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ANTONYMICAL RELATIONSHIPS OF GERMAN-SPEAKING TERMINOLOGY IN THE ROBOTICS

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The article is devoted to the research of antonymic relations of terms in the field of robotics in German language on the material of 1670 language units, selected by a continuous selection from 16 scientific and technical professional sources of the field of robotics. The scientific novelty of the study lies in the research itself, as the professional language of this field has been explored at first. The concept of antonymy, its classification and ways of creation were identified. A comparative analysis of the antonymic series at the semantic level was performed.

Antonymy is a special characteristic of the lexical meaning of words, a specific linguistic reflection of differences and contradictions in objects and phenomena of the objective world. Classification of antonyms in a common vocabulary is based on the following criteria: 1) the degree of dependence on the context; 2) the number of units involved in antonymy; 3) by structure; 4) by the way of creation.

Antonymy has a significant place in the German-speaking terminology of robotics. The study identified 16 antonym pairs that use the following types of antonymic relationships to indicate their extreme positions in the terminology under study: complementary antonyms (62,5% antonyms), conversion-antonyms (25% antonyms), and vector antonyms (12,5% antonyms). In all the examples considered, that the opposition is accomplished by varying one of the components of a complex term or terminological combination, and the other components do not change their word-forming structure. The main ways to create German antonyms of robotics include: 1) opposing with the help of paired polar prefixes. In German terminology, the term can be contrasted by using the polar prefixes set in German, namely: ab- / ein, ein- / aus-, ab- / an-, ab- / auf-; 2) opposition by adding a prefix to one of the terms of the opposition as mis-, dis-, de-; 3) opposition by a negative suffix. In contrast to the technical concepts in German, the negative suffix los- can be used; 4) opposition by means of negative particles nicht-, un-; 5) opposition of a pair of constituents within complex terms and terminological combinations. The opposing components within a complex word can be adjectives, nouns (with or without prepositions), adverbs and numerators. Prospects for further studies of the semantic organization of scientific and technical terminology in the field of robotics in German have been determined.

Key words: term, robotics terminology system, complementary antonyms, conversion-antonyms, vector antonyms.

АНТОНИМІЧНІ ВІДНОШЕННЯ НІМЕЦЬКОМОВНОЇ ТЕРМІНОЛОГІЇ В ГАЛУЗІ РОБОТОТЕХНІКИ

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Статтю присвячено дослідженню антонімічних відношень термінів галузі робототехніки німецької мови на матеріалі 1670 мовних одиниць, відібраних шляхом суцільної вибірки з 16 науково-технічних фахових джерел галузі робототехніки. Наукова новизна дослідження полягає в самому дослідженні, адже вперше досліджено фахову мову цієї галузі. Ідентифіковано поняття антонімії, її класифікація, способи творення. Проведено зіставний аналіз антонімічних рядів на семантичному рівні.

Антонімія – особлива характеристика лексичного значення слів, специфічне мовне відображення відмінностей і протиріч у предметах і явищах об’єктивного світу. Класифікація антонімів у загальновоживаній лексиці відбувається за такими критеріями: 1) за ступенем залежності від контексту; 2) за кількістю одиниць, що беруть участь в антонімії; 3) за структурою; 4) за способом творення.

Антонімія займає вагоме місце в німецькомовній термінології робототехніки. У результаті дослідження було виокремлено 16 антонімічних пар, які для позначення своїх крайніх позицій досліджуваної термінології використовують такі типи антонімічних відношень: комплементарні антоніми (62,5% антоніміє), антоніми-конверсиви (25% антоніміє) та векторні антоніми (12,5% антоніміє). В усіх розглянутих

прикладів протиставлення здійснюється шляхом варіювання одного з компонентів складного терміна або термінологічного сполучення, причому інші компоненти не змінюють свою словотворчу структуру. До основних способів творення німецьких антонімів робототехніки належать: 1) протиставлення за допомогою парних полярних префіксів. У німецькій термінології протиставлення термінів може здійснюватися за допомогою використання парних полярних префіксів, усталених у німецькій мові, а саме: *ab-* / *ein*, *ein-* / *aus-*, *ab-* / *an-*, *ab-* / *auf-*; 2) протиставлення за допомогою додавання префікса до одного з термінів опозиції, як *mis-*, *dis-*, *de-*; 3) протиставлення за допомогою заперечного суфікса. Для протиставлення технічних понять у німецькій мові може використовуватись заперечний суфікс *los-*; 4) протиставлення за допомогою заперечних часток *nicht-*, *un-*; 5) протиставлення пари конститuentів у межах складних термінів і термінологічних сполучень. Протиставлені компоненти в межах складного комплексу можуть бути прикметниками, іменниками (з прийменниками або без), прислівниками та числівниками. Визначено перспективи подальших досліджень семантичної організації науково-технічної терміносистеми в галузі робототехніки німецької мови.

Ключові слова: термін, терміносистема робототехніки, комплементарні антоніми, антоніми-конверсиви, векторні антоніми.

1. Introduction

An important type of semantic relationship between lexical units is their opposite, or antonym. Sources from the point of view of human practice of differences in the phenomena and subjects of the objective world at their estimation comprehension are reflected in language as opposition. Thus, according to the linguist L.O. Symonenko antonymy is one of the most respected language universals of the lexicosemantic generation, which is constantly evolving, has no clear boundaries and essentially meant the system of science (Симоненко, 2009). The relationship of opposites, which is reflected in antonyms, is one of the important features of systematic terminology.

Concerning terminological antonyms, different authors express directly opposite opinions. As is well known, linguists distinguish between two opposing views on the nature and place of antonyms in language. Some linguists like L.S. Datsyuk and L.O. Novikov emphasize the lack of antonymy in terminological systems, arguing that “opposite positions of concepts in the system are usually not denoted by words with antonymous meaning, and even the fact that existing and isomorphic relations in individual fragments of terminological systems does not give grounds to talk about antonymy with terms as about their property” (Дацюк, 1989: 9; Новіков, 1973).

The vast majority of terminologists, such as B.N. Golovin, V.P. Danylenko, B.A. Tatarinov, L.O. Symonenko and others (Головін, 1987; Даниленко, 1977; Татарінов, 2006; Симоненко, 2009), argue that antonyms are an integral feature of any language system.

The aim of the study is to investigate the scientific and technical terms of German robotics, which are related by antonymous relations. The objectives of the study are to determine the types of antonyms of German

robotics, their origin. The study is based on the German-speaking terms in the field of robotics (1670 terms), extracted from 16 professional sources.

2. The concept of antonymous relations in linguistic theory

According to researchers, antonymous relations help to determine in detail the place of terms, their interdependence and interaction within the terminology and are based on the opposition of specific properties that do not violate the basic principles of terminology: stylistic neutrality, unambiguity, accuracy. According to V.P. Danylenko in the terminology “concepts are born in pairs” (Даниленко, 1988: 79–80), that is, there are already conditions for the formation of antonymous relations in the very nature of scientific terms.

Recently, most linguists turn to the universal classification according to the following criteria: 1) the degree of dependence on the context; 2) by the number of units participating in the antonymy; 3) by structure; 4) by the method of creation. According to the degree of dependence on the context of I.N. Pozdnysheva distinguishes between contextual and linguistic antonyms (Позднишева, 2007). D.A. Cruse distinguishes two types of antonyms: counter and contradictory (Cruse, 2002). V.A. Tatarinov distinguishes an additional class of antonyms: convertible antonyms. The essence of contrasting antonymy is that opposite concepts contradict each other, but can not exhaust the whole genus (Татарінов, 2006: 17). Contrasting antonyms express a qualitative opposition. Between them, as a rule, there is a term with an intermediate value, for example: *die Vorderachse – die Mittelachse – die Hinterachse* (front axle – middle (central) axle – rear (back) axle). In this case *Die Mittelachse* is an average member of the opposition. It should be noted that the opposition of these terms is realized through the use of certain prefixes,



which are in antonymous terms: **vorder** – **hinter**. To the simplest category of antonyms V.A. Tatarinov counts contradictory antonyms. The opposition in this case is based on the presence or absence of a certain property or feature (Татарінов, 2006: 16–17). The phenomenon of antonymy is evidenced by the following examples of German terms of robotics: a description of the presence or absence of a gearbox – *der Pneumatikmotor mit/ohne Getriebe* (pneumatic engine with / without gearbox). In this example, the main role is played by opposite in content prepositions – **mit** / **ohne**, which indicate the presence / absence of something (Татарінов, 2006: 19). Convertible antonyms express opposition on the basis of oppositely directed properties (Татарінов, 2006: 17), for example: *longitudinal – transverse, upper – lower, front – rear, outer – inner, left – right*, etc. The German language is dominated by the conversion type of antonyms: *die Rückwand – die Stirnwand; Lenkrad links – Lenkrad rechts, Seitenwand links – Seitenwand rechts; der Längsträger – der Querträger; der Einlasskrümmer – der Auslasskrümmer*, etc. A significant part of antonyms in the terminology of robotics in the German language is formed with the help of antonymous word-forming means – prepositions, prefixes: *die Ausführungszone – die Einführungszone; die Vorderachsaufhängung – die Hinterachsaufhängung* (Татарінов, 2006). L.A. Novikov proposes the following classification of antonyms: *contradictory correlates* – opposites that mutually complement each other, without transitional links; they are in relation to the private opposition. For example: *normal battery discharge – an abnormal battery discharge*. *Contra correlates* are antonyms that express polar opposites within one entity in the presence of transitional links, ie internal gradation. Such antonyms are in relation to the gradual opposition. For example: *monoplane – biplane – triplane*. *Vector correlates* are antonyms that express different directions of actions, signs, and social phenomena. For example: *opening valves – closing valves*. *Conversives* are words that describe the same situation from the point of view of dif-

ferent participants. For example: *sell – buy; to win – to lose*. Pragmatic antonyms are words that are regularly contrasted in the practice of their use, in contexts. Pragmatic antonyms (words that have become antonyms through private figurative use in language) and quasi-antonyms ("approximate" antonyms, not entirely accurate in terms of component composition and interpretation, or for other reasons) are not often used in robotics terminology. This is due to the fact that terms are exact lexical units, which are characterized by an approximate or inaccurate meaning (Новіков, 1973).

The effectiveness of linguistic research is always more tangible if the analysis is conducted on linguistic material, united by any commonality, identity, because only against the background of identity can be traced the differences of individual words. Apparently, such a "community", ie a group of words, which is based on the most generalized, abstract meaning, is the part of language that serves as a basis for a systematic description of the semantics of the lexical structure of language. The study confirms that there are specific features of antonyms depending on their belonging to different parts of speech, and therefore on their meaning, functions, word-formation capabilities. The originality of the antonymy of different parts of speech, its richness or poverty, as well as its nature, depend on the originality of a number of factors that characterize the words in each part of speech. One of such important factors that determine the originality of the antonym in the adjective is its word-forming capabilities. Obviously, the word-forming patterns inherent in antonyms in one part of speech, which will not be inherent in the same phenomenon in another.

3. Types of antonymous relations, bases of typology of antonyms of German terminology of robotics

During the study and analysis of the terms of robotics in the German language, 16 antonymous pairs were identified (Петренко, 2019), which to denote extreme positions in the terminology of robotics use the following types of antonymous relations: (see Table 1):

Table 1

Antonymous relations of robotics terminology in German

№	Types of antonyms	Number	% all antonyms	Examples
1	Complementary antonyms	10	62,5 %	die Abwärtsbewegung – die Aufwärtsbewegung
2	Convertible antonyms	4	25 %	der Roboter-exporteur – der Roboter-importeur
3	Vector antonyms	2	12,5 %	die Eingabe – die Ausgabe
	Total	16	100 %	

1) **complementary antonyms**, are 62,5% and have the largest number of units of German robotics, for example: *die Abwärtsbewegung* – downward movement, *die Aufwärtsbewegung* – upward movement; *die Einführungszone* – zone of introduction, introduction, installation, *die Ausführungszone* – execution area, *RMS* (remote manipulatorsystem), *LMS* (lokal manipulatorsystem);

2) **convertible antonyms** (25% of antonyms), describing an identical situation in which participants with opposite functions are involved. The conversion is evidenced by the following examples: *indirekte Programmierung* – indirect programming, *direkte Programmierung* – direct programming; *der Roboter-exporteur* – robot exporter, *der Roboter-importeur* – robot importer; *externe Sensoren* – ambient sensors, external, *interne Sensoren* – internal sensors;

3) **vector antonyms** (12,5% of antonyms) – express the opposite in terms of actions, properties, features. However, this type of antonyms is not widely used, for example: *die Eingabe* – introduction, power supply, *die Ausgabe* – output; *basic input system*, *basic output system*; *die Roboterhardware* – robot equipment, *die Robotersoftware* – robot software.

The main ways of creating German antonyms of robotics are (Петренко, 2019):

1) opposition by means of paired polar prefixes. In German terminology, the opposition of terms can be done through the use of paired polar prefixes established in the German language, namely: **ab-** / **ein**, **ein-** / **aus-**, **ab-** / **an-**, **ab-** / **auf-**: *die Abwärtsbewegung* – *die Aufwärtsbewegung*, *die Einführungszone* – *die Ausführungszone*;

2) opposition by adding a prefix to one of the opposition terms like **mis-**, **dis-**, **de-**, example: *Zentrales Prozessleitsystem* – *Dezentrales Prozessleitsystem*;

3) opposition with a negative suffix. A negative suffix can be used to contrast technical concepts in German **los-**, example: *kolbenstangenloser Zylinder* – *kolbenstangener Zylinder*;

4) opposition by means of negative particles **nicht-**, **un-**, example: *der Ordnungsgrad* – *der Unordnungsgrad*, *die Freiheit* – *die Unfreiheit*;

5) contrasting a pair of constituents within complex terms and terminological combinations. Opposite components within a complex can be adjectives, nouns (with or without prepositions), adverbs and numerals, for example: *der Roboter-exporteur* – *der Roboter-importeur*; *externe Sensoren* – *interne Sensoren*.

It should be noted that antonym components do not always express the opposite of terminological concepts in complex terms. Example: *die Roboterhardware* – robot equipment, *die Robotersoftware* – robot software. Qualitative adjectives «hard» and «soft», form an antonym separately from the term, but do not have the opposite meaning in a complex term or phrase.

4. Conclusions

Thus, the analysis of antonymy in the German language of the studied terminology allows us to draw the following conclusions. In the philological literature there is no single concept for the interpretation of the concept of “antonyms”, their classification and systematization, but in general we can distinguish two areas in the study of antonyms: applied and linguistic study of robotics in modern German, which suggests that antonyms is inherent in the studied terminology and is its most important system-formal category. In all the considered examples, the opposition is carried out by varying one of the components of a complex term or terminological phrase, and the other components do not change their word-forming structure. The results of the study indicate the need for further research in terminology in the field of robotics. Since the terminology system for robotics is open and dynamic, the process of its formation continues and is characterized by continuous enrichment. New terms and phenomena need a detailed analysis, which will be the subject of our further research.

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