Ways of Vocabulary Enlargementin the English Sublanguage of Physics[1]

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Abstract

Improvements and changes in all the fields of today's world civilization lead to making new discoveries, developing new technologies and products that have a great impact on the human mind, contribute to development of languages which reflect all the new phenomena and serve for fixing and transferring the just appeared knowledge. As a result, there appear so-called specialized vocabulary (terms) in all the fields of science, particularly in such physics fields as medical physics, physics of perspective materials, distributed intellectual systems, quantum devices and radio photonics, and others, the central part of which being terminology. Some part of the vocabulary contributes to enlarging of common language lexical units' number as well. Emergence of such a large number of vocabularies requires their being regulated and ordered as there appear many versions of their writing and necessity of defining common scientific principles of their formation. The relevance of all the ideas mentioned above defines the purpose of the article, which is to consider the ways of forming professional lexical units in different fields of physics from the point of view of their structure and semantics and their influence on the increase of common language vocabulary. The article outlines the opportunities of how to define the ways of word forming as well as its models in multi-field physics. The leading approaches to the study are methods of structural, contextual, word forming analysis, descriptive method, comparison and generalization of word forming ways in multi-field physics, models of these ways, the development of criteria for determining the direction of derivation and the corresponding methodology for analyzing word-formation relationships for substantivation. The results of the research conducted can be used in higher school practice of English lexicology courses, as well as in making dictionaries on language for special purposes in multi-physics fields. The results also showed a sharp increase of special terms the number of which even exceeds the common vocabulary number due to two main ways: substantivation and conversion.

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Considered is compounding and eponym terms' contribution to enlargement of physics fields' vocabulary as well.

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1. Introduction

Rapid development of the entire scientific world, particularly multi-field physics, causes emergence of great amount of specialized words. Interpenetration of various sciences contributes to increasing of commonly used vocabulary in its number as well. Massive penetration of lexical units into both terms and commonly used vocabulary necessitates their regulation and streamlining, since unsystematic nature results in emergence of many versions of writing of these lexical units as well as necessity of defining common scientific principles of their formation. This phenomenon makes it difficult, and sometimes even impossible, to use the lexical units in a professional communication environment properly. There is also no common interpretation among researchers of the process of mutual transition of specialized and commonly used lexical units, description and analysis of the mechanism of this phenomenon. Grinev (2000) argues that "the growth in the number of terms of various sciences is ahead of the growth in the number of commonly used words in a language, and therefore at present the number of terms in individual sciences exceeds the number of commonly used words" (p.3). This phenomenon proves the importance of the role of information in life, which is possible, of course, due to the involvement of the "information explosion" in positive changes in the language (Whorf, 1956, p.94). Considering all this, the aim of the research is to define ways of formation of terms in different fields of physics, transition of terms into the common language vocabulary causing its enlargement in number. Special attention is to be paid to mono-semantic and poly semantic groups of terms as well as to words or names derived from the name of a person. The study of scientific and theoretical literature allows us to state that the issues considered in this research have been studied, but not completely, for example, the issue whether conversion and substantivation are two identical or quiet different ways of word formation or one of them is a part of the other one. It is also disputable whether eponym terms are terms or common vocabulary lexical units. Not completely clear is the question of the influence of specialized lexical units on the literary language as well. This can be explained by the fact that language is always a mobile and a changeable phenomenon. It is like a living organism is influenced by both external and internal factors, is constantly evolving; some lexical units appear and undergo some changes, others disappear. The results of the study can contribute to integrating the results of the linguistic analysis into the educational process in order to promote the development of students' language competencies (Bekimbetova & Danilova, 2015; Bobyreva & Latypov, 2015; Wyrasti, et al., 2019) as well as to promoting some linguistic issues.

2. Methods

The research is based on the scientific works of such scientists as I.V. Arnold, A.I. Smirnitsky, L.A. Kapanadze, O.S. Akhmanova, G.K. Arthur, A.Yu. Bagiyan, A.V. Superanskaya and others. To conduct the research, we dealt with methods of structural, contextual, word forming analysis, descriptive and comparison method, method of observing and collation, the main ones being comparison and collation methods. These main methods were used to compare and collate terms and words of common use. In the study of a subject of vocabulary enlargement in multi-field physics doctrines in various fields of linguistics such as word formation, determinalization, lexicology (A.I. Smirnitsky; I.V. Arnold, L.S. Gadimova; O.D. Meshkov; R.S. Ginsburg; O.S. Akhmanova; A.Yu. Bagiyan; A.V. Superanskaya; G.K Arthur; O'Grady, W.; Guzman, V.; Archibald, J.; Aronoff, M.; Rees-Miller, J., etc.) were used. The method of observation was used for getting information on transition of physics field terms to the commonly-used stratum. In the frame of the research due to this method we can also find out the terms which exist in the physics sphere only.

3. Results

According to the research, the ways of word building in multi-field physics can be defined as conversion, affixation, compounding, shortening, and from-name formations. One more way of word building in the field mentioned should be considered to be substantivation which is not accepted by all the researchers. Meanwhile, substantivation is defined as transition of words to a noun group from other parts of speech due to the ability to point to the subject, not to its sign and so on (Quine, 1960, c. 451) *(to act – an act)*. Some researchers define substantivation as morphology syntax way of word formation (Harris, 1988, c. 287). The majority of all the substantivated parts of speech are represented by adjectives and participles.

Substantivation occurs mainly as the process of transition of lexical units into the category of nouns from another part of speech, mainly from adjectives and verbs, due to the acquired ability to directly indicate the subject (and not only through its sign) on the base of morphological and syntactic word-formation types. (Goatly, 2007, p. 460). Analysis of the process of substantivation resulted in development of criteria for determination of the direction of production and the corresponding methodology for analyzing word-formation relationships. Under the productivity understood is the primacy of the lexical units of one part of speech and the secondary production of lexical units of another part of speech. Distinguished are such criteria as semantic, synonymic, frequency and derivational one. With the semantic criterion for the determination of the derivative during substantivation it is necessary to analyze the type of semantic links between the analyzed words. The capacity of a

noun in relation to parts of speech can be determined from the analysis of semantic links in a pair of words, for example, *permit - permittivity, transform - transformer*. The internal production of a noun in relation to parts of speech is determined by the establishment of semantic relations between the verb and the verbal noun, noun and noun, adjective and noun: action is the process of action *(scan - scanning, normalize - normalizing)*, action is the person or object *(keep - keeper, accept – acceptor)*, noun - noun *(capacity - capacitance, bunch - bunching)*, adjective - noun *(audible - audibility, frequent - frequency)*. Compared with other criteria, the derivational criterion is the most formal (Varlamova et al., 2016). Words that relate to the principle of transition from one part of speech to another one exist in the system of word-formation relations. These relationships link the words of a common root into certain structural-semantic unity, called word-formation nests. The result of substantivation is the creation of a lexical unit homonymous with the source: *to capture - a capture*. In this case substantivation is defined as a method of word formation in which new professional lexical units arise without changing the basic form of the original word, i.e. without adding or changing the basic form of the original lexical unit. No morphemes are added or changed; they are included in the new paradigm, get new syntactic and semantic functions, compatibility and new lexical and grammatical meaning: *to relay - a relay, to capture - a capture, to shield - a shield*. The basic form of a lexical unit is here understood by the word form in which the concept denoted by this lexical unit is expressed in the most abstracted form in relation to the particular one. For verbs, the main form is the infinitive form, for nouns it is the form of the common case (Arnold, 1959, p. 129). Some researchers define substantivation as a type of conversion; others consider these two concepts to be completely different or identical processes. We consider that both conversion and substantivation to be different word building ways. If substantivation is the result of transition of words from many parts of speech to only noun, conversion may take place in transition of different parts of speech to different ones (noun to verb, verb to noun, adjective to noun, etc.). At present noun-to-verb form is the main process of word formation. On the other hand, conversion is the phenomenon relating to language transition. Both of the ways are morphological and syntactic word-formation types, not only substantivation but any kind of transposition being considered as conversion. So, “conversion” can be defined as a synonym of “transposition”. When speaking on the synonymic criterion we consider the synonymic series that includes this lexical unit, then by structural simplicity or complexity of synonyms, we can speak about the internal simplicity or productivity of the lexical unit. In the pair *to capture* (verb) - *a capture* (noun) the noun is simple, since its synonyms *catch, seize* are structurally simple. Thus, the synonymic criterion is based on the assumption that lexical units with a simple structure have the internal simplicity of root lexical units, since relationships between words cannot be compared, for example, *to capture* (verb) - *a capture* (noun) and *catch* synonyms, *seize* in verb and noun forms, since there is no noun form in the verb *seize*, and in the pair *to catch - a catch* structure is simple. One

more criterion is the frequency criterion. It is not widespread. The more structurally complex formation is, the less frequent it is. Take, for example, the lexical unit *ionizer*, which is structurally more complex than the verb *to ionize* and less frequent. The aim is to compare the frequency of using the correlative values of a pair of lexical units. If the lexical unit is more frequent in use, then this indicates the primacy of the base, if the frequency is lower, this means a low frequency of use of the lexical unit, that is, its low frequency or efficiency. The analysis shows that the verb *capture* is the primary, and the verbs *relay and shield* are secondary (the analysis was performed using the dictionary The OO English Dictionary (International Phonetic Alphabet) P.O. Box 26300. ColoradoSprings, CO 80936. 1992 (Bagdasarova, 2017; Jenaabadi, & Shad, (2013). The primary is the member of the pair, which has a high frequency of use in the dictionary. And another member of the pair will be considered a derivative. So, for determining the direction of production in the linguistic literature, such criteria as semantic, derivational, synonymous and frequency are derived, the most common of which being semantic one.

Conversion, according to some researchers, takes place only in the sphere of nouns and verbs, and it is a one-time act of creating a new word. Conversion is an extremely productive means of enriching vocabulary with new lexical units (Bagdasarova, 2017, p. 90-92) as it has a wider prevalence especially in the English language. This phenomenon can be explained by the coincidence of the sound form of nouns and verbs as a result of the loss of endings, as well as borrowings from the French language (Coetzee, 1992, p. 12). Conversion is considered as non-affixing formation of lexical units of one part of speech, accompanied by a semantic shift. So a new lexical unit homonymous with the original one appears (*couple n., couple v.; delay n., delay v.*). Verbs converted from nouns may denote action characteristic of the object *(scale – to scale, shadow – to shadow)*; instrumental use of the object *(scan – to scan)*; acquisition or addition of the object; deprivation of the subject. Nouns converted from verbs usually denote instance of the action (*break-up*); agent of the action; place of the action; object or result of the action (*buried*).

Eponym terms considered in the research make up a large group of lexical units defined as one-, two- and three component ones (*volt, fermion; Aharonov-Bohm effect, Bose-Einstein condensation; Gerasimov-Drell-Hearn sum rule (GDH sum rule), Hohenberg-Kohn-Sham formalism, Rayleigh-Gans-Debye formula*). In English terminology some eponym terms are usually truncated (*Hohenberg-Kohn-Sham formalism - Kohn-Sham formalism, Landau-Lifshitz-Bloch equation - Landau-Lifshitz equation*). This is due to time economizing principle.

Compounding. One of the main productive words forming ways is considered to be compounding which makes a large group of vocabulary. These are lexical units consisting of mainly two stems occurring in the language. They are usually combined into a single word or written as two words joined with a hyphen. They are free forms with structural cohesion. This enables them to function in a

sentence as a separate lexical unit (*kilowatt, thin-film, electron-binding,* picowatt, single-photon, lightguide*, waveguide*). There may be three stem lexical units as well, the number of which is not big though (*root-mean-square, ultra-low-expansion*). There may be noun-noun (*desk-top, space-time,* electron-electron), noun-adjective (*light-induced, laser-induced, fiber-optic),* adjective-noun (*one-channel, solid-state, high-speed,* wide-angle), adjective-verb, verb-adjective (*cross-polarized*), verb-preposition (close-up), adjective-preposition (*as-grown*), preposition-adjective (off-diagonal), adjective-adverb (*single-frequency*), noun-participle (*light-emitting*), noun-preposition-noun (line-of-sight) compounds. Compounds are divided into two groups: compositional and noncompositional. Compositional compounds' meanings are based on the ones of the constituents while noncompositional compounds' meanings are different from those ones' of their parts *(wavelength-division), step-and-repeat).*

Shortening. This way of word formation is due to shortening or reducing a word without changing its meaning. Reductions may mainly be produced by initial letters only or by the beginning of the full form of the word (*alternating current – AC, alternating current neutral - ACN, analog digital microprocessor – ADM, battery – BAT, circuit diagram – CD, direct current – DC, low voltage power supply – LVPS, AFM - atomic-force microscope*).

Affixation. The word-formation method of affixation forms various lexical units in multi-field physics (*resist* (verb), *resistance* (noun), *resistible* (adjective), *resistant* (adjective), *resister* (noun)). During conversion, the change does not take place in the form of a lexical unit, but in its functions, therefore A.I. Smirnitsky determines conversion as the morphological method of word formation. Lexical units formed by conversion have the same base. For example, the basis of the lexical unit *act-*, which is a verb, in this case coincides with the noun root *act-*. These two semantically different lexical units are distinguished by the system of their forms - the paradigm. The noun *act-* has the substantive system of infusive suffixes *–'s, –s, s '*, the verb *act-* has the verb system of inflective suffixes *–s, –ed, –ing*. This distinguishes them as different lexical units, formed through a paradigm change.

Transition of terms to common language group. One of the main channels of penetration of professional specialized lexical units into the commonly used lexical structure is the use of this vocabulary in the media, scientific and technical forums, conferences, symposia, during various meetings of representatives of different fields, not only physics, etc. which contributes to the "propaganda" of this vocabulary and its gradual assimilation by the broad masses of people. "It is thanks to the wide dissemination of scientific and technical knowledge ... the frequent use of terms in newspaper texts, on radio and television contributes, on the one hand, to their gradual assimilation by wide readership, and on the other hand, the professional lexeme turns into a word for specialists into "words for all" (Goatly, 2000, p. 89). Transition of professional lexical units occurs in stages. Identified are two stages of this transition:

determinilization and despecialization. The basis of the process of despecialization and determinilization is the use of professional lexical units in non-special literature, including fiction. At the same time, the term may influence the context by putting forward a functional-stylistic coloring against the background of an inappropriate context. The context may also affect the term and contribute to the appearance of additional connotation meanings in the term.

4. Discussion

Researcher Smirnitsky F.I. in his works disagrees with the semantic interpretation of the concept "conversion", according to which conversion is "a change in the meaning of a lexical unit". The researcher also does not accept the syntactic interpretation of the concept under consideration, which considers conversion "a change in the syntactic function of a lexical unit". The researcher did not take into account the factor that lexical units refer to certain grammatical types not only in accordance with the system of their forms, but also depending on their grammatical connections with other lexical units. The mistake was in the opinion that one paradigm is enough for the grammatical design of a lexical unit. Another linguist Arnold I.V. subjects this interpretation to criticism, considering it unacceptable (Arnold, 1986, p. 157). If we analyze the lexical units: *acts, acts*, we can determine that both of them can belong to one of two paradigms: *act, acts, acted, acting* (verb) and *act, acts* (noun). They may have one meaning or another. Even the ending *–s* in the form of *acts* misleads us in defining the meaning, since there are lexical units with such an ending in both paradigms. It should be added that each of these lexical units is used in the language without any additional morphological indicators. Consequently, many researchers believe that not only morphological, but also syntactic factors, word order, changes in values, various associations and relationships with rows of already existing lexical units act in conversion. According to syntactic approach conversion is a functional shift. American and English researchers consider conversion to be the formation of a lexical unit of one part of speech from the word of another part of speech. However, they argue that the lexical units in modern English can simultaneously perform the functions of different parts of speech. This interpretation may mean that in English there is no division into different grammatical categories of lexical units, since the same lexical unit cannot simultaneously refer to different parts of speech (Ginsburg, 1979; Zhluktenko, 1958). Transition of professional lexical units into the common usage occurs in stages by specialization and determinism. Analysis of the studied lexical units showed a shift in the values of these units during the transition to the commonly used language. The results of the study confirm that the terminological lexical unit of the sphere of physics becomes common after going beyond the narrow terminological usage with a variety of functional uses. These terms have both a direct meaning and a figurative

meaning, which create additional images for objects, actions, etc., expand their semantic scope and form a non-terminological meaning.

5. Summary

The research conducted contributed to defining such word forming ways as substantivation, conversion, eponym terms, compounding and shortening, as well as affixation, the first two of them being the most productive ones.Analysis of the lexical units of multi-physics fields show that the role of conversion in word-formation is much broader than substantivation and lexicalization, since only the grammatical forms of the verb are substantiated, and many parts of speech are subjected to conversion. It is concluded that in forming terms not only nouns, verbs, adjectives and adverbs take part. Great is the role of conjunctions and prepositions in word forming process as well.

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