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Tetiana Halai,
PhD., Associate Professor at English Language Department,
Ivano-Frankivsk National Technical University of Oil and Gas
https://orcid.org/0000-0003-3370-0727
Ivano-Frankivsk, Ukraine

Yuliia Hrybinyk,
PhD., Associate Professor at English Language Department,
Ivano-Frankivsk National Technical University of Oil and Gas
https://orcid.org/0000-0002-5461-5540
Ivano-Frankivsk, Ukraine

Oksana Tsaruk,
PhD., Associate Professor at English Language Department,
Ivano-Frankivsk National Technical University of Oil and Gas
https://orcid.org/0000-0003-1842-1930
Ivano-Frankivsk, Ukraine

Features of the phenomenon of polysemy and homonymy in the corpus of metaphorical terms in the English professional language of geology

Особливості явищ полісемії та омонімії в корпусі метафоричних термінів англійської фахової мови геології

Summary. *Modern technical terminology, evolving in proportion to the advancement of science and technology, serves as a means of expressing, preserving, and transmitting specialized technical concepts, thus ensuring effective communication among experts. The rapid exploration of the Earth necessitates the intensive development of terminology in the field of geology, which defines the need of the study of terms in this domain. This article attempts to investigate paradigmatic relationships in the corpus of metaphorical terms in the English specialized language of geology. The metaphorical term is interpreted as a term formed through metaphorical transfer of a name from one object to another, from one sphere to another, based on the associative similarity, with all the structural and semantic characteristics of a common term. Research methods are based on the use of general scientific methods of analysis, synthesis, deduction, induction, descriptive methods, as well as the methods of componential, definitional, distributive, and semantic analyses. The material consists of a multitude of metaphorical terms, selected through the method of continuous sampling from the contemporary English geological terminological*

dictionaries. The comprehensive analysis has revealed that lexical and semantic processes of polysemy and homonymy are characteristic of the corpus of metaphorical terms in the English specialized language of geology. The comprehensive analysis of these terms showed that both intra-systemic and inter-systemic polysemy is characteristics for the metaphorical terms under study. We have identified polysemic metaphorical terms having two, three, four, or more meanings. Particular attention is paid to the topic of homonymy. The paper describes and analyzes two primary types of homonymous terms: intra-branch and inter-branch. The research findings affirm that metaphorical terms in the field of geological science can be homonymous within the scope of geology and simultaneously polysemic in relation to other terminological systems. The analysis conducted revealed that this geological terminology includes metaphorical terms that can be polysemic within this scientific field and homonymous regarding the other terminologies.

Key words: *metaphorical term, polysemy, homonymy, professional language, geology.*

Анотація. *Сучасна технічна термінологія, формуючись пропорційно розвитку науки та техніки, є засобом вираження, зберігання і передачі спеціальних технічних понять, запорукою ефективного спілкування між фахівцями. Швидке освоєння нард землі обумовлює інтенсивний розвиток термінології цієї галузі, що визначає потребу дослідження її термінів. Стаття присвячена дослідженню парадигматичних відношень, наявних у корпусі метафоричних термінів англійської фахової мови геології. Метафоричний термін розглянуто як термін, утворений шляхом метафоричного перенесення назви з одного предмета на інший, з однієї сфери в іншу на базі асоціативної схожості, для яких притаманні усі структурно-семантичні особливості звичайного терміна. Дослідження ґрунтується на використанні загальнонаукових методів аналізу, синтезу, дедукції, індукції, описового методу, а також методів компонентного, дефініційного, дистрибутивного та семантичного аналізів. Матеріалом послугувала множина метафоричних термінів, отримана методом суцільної вибірки з сучасних англомовних термінологічних словників геології. Комплексний аналіз показав, що для корпусу метафоричних термінів англійської фахової мови геології характерні лексико-семантичні процеси полісемії та омонімії. Для запропонованого корпусу термінів характерна внутрішньосистемна та міжсистемна полісемія. За кількістю значень виявлено полісемічні метафоричні терміни з двома, трьома, чотирма й більше значеннями. В роботі описано та проаналізовано два основних типи омонімічних термінів: внутрішньогалузеві та міжгалузеві. Результати дослідження засвідчують, що метафоричні терміни англійської фахової мови геології можуть бути омонімічними в межах геології та стосовно інших терміносистем одночасно. Проведений аналіз показав, що даній терміносистемі притаманні метафоричні терміни, які можуть бути полісемічними в межах англійської фахової мови геології та омонімічними відносно інших терміносистем.*

Ключові слова: *метафоричний термін, полісемія, омонімія, фахова мова, геологія.*

Introduction. The advancement of science and technology, and the emergence of new concepts give rise to new terms, and the existing ones acquire new meanings. This evolution leads to potential ambiguity, even within a single system of terminology. An essential process of functioning in the English specialized language of geology involves the continuous development of meanings within its terminology (polysemy), as well as the presence of homonymous units. This is a natural phenomenon in a developing terminological system, that reflects the process of cognition of objective reality, that is constantly changing.

The issue of identifying and linguistically analyzing lexical and semantic relationships, including polysemy and homonymy, is a subject of debate. Evidence of this is the numerous works by both ukrainian and foreign linguists, including O. S. Achmanova, R. I. Dudok, Yu. A. Karpenko, I. S. Kvytko, L. Lipko, O. D. Ohuj and others.

The relevance of this work is determined by the absence of comprehensive studies of the phenomena of polysemy and homonymy within the corpus of metaphorical terms in the English specialized language of geology.

The aim of the study is to investigate the phenomena of polysemy and homonymy within the corpus of metaphorical terms in the English specialized language of geology. The realization of this aim involves the following tasks: to examine and generalize the principles of distinguishing the concepts of homonymy and polysemy; to identify and analyze the main types of polysemic terms and homonymous lexical units within the studied domain.

Methodology/Methods. The sources of the material under study were corresponding specialized online and printed dictionaries and encyclopedic dictionaries. In accordance with the aim of the study, the research methodology is comprehensive. The following methods have been employed: descriptive and comparative method, methods of componential, semantic and distributive analysis.**Results and Discussion.** Polysemantic relations in terminology are internally interrelated meanings of a single terminological unit, that convey the essential features of two or more concepts within a certain field of knowledge and share the same specialized meanings [5, p. 66]. In this regard, O. V. Konstantinova notes that polysemy of terms in the English language reflects the deepening, refinement, and development of specialized knowledge. A polysemic term, by its content, differentiates extremely nuanced understanding of the nature of things, laying the foundation for gradual reevaluation of terminology elements, which is reflected in their semantic structure [4, p. 10]. Among the reasons for the emergence of semantic diversity within terminological systems, the following can be identified: coexistence

of concepts that reflect different perspectives, hypotheses; limitations in the dictionary material in relation to the number of concepts that need to be termed; traditions of the term usage, its semantic and derivational connections; the development of scientific concepts, which leads to gradual changes in the semantic content of individual terms; improper borrowing of lexemes from other languages; extralinguistic factors.

We agree, that unambiguity is not an inherent feature of terminology but rather a requirement imposed upon it. Therefore, it is more of a preference rather than an objectively attainable reality within specialized terminological systems.

It is also worth agreeing with the linguists, who believe that terminological polysemy, as a semasiological process during the development and stabilization of a terminological system, never disappears. It is present at all stages of the development of both common language and specialized domains. However, polysemy is realized otherways in terminology than in common language, where this phenomenon leads to the expansion and enrichment of the vocabulary. Within the specialized terminology, it is not always desirable, as it disrupts the unambiguous correspondence between the referent and the sign that nominates it. Therefore, in terminological systems of many disciplines, it is often easier to find polysemic terms [1, p. 189].

Metaphorical polysemy is manifested in the fact that a metaphorically reinterpreted word can express information of different quality about geological concepts but with a certain common meaning.

The analysis of the semantic structure of the metaphorical terms of the English professional language of geology allows us to distinguish polysemic terms that have several meanings: a) within the geological terminology (intrasystem polysemy); b) within the geological terminology and other fields (intersystem polysemy).

Among all the types of polysemy, the most common is intrasystem polysemy. T. M. Dyachuk states that intrasystem polysemy is the development of secondary terminological meaning based on another. It is characteristic for terms whose meanings simultaneously belong to several logical categories. [2, p. 67]. An example of the this type of polysemy is a geological metaphorical term *active glacier*, which has two meanings in the analysed terminology: 1) «*a glacier that has an accumulation area and ice flowing in it*»; 2) «*a glacier that moves at a relatively high speed in coastal areas at low latitudes, where intensive accumulation and ablation are observed*» (shared semantic core – «ice, glacier»). Another sample is the geological term *roof*: 1) «*rocks located above the ore body*»; 2) «*bedrock surrounding the surface of an intrusive body*» (shared semantic core – «rock»).

Intersystem polysemy involves the existence of different meanings of one term in different branches of science with practically unchanged semantic core but a different set of peripheral semes [7, p. 31]. This happens during the development of a new field of science or technology, when existing terms are used to name new concepts or objects [6, p. 535].

Taking into account the fact that geology is closely intertwined with a number of other sciences, both technical and economic, the corpus of metaphorical terms of the geological terminology is characterised by external polysemy. For instance, the metaphorical term *foot,* with the meaning «*the lower part of a fold*», is typical for geology, while geomorphology uses the same term with the meaning «*the lower part of a slope or rise*». The shared semantic core for both cases is «lower part of the relief». External polysemy is illustrated by the term *active layer*, which in geology is used to refer to «*surface sediments characterized by seasonal changes in volume*», and in permafrost studies it denotes «*the surface layer of soil above the permafrost layer, which freezes every winter and thaws every summer*» (shared semantic core is «surface layer of rock»).

In the English professional language of geology, there are metaphorical terms, united in a group characterized by both internal and external polysemy, that is the same term is used in different scientific and natural sciences and is simultaneously polysemic within geology. A vivid example is the term *marker bed*, that is used in seismology with the meaning «*a layer associated with a specific character of seismic wave reflection over a large area*» and in geology, it represents 1) «*a rock layer clearly and easily identified*»; 2) «*a rock layer, the base of which is used as a* surface reference in the preparation of structural maps in contour line» (shared semantic core – «rock layer»). The term floor with the meaning «the surface of rocks, usually eroded, above which sediments were deposited» in stratigraphy, in geomorphology refers to «the horizontal surface of the soil under the waters of a river, lake or ocean», and in the context of geological terminology, this term is used with two meanings: 1) «the bedrock surrounding the lower surface of an intrusive body»; 2) «the layer of rock directly underlying a coal seam» (shared semantic core – «rock»). This type of polysemy is also brightly illustrated by the term horseback – (glaciology) «*a low rise formed by sand, gravel or rock*»; – (geology) 1) «*a layer of clay shale or sandstone in a coal seam*»; 2) «*a lens-shaped inclusion of another rock* in a coal seam» (shared semantic core – «rock»).

Closely related to polysemy in the professional language of geology is the phenomenon of homonymy, where, unlike polysemy, it is not the meanings of the terms that interact, but rather the same sound (phonetic form) of terms with different meanings.

Metaphorical homonymy is manifested in the fact that metaphorical terms can express the concepts of several completely different spheres of purpose and are characterized by the preservation of the external form and the absence of common semantics. The analysis of dictionary definitions gives grounds to conclude that the group of homonymous metaphorical terms is not numerous. Traditionally, we single out two main types of homonymous terms: cross-disciplinary and intra-disciplinary.

According to L. A. Zakretska, in terminologies of various sciences, cross-disciplinary terminological homonymy is the most common type. In this phenomenon, a term-word seems identical to itself, while the concept-terms are different. This is evident through its involvement in various conceptual connections, leading to inadequate lexical compatibility within separate terminologies [3, p. 27]. Cross-disciplinary homonyms are terms within one field that have been redefined and entered the terminology of another science.

Cross-disciplinary homonymy in the corpus of metaphorical terms of the English language of geology is represented by a small number of examples. In particular, the metaphorical term *eye* in meteorology refers to the concept of «*a circular area of relatively weak wind or good weather in the centre of a tropical cyclone*», in paleontology it indicates «*the ring-shaped part of the hook of a holothurian*», and in geology this term functions with the meaning «*an opening from which water from a spring flows to the earth's surface*». External homonymy is also exemplified by the following metaphorical terms: *toe* – (volcanology) «*a rounded protrusion formed from the edge of moving lava*»; (geology) «*the bottom of a* borehole, the front edge of a shear zone»; bridge – (geology) «a natural bridge formed as a result of erosion»; (speleology) «a remnant of dissolved rock forming a link between cave walls»; (electricity) «a device for comparing resistance».

In contrast to cross-disciplinary homonymy, intra-disciplinary homonymy in the corpus of metaphorical terms involves the reinterpretation of radically different concepts within a single term. An example of intra-disciplinary homonymy is the metaphorical term *bayhead*, which only in the field of geology has two completely different meanings: «*the top of a bay*» and «*a swamp located at the top of a bay*». An interesting sample of internal homonymy is the term *soap rock* – 1) «*steatite*»; 2) «*a metamorphic rock with a massive, shale or fibrous structure*».

A characteristic feature of metaphorical terms is that they can be homonymous within the professional language of geology and with respect to other terminological systems simultaneously. It is worth noting that in some fields these terms are used in their direct meaning, while in geology they are metaphorically reinterpreted. For example,

the geological term *mouth* is homonymous within geology with the following different meanings: 1) «*the place where a river flows into a larger body of water*»; 2) «*a opening that is the entrance to a cave*»; 3) «*the entrance to a bay*». In paleontology though, the term is used in its direct meaning «*the entrance to the digestive tract of an animal*». Other examples of this phenomenon in the English language of geology include the following metaphorical terms: *neck* – (botany) «*the narrowed part of an archegonium*»; (paleontology) «*the narrowed front part of the living chamber in breviconic shells*»; (volcanology) «*a vertical, cylindrical intrusion*»; (geology) 1) «*the narrow part of a fault flow*»; 2) «*a vertical ore body of cylindrical shape*»; «arm» – (geology) 1) a long, narrow inlet of any water body; 2) a tributary; 3) a rocky outcrop that extends laterally from a mountain range; (paleontology) one of several radially arranged appendages that are extensions of ambulacra.

While investigating the metaphorical terms of the analysed language, we came across the terms that can be polysemic within this field and homonymous with respect to other terminological systems. For example, the term *reservoir* is polysemic in geology, denoting 1) «*an underground accumulation of oil or natural gas*»; 2) «*an artificial or natural reservoir*» (common semantic core – «container»). However, it becomes homonymous when denotes «the enlarged back of the throat *of some mobile protists*» in paleontology.

The term sculpture in geology is polysemic, with the common semantic element «relief», encompassing: 1) «a surface form of relief formed by erosion, water, and wind»; 2) «a relief form resulting from its alteration». However, in the realm of paleontology, it becomes homonymous and denotes «well-developed ornamentation on the hard parts of animals».

It should be noted that many homonymous and polysemic metaphorical terms within the geological terminological system are ambiguous in nature. For example, the polysemic term *screw ice* encompasses the following meanings 1) «*small fragments of ice that accumulate in the form of lumps*»; 2) «*a small accumulation of compressed ice*», and the homonymous metaphorical terms *curtain* means 1) «*a thin hanging layer that descends from a cave wall*»; 2) «*a bridge-like formation connecting two adjacent protrusions*».

Less common are three-valued metaphorical terms, for example, polysemic metaphorical terms: *lava dome* – 1) «*a dome-like uplift formed by solidified lava*»; 2) «*a lava bubble formed on a lava flow*»; 3) «*a volcano in the shape of a dome*», or the term *fork* – 1) «*a place where two or more streams merge*»; 2) «*a smaller flow that forms a fork*»; 3) «*an area adjacent to or enclosed within a fork*». Homonymous metaphorical terms are presented with the terms *feeder* – 1) «*a channel through which*

magma is supplied from a magma chamber»; 2) «*open holes or channels in the rock through which ore-bearing solutions or gases can move*»; 3) «*a tributary that feeds a larger tributary or a lake connected to it*».

Metaphorical terms that have four (*vein* – 1) «*epigenetic mineral filling of a plate-shaped fracture in the host rocks*»; 2) «*vein intrusion*»; 3) «*narrow channel in continental ice*»; 4) «*a riverbed in rocks*») or more meanings (*toe* – 1) «*the bottom* of a borehole»; 2) «the lower, curved boundary of displaced shear material»; 3) «the front edge of a sheeted plate»; 4) «the bottom of a slope»; 5) «one of the rounded *protrusions formed by moving lava*») are rare.

Agreeing with the views of L. Lipka and J. Lyons, it is worth noting that polysemy occurs much more frequently in the language than homonymy. This is because, in most cases, polysemy is the result of metaphorical extensions, that is significant for the functioning of a language as a semiotic system. [8, p. 136].

Conclusions. Thus, the corpus of metaphorical terms of the English professional language of geology is characterized by polysemy. The phenomenon of polysemy and homonymy occupies a prominent place within the stydied corpus of metaphorical terms. The analysis of metaphorical terms has shown that the phenomenon of intrasystem homonymy is atypical for the studied terminology. At the same time, a number of terms of the outlined terminological system are homonymous for units from other fields of knowledge and human activity, i.e. inter-domain homonymy has proved to be a characteristic semantic phenomenon for metaphorical terms in geological terminology. Despite the fact that the metaphorical terms are polysemic and homonymous, each of them is united by a common feature, on the basis of which the metaphorical rethinking took place.

As a perspective for further research we see the study of the relationship between the phenomenon of polysemy and homonymy phenomena with other paradigmatic relations within the analyzed terminology, namely: synonymy and antonymy.

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