

FUNCTIONING OF BASIC PHYSICAL TERMS IN THE SCIENTIFIC ENGLISH TEXTS

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Abstract. This article is devoted to the study of several basic physical terms, namely, their functioning in scientific English-language texts. Physical terminology, as part of the common vocabulary, is not isolated from the laws of its development and functioning. The authors have analyzed physical synonymous terms and established that there are the same lexical-semantic processes in the analyzed terminology, that language has in general (polysemy, synonymy), but taking into account the specific features of the implementation of these processes. It was noted that the language of modern science, including physics, is English and all important results are published and reported in English, although the discoveries are made by representatives of different nationalities. Accordingly, English is the international language and its function is the transcultural transmission of knowledge. Based on relevant and accurate examples, authors suggested that the choice of synonymous variants in the English-language scientific articles due to several factors. Impact on accurate interpretation of scientific knowledge is decisive in the choice of words.

Key words: linguistics, English language, text, translation, vocabulary, word, term, physics.

1. INTRODUCTION

As a result of global processes of the XXI century the world community, including the scientific, is becoming more integrated. Large scale globalization in all spheres of scientific knowledge provides opportunities not only to exchange experience and ideas, but also gives a professional engagement that is truly international in nature. In the language processes of this kind are especially clearly seen on the lexical level, this fact is referred in works of Kazan linguists, for example, L.R. Sakaeva (2012), D.R. Sabirova (2015), A.M. Mubarakshina (2016), A.A. Abdrakhmanova (2015), A.R. Baranova (2016) and others. Expansion of foreign companies in the Russian market requires graduates to have a good language level; this fact has increased the need of youth in the knowledge of foreign languages. Business and science experts have begun to use actively a foreign language for receiving and transmitting, in particular the technical information as part of the process of globalization. This process also applies to the scientific sphere. In particular, physics as a science is increasingly penetrating into everyday life, more and more embedded in traditionally distant from its field. It is well known that the most important aspect of physics is its terminology, so the knowledge of specific functioning of terms in authentic English texts can help to interpret adequately scientific information not only to specialists in the field of the exact Sciences but also the Humanities. This fact determined the aim of our study to examine the specificity of functioning of the most common physical terms in the English-speaking academic sources.

2. METHODS

To describe the system of special signs and symbols the following terms are used: languages for specific purposes (Language for Specific Purposes, LSP), a metalanguage, special vocabulary and terminology. The term "languages for special purposes" was borrowed from English-speaking authors that developed this concept: P. Robinson, J.M. Swales (1971), T. Hutchinson, A. Waters (1978), K. Hyland (1999). One of the kinds of languages for special purposes is a metalanguage, which means "language, by means of which the description and subsequent investigation of the properties of another language is revealed and which is the object of research for the first one" (Komarova, p.709). Special vocabulary includes terms and professionalisms. A

special vocabulary has a number of specific features that are directly related to the purpose of languages for specific purposes: to assign a language tool in professional communication. Therefore, the difference between the special language and literature is their function. To determine the specificity of functioning of basic physical synonymous terms, the following methods were used: method of continuous sampling, the method of component analysis, method of semantic analysis, static method of quantitative characteristics.

3. RESULTS

The term "speed" refers to a vector physical quantity that characterizes the speed of movement and the direction of motion of a material point in the selected reference system. When the researcher wants to tell only about the speed of displacement of a material point without regard to the direction of motion, we use the term module speed, however in common parlance the word "speed" is used in both cases, a similar situation is observed in English, where the term has two variants: speed and velocity. The word "speed" denotes a scalar value, that is, the module of the velocity, "velocity" – vector, i.e. the velocity vector. As the author of "Difference between velocity and speed" writes on the website www.differencebetween.net (date of access 15.05.2017): "Velocity and speed are often incorrectly used interchangeably. For a layman, this doesn't pose too much of a problem as the two words have very similar applications. However, when one enters the world of physics, the differences between velocity and speed become very important indeed. *Speed is a scalar quantity.* This means that the magnitude, or strength, of the quantity is being measured. Speed only cares about how fast you are going, not where you are going. *Velocity is a vector quantity.* This means that the magnitude is still being measured, just like it was for speed, but the direction is also being measured. Velocity cares about both where and how fast you are going".

Thus, according to the website www.corpus.byu.edu the term *velocity* is used more frequently than *speed* (7382 vs 897 matches among all entries):

Since charged particles rarely travel close to the speed of light we may conclude that the magnetic forces are by orders of magnitude smaller than the electric forces.

Wind **velocity** and force are both local vectors, i.e. vector measured at a given point in space.

This phenomenon may be due to the fact that the word speed is used to denote vector and scalar quantities, besides, it is much more common. If we turn to the book “Fundamentals of Physics” authored by Jearl Walker Robert Resnick (2011, p. 14–18), we can see that the term *velocity* is used more often because in the context it is meant a vector quantity, the term *speed* is used only to refer to the modulus of the average speed and instantaneous speed module.

A similar situation is observed with the term *beam* (e.g. beam of light), which also has another variant in English – *ray*. Term *ray* refers to the line along which the light energy is transferred, is applicable only to rays of light. Is a model that simplifies the study of the speed of light through optical devices and the study of such phenomena as diffraction, dispersion and interference. The term *beam* refers to the projection of moving particles or waves; it is used not only in optics but also in other areas of physics. If the beam referred to as *beam*, then it becomes applicable to concepts such as wavelength, amplitude and phase of the wave, the thickness of the beam (which is not applicable to the term *ray*).

A bit more complicated things with the use of the term motion, which has two close equivalents in English: movement and motion. Based on the article “The difference between the driving conditions and traffic” on the website *www.arj.no* as well as article “Movement” on the website *www.slideshare.net* (date of access 15.05.2017) we came to the conclusion that the word *movement* denotes change of position in the selected reference frame and the *motion* – change of position over time in the selected reference system. The first word is more often used in everyday speech, the second – in the popular scientific and scientific articles, especially in physics. According to the site *www.corpus.byu.edu* (date of access 15.05.2017) the term *movement* is used more often than the *motion* (3153 against 956 matches) among the articles in the ACADEMIC section; it is not surprising, because the term *motion* applies in mechanics mostly, which examines the movement over time, and the word *movement* is more commonly used, for example:

*The nature of the **movement** of particles by the wind in deserts has been closely investigated by Bangold (1941).*

*The book by Nowacki (1975) gives a very thorough account of thermoelastic effects which become important at high frequencies, as in wave **motion**.*

4. DISCUSSION

According to A. Einstein and L. Infeld, "the reality created by modern physics, of course, far removed from the reality of the old days" (Einstein, p. 241). Obtaining a single consistent physical theory about the world is possible only through correct interpretation of the language and only with a clear idea about the structure of consciousness. Thus, examining the most common physical terms and their usage in English scientific texts, we can say that the physical terminology, as part of the common vocabulary, is not isolated from the laws of the development and functioning of the common vocabulary. The analysis illustrates the lexical–semantic processes in the analyzed terminology that characterize language in General (polysemy, synonymy), but with the specific features of these processes.

5. SUMMARY

The frequency of use of physical terms according to the website "British national corpus" is shown in the Table 1:

Table 1: Frequency of use of physical terms

<i>velocity</i>	7382	<i>speed</i>	897
<i>beam</i>	4276	<i>ray</i>	913
<i>movement</i>	3153	<i>motion</i>	956

Comparing the examples and the specificity of the use of basic physical terms, we can assume that the choice of those or other synonymous variants in the English-language scientific articles is based on several factors:

- Connotation of the lexical meaning, which affects interpretation of scientific information;
- The preferential use of one term by reputable scientists, leading to less frequent use of the other; the choice does not affect the interpretation of the information;

• In order to avoid lexical repetitions when writing articles, when the choice does not affect the interpretation of the information.

6. CONCLUSIONS

Physical Sciences are of great importance for the development of society through practical application of scientific developments, and theoretical explanation of phenomena in the actual world and beyond. It should be noted that the issue of international harmonization of physical terminology today is very serious. The language of modern science, including physics, is English, and all important results are published and reported in English. But "discoveries were made and almost are still made simultaneously by the Japanese, Germans, Americans, British, Swiss and other nationalities" (Ivanova, p. 21). Therefore, English serves as a lingua Franca and the function of the transcultural transmission of knowledge. Therefore, one cannot ignore the fact that the physical terms are products of not only physics, but also of linguistics, and to take into account the features of their choice and using in scientific texts.

The practical significance of this work lies in the use of selected material in the study of physics in English secondary schools, and also in compiling an English-Russian dictionary of the physical terms.

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