologies, rocketry, space exploration, aircraft construction, avionics, as well as the sphere of national security, military defense etc. The circulation is 107,000 copies (7). The journal has an official site where electronic articles can be retrieved on a paid basis.

The specified weekly journal represents a marginal genre of scientific discourse, which is characterized by a scientific style of speech with elements of business language (numerous names of organizations, documents, etc.) and journalistic styles (numerous tropes and stylistic tools). The language of the journal's articles contains a lot of general scientific and narrow-field terminology, but at the same time it is very rich in stylistic means, required by the nature of the information presentation and the overall purpose of the publications.

The focus of our research is on the functioning of metaphors and metonyms (as a type of metaphors) in the discourse, which provides mass communication to a wide range of readers. Metaphors are a powerful tool for highlighting events in the real world, and also reflect people's attitude to these events. Metaphors give a deeper understanding of the English-speaking societies, particularly in such a specific discursive genre, where science is closely intertwined with business and politics.

G. Lakoff and M. Johnson define metaphors as “understanding and experiencing one kind of thing in terms of another”. Thus, metaphor is a way of conceptualizing reality by interpreting the entities (ideas and things) of a certain domain of human experience in terms of the entities of another domain of experience. Within the cognitive theory of metaphor, initiated by J. Lakoff and his co-authors M. Johnson and M. Turner (Lakoff 1987; Lakoff 1993; Lakoff, Johnson 1980, 1999; Lakoff, Turner 1989; Johnson 1987; Turner 1993, 1994, 1998), whose opinion continues to be supported by other foreign scientists (Croft 2004; Evans 2003; Kövecses 1995, 2000, 2002; Turner, Fauconnier 2000), metaphor is considered to be a cognitive mechanism that ensures the thinking and communicative activity of a person, – «Our ordinary conceptual system, in terms of which we both think and act, is fundamentally metaphorical in nature. « (Lakoff, Johnson 2003: 3).

According to its cognitive mechanism, a metaphor expresses the conceptual structure of one type using the conceptual structure of another type (Lakoff 1999: 5) on the basis of a categorical shift, which occurs due to the attribution of a certain atypical feature to the designated object due to similarity by analogy [Arutiunova 1990: 202, 211).

A conceptual structure (conceptual domain) that is projected onto another structure is called the source domain, and the domain onto which the projection is implemented is called the target domain (Lakoff 1980). System correspondences between the realm of the source and the realm of the target are generally recognized within the conceptual system of the same community (Lakoff 1993).

The metaphor is explained in terms of mapping (mapping) (Kövecses 2002: 6; Lakoff 1993: 210; Lakoff 1980: 71) – a cognitive operation of superimposing conceptual elements of the source domain onto the conceptual elements of the target domain (Kövecses 2002: 6; Lakoff 1980: 245), in the process of which those features of the interpreted phenomenon are “highlighted” which, from the point of view of native speakers, are essential for its understanding (Lakoff 1993: 54).

The conceptual structures involved in the cognitive operation of mapping are described in terms of concepts (Lakoff 1980) and domains organized on the basis of image-bearing schemes that provide restructuring of the target domain according to the principle of the structure of the source domains (Croft 2004) and frames (Mynskyi 1988).

Metaphors allow communicators to understand more abstract or inherently unstructured entities in terms of more concrete and structured ones. Therefore, the main function of a metaphor is to interpret complex mental constructs through sensory perception, which is hard to do otherwise (Martyniuk 2011: 113).

The use of specific concepts to understand more abstract mental entities is explained by the principle of “embodiment” of cognitive structures, according to which human mind, anthropocentric in nature, understands non-objective reality based on its direct sensory experience (Lakoff 1980; Lakoff 1993; Lakoff 1999).

According to established language patterns and conventional perceptions, scientists identify conventional and new or creative metaphors (Lakoff 1980: 211). New / creative metaphors provide “new understanding of our experience”, for example: (1) “A proven CURE for light jet growing PAINS” – about the new improved model of the RS-24 business class jet aircraft from the Swiss company Pilatus. In the given example, a new model of aircraft is metaphorically represented by the word “cure”, while the situation with light jet aircraft is associated with the word “pain”. Regarding the analyzed genre of discourse, creative metaphors are most widely represented in the headings and subheadings of articles. It is common knowledge that English-language headlines use an expressive, “connotation-rich” vocabulary, are often scathing, sarcastic and designed to intrigue the readers. This principle works in the analyzed journal. Conventional metaphors appear to be more numerous in the actual texts of the articles.

Conventional metaphors are extremely common in everyday language. They are aimed mainly at filling nominative conceptual gaps by detailed description

of phenomena. The image constituent of such metaphors is obliterated, which causes them to lose their expressiveness. Conventional metaphors form a person’s conceptual system, based on repeated «systematic correlations between phenomena recorded in our experience» and are perceived as habitual ways of conceptualizing reality, implemented in everyday speech and mental activity. Numerous conventional metaphors in the journal include: (2) «In the 1980s, the Air Force looked at Northrop’s F-20 as a basic air-defense fighter»; (3) “The problem is that oil-producing plants grow slowly, are harvested once a year and compete with food production for land and water”; (4) Remember that fact if, and when, you see Chinese astronauts walking on the Moon, while Americans are still stuck in low-Earth orbit.

According to the nature of the source domain, conventional metaphors are divided into **ontological**, **structural** and **orientational** (Lakoff 1980: 14–61).

Ontological metaphors represent a non-physical object as something comprehensive and tangible. In other words, an ontological metaphor is a type of metaphor (or figurative comparison) in which something concrete is projected onto something abstract. This is a way of «interpreting events, actions, emotions, ideas, etc. as objects and substances» (Lakoff 1980: 58). One of the implementations of the ontological metaphor is personification (Kövecses 2002: 35). Depending on the nature of the source domain (an inanimate object or a living being), the ontological metaphor can be, accordingly, objective (for example, MIND is a MACHINE, IDEAS are OBJECTS [11, p. 283]), biomorphic or zoomorphic (for example, ABSTRACT COMPLEX SYSTEMS are PLANTS (Kövecses 2002: 281), FIRE is a HUNGRY BEAST (Kövecses 2002: 283) and anthropomorphic (for example, TIME is a THIEF (Kövecses 2002: 285). The latter is characterized as basic in the theory of metaphor, since it is the basis for a person’s inherent tools for knowing the objects of the surrounding world through the prism of oneself (Kövecses 2002: 35): (5) “We essentially saw the engine initiate ignition, get up to about 400 psi, and then it encountered a condition it didn’t like, and we think it may have been due to an extended spin start... – in the given example, the ENGINE plays the role of a PERSON who did not cope with certain technical tasks.

Structural metaphors represent an object as consisting of other objects, and use a clearly defined and spatially delineated concept to structure another (Lakoff 1980: 14–61), for example A PURPOSEFUL LIFE is a JOURNEY; DISPUTE is WAR (Kövecses

2002: 33–34; Lakoff 1980: 14) The following structural metaphors can be found in the analyzed journal: (6) *“The latest round in the fight for coveted slots at Tokyo’s Haneda Airport shows that despite Japan Airlines’ (JAL) financial recovery, it is still being haunted by its journey through bankruptcy protection* – the attempt of Japan Airlines to improve their financial position are metaphorically represented through such concepts as FIGHT, RECOVERY and JOURNEY.

At the heart of the orientational metaphor is the experience of spatial orientation of a person in the world, oppositions like below-above (MORE is ABOVE – LESS is BELOW), ahead-behind (FUTURE EVENTS are AHEAD – PAST EVENTS are BEHIND) (Lakoff 1980: 15) etc. For example, (7) *“Shutdown leaves NASA staff out in the cold”*; (8) *Brazil is now the industry’s «hot spot.» says Rob Wilson, president of Honeywell Business and General Aviation*; (9) *FAA officials have spent considerable energy this year warning industry that shrinking resources tied to federal budget cuts would put the squeeze on myriad airworthiness approvals, new product certifications and related tasks that keep aviation going – and innovating*; (10) *Deliveries are projected to rise 17% in 2023 from 2022, returning to 2019 delivery levels much earlier than expected.*

Metaphors are embodied with the help of metaphorical expressions (Lakoff 1999: 43). Any linguistic structure that means a certain class of objects, subjects, etc. and is used to characterize and name another class of objects is considered as a metaphorical expression (Arutiunova 1990: 3). «Superfluous» metaphorical expressions are material for the reconstruction of conceptual elements that are transferred from one level to another. In the vast majority of cases, this is a phrase of different partial linguistic affiliation. For example, the phrase (11) *a wave of innovation and investment in aircraft interiors* conceptualizes INNOVATION as a PHYSICAL PHENOMENON (WAVE), the characteristic property of which is rapid movement; (12) *Improved connectivity will provide the next leap in viewing system status in real time*, where INNOVATIONS are expressed again through the PHENOMENON OF PHYSICS (LEAP), which is characterized by rapid forward movement; (13) *Airlines and MROs are, in fact, jumping on the new technologies, and pushing back the boundaries in documents management*, where INNOVATIONS act as TARGET, etc.

Metaphors of personification are realized by predicates, within the framework of which the denotation of the target domain plays the semantic role of an agent/patient, for example, an engine, an airplane,

a rocket, a company are not living entities, but they are given the characteristics of a person, namely: the ability to move, grow, get old, die (Kövecses 2002: 35): (14) *Today, many mature aircraft are worth more as parts than as a whole*; (15) *Expectations are high for the new Falcon 9 to prove military, commercial-satellite launch capabilities*; (16) *aged but upgraded Kfirs*; (17) *The J-2X engine will not be needed to send humans into lunar orbit..., etc.*

Along with metaphors, metonymies are quite a frequent stylistic phenomenon. Metonymy is a cognitive process in which one conceptual entity, the source, provides mental access to another conceptual entity, the target, within the same domain.

The cognitive theory of metonymy arose on the basis of the cognitive theory of metaphor (Lakoff 1980; Mendoza 2000; Mendoza 2002; Turner 2000). Metonymy is formed similarly to metaphor: the realm of the source is projected onto the realm of the target, with the difference that in metonymy both realms belong to a common sphere of experience (domain), unlike metaphor, where they belong to different domains.

Metonymy consists in the identification of connections between the components of a certain conceptual domain of the source and their projection onto another component of the same conceptual domain (target) through substitution (Barcelona 2002).

The elements of the metonymic relation are referred to as constituents of the conceptosphere (the conceptosphere means a «conceptual field, an integrated area of knowledge» or concepts, domains, matrixes of domains (Croft 2004; Mendoza 2000; Mendoza 2002). Metonymic relations are defined in terms of contiguity and are described by a limited set of concepts. Configurations of these concepts are quite established and represent universal productive models of metonymic transfers: PART instead of WHOLE: (18) *The single engine powering the second stage, meanwhile, fired for seven minutes and 15 seconds, releasing the EROS C-3 satellite into its planned orbit about 15 minutes after liftoff*; MANUFACTURER instead of PRODUCT: (19) *He launched a Falcon*; TOOL instead of USER: (20) *hose-and-droge meaning a tanker*; INSTITUTION instead of RESPONSIBLE PERSONS: (21) *IAI pitches Kfir as fourth-generation fighter at one-third of the price; Alitalia must find fresh funds to remain afloat*; PLACE instead of INSTITUTION: (22) *China is buying into business-aircraft production, but buyers are favoring imports), etc.*

The most widely represented metonymies are of the type INSTITUTION instead of RESPONSIBLE PERSONS, since the analyzed discourse is about

business relations, and therefore every article contains many names of manufacturing companies, airlines, state institutions, committees, commissions, etc.

The systematicity of these models indicates that they are sustainably used in in everyday communication and are easily understood by the addressors and addressees, which contributes to the process of conventionalization of metonymy (Barcelona 2002: 229–231; Lakoff 1980: 37–39).

To conclude, metaphorization is inherent not only in non-fictional discourse, but also in scientific, business and journalistic discourses. The mechanism of metaphor consists in projecting one conceptual structure (the source domain) onto another

structure – the target source. Taking into account the usability in everyday communication, linguists identify conventional and new or creative metaphors. According to the nature of the source domain, conventional metaphors are divided into ontological, structural and orientational ones.

Since the researched weekly journal belongs to several discursive genres, among which scientific and business are the leading ones, it is dominated by conventional metaphors and metonymic expressions. Creative metaphors are less represented in the text of the articles and are more often found in headlines, subheadings and advertising texts that are also present in the journal.

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