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STRUCTURAL SEMANTIC, COMMUNICATIVE AND PRAGMATIC PECULIARITIE OF THE POPULAR SCIENCE TEXT

The article deals with the genre of the popular science newspaper text in the structural-semantic, communicative and pragmatic aspects. The contextual analysis method has revealed the semantic structure of the popular science newspaper text in English and Russian. Prototypical (most widely used and found in all the texts studied) components of the semantic structure of the popular science media text are the author's commentary and the scientist's commentary. These components build up the contents of the text and help the reader understand it. Research has also shown that within these prototypical components, two main communicants – the author and the scientist – are functioning. The study has revealed several models of interaction between the author and the researcher. The most widely used model is the one in which the author's statement is followed by the scientist's statement containing elaboration and evaluation of the information provided by the author. Research has found that their interaction takes the form of a virtual dialogue, the third party being the reader, and contributes to the main communicative goal of the popular scientific text, which is popularization of scientific knowledge.

Рассматривается жанр научно-популярного газетного текста в структурно-семантическом, коммуникативном и прагматическом аспектах. Выявлена семантическая структура научно-популярного текста на английском и русском языках. Установлено, что прототипическими (наиболее употребительными и встречающимися в анализируемых текстах на обоих языках) компонентами семантической структуры научно-популярного медийного текста являются комментарий автора и комментарий ученого. Данные компоненты обеспечивают развертывание содержания текста и способствуют его пониманию массовым читателем. Установлено, что в рамках данных прототипических компонентов функционируют участники общения – автор-журналист и ученый. Выявлены модели взаимодействия автора и ученого, наиболее употребительной из которых является та, при которой высказывание автора сопровождается высказыванием ученого с уточнением и оценкой. Установлено, что их взаимодействие в научно-популярном тексте осуществляется в форме виртуального диалога, третьим участником которого выступает читатель, и способствует реализации основной целеустановки научно-популярного текста – популяризации научного знания.

Introduction

Modern linguistic studies approach text and discourse from two main perspectives. The communicative perspective studies text as language in action and the cognitive perspective studies text as a structure which forms and transmits knowledge. In modern information society there is a need for an adequate transmission of new scientific knowledge. In modern information era, effective

«communication between experts and the rest of society is needed to maintain both the authority of the expert and the trust of the public» [1, p. 58]. Popular science articles published in newspapers and magazines play an extremely important role in this process.

The aims of our research are the following: to establish the prototypical semantic structure of popular science texts in American, British and Belarusian press; to define models of communication within the text genre under study; to establish pragmatic functions of the components of the semantic structure.

The research was carried out on the material of 200 PS articles published in British and American newspapers («*The Washington Post*», «*The New York Times*», «*The Independent*», «*The Sunday Times*», «*USA Today*») and Russian articles published in Belarusian newspapers («*Народная газета*», «*СБ – Беларусь Сегодня*», «*Свободные новости плюс*», «*Обозреватель*») published in 2007–2012.

1 The popular science media text as a text genre

The status of the popular science text is a disputable question in modern lingvostylistics. Some researchers view it as a subdivision of the scientific text (M. P. Brandes, I. R. Galperin, T. A. Timofeyeva, N. M. Razinkina, M. N. Kozhina). Others state that the popular science text can be studied as a separate functional text style (N. N. Mayevsky, G. A. Vasyuchenko, A. V. Stepanov). In this article, we consider the popular science text as a subdivision of the scientific text because it has all the main features of a scientific text. Firstly, the popular science text contains new knowledge which we view as new results of scientific research. Secondly, it has similar contents and extralinguistic factors which define the use of specific linguistic means.

As a text genre the popular science text has a number of characteristics. The main communicative aim of this text genre is scientific popularization [1, p. 58] which means «translation» of scientific information into the common knowledge language [12, p. 236]. A popular science text published in mass media reports on scientific research results in various fields of science and their implications for human life and health, as well as the promotion of new scientific ideas, concepts, discoveries and developments to the mass audience.

Furthermore, the popular science text connects scientists and readers by giving the wide audience the most interesting and important information in a form that is easy for their comprehension. Laypeople act as the addressee of the popular science text, while the addresser of this text genre is not only a scientist but also a journalist who has a good command of the subject he or she is describing, the factor of the recipient being the dominant factor.

Another peculiar feature of popular science text is persuasiveness which means that the popular science newspaper article is meant for persuasion, like any journalistic text. The popular science text is also suggestive, which is meant to influence the reader's imagination, emotions, and their subconscious through subtle hints, imagery, rhythm, sound associations. Communication in the popular science text has a mixed nature because this text genre has features of both the scientific and the journalistic text, and it combines different ways of presenting information, alongside with the narrative form of presentation, such as direct speech or an interview).

It is important to note that the author's aim is to create a certain mental structure that regulates the process of informing the reader about certain properties of the object and about the author's understanding of it.

2 The semantic structure of the popular science text and its pragmatics

Understanding the text according to the aim of communication will be effective if backed up by interaction between the addresser and the addressee. To understand the text as a whole, it should be perceived as a model which forms the basis of expansion of its contents and of the reader's perception» [2, p. 219]. Such a model is called a semantic structure which can be defined as a frame containing definite information and help the addresser to reach their communicative goal. We established the semantic structure of the popular science text on the basis of macrostructure theory by T. A. van Dijk [6] because this theory gives the opportunity to take into account peculiarities of different text types and genres and allows structural variability. According to T. A. van Dijk, the schematic superstructure (semantic structure) is a form for organizing text macrostructure as a whole [6, p. 130], a conventional scheme which determines the general layout of the text irrespective of local or global text meanings [6, p. 255]. The semantic structure consists of a number of components typical of a given text genre or type.

In identifying the conventional structural scheme of popular science articles, we rely on the idea that the texts of this genre function in a common communicative situation and a typical communicative goal. This communicative purpose defines the structure of the texts under study.

The analysis of the English and Russian newspapers has shown the following semantic components of the superstructure: *scientific problem, hypothesis, experiment, research perspectives, research results, practical application of new scientific knowledge, author's commentary, scientist's commentary, layman's commentary*. These components of the semantic structure have been defined basing on the context and the total contents of each article under study.

The component *scientist's commentary* involves a statement made by an expert in a particular field of science. It is verbalized with the help of direct and indirect speech, which contains an explanation of the causes of the problem, evaluation of research results, scientist's personal experience, etc. Cf.: «That is an area the size of Greater London,» said Dr Drolshagen. «This asteroid is a little bigger.» – У нас одно желание – помочь как можно большему числу больных, – признается ученый. – Разрабатывая свой метод, мы провели широкомасштабное исследование по изучению качества жизни больных с подобной патологией.

The component *author's commentary* involves a statement made by a journalist, the author of the article. It expresses the author's opinion on the issue under discussion, or factual information on the subject of the article. Cf.: Both Bill Gates and Warren Buffett know a bit about making money – and also about giving it away to charity. Now scientists have proved that such acts of philanthropy can be a short-cut to achieving happiness; В окно моей спальни на седьмом этаже заглядывают две вышки мобильных операторов, взгромоздившиеся на крышу двухэтажного магазина.

The component *layman's commentary* is a statement made by a participant of a scientific experiment, a patient or another person who is relevant to the problem described. Opinions of ordinary people in a popular science text represent the problem as relevant for every reader. The component *research results* component contains factual information about obtaining academic results or statistics. The component *practical application of scientific knowledge* contains practical recommendations for application of research results in everyday life. The component *scientific problem* refers to a scientific phenomenon. The components *experiment*, *hypothesis*, *research perspectives* refer to parts of text which inform the reader on the progress of a scientific experiment, hypotheses, as well as the progress of research in a certain direction.

Our analysis indicates that the structure of the studied texts allows of different combinations of semantic components within a text (which distinguishes popular scientific text from scientific text). In our view, this can be explained by variability of the popular science text as a text type, which is able to combine the features of scientific, fiction and journalistic texts. In addition, such a semantic structure is determined by the pragmatics of the popular scientific text. The aim of the author (a journalist) is not only to inform readers about the latest research results, but also to convince them of importance and relevance of scientific problems discussed in the article.

The results of the analysis of the semantic structure of English and Russian popular science texts are shown in Table.

The semantic structure of popular science texts in English and Russian

Global semantic components	Semantic components	Number of usages in English articles	Usage rates	Number of usages in Russian articles	Usage rates
Commentary	Scientist's commentary	445	33,3%	313	24%
	Author's commentary	403	30,1%	520	40%
	Layman's commentary	54	4%	19	1,5%
Scientific problem	Research results	236	17,6%	165	12,7%
	Scientific problem	71	5,3%	87	6,7%
	Practical application of scientific knowledge	60	4,5%	162	12,5%
	Experiment	34	2,5%	11	0,8%
	Research perspectives	12	1%	14	1,1%
	Hypothesis	23	1,7%	10	0,8%
Total		1338	100%	1301	100%

Analysis of Table 1 shows that the most common semantic components of popular science texts in English and Russian are *the author's commentary* and *the scientist's commentary*. This suggests that they are prototypical for the popular science newspaper text, while the other components are optional and can be used by a journalist according to the topic of the article and the author's goals.

The component *study results* is also common and often used in the texts under analysis because the author and the scientist can give details about the study and evaluate the results, the work of scientists, importance of the problem on their basis. Combination of components in the popular science text allows the author to make the article interesting to the reader by alternating evidence with commentaries.

3 Communicants in the popular science text and their interaction

For the author of the popular science text it is essential «not only to verbalize new knowledge but also to aim the text at the recipient» [10, p. 254] to influence the recipient's opinion and attitude to scientific issues and their practical significance [4, p. 9]. The mass media text acts as «an active mediator in establishing contact between people» [5, p. 143] and a means of communication between the journalist and the audience.

In communicative stylistics a journalistic text is characterized by the presence of the main participants of communication as «the addresser / addressee» [8, p. 45] or «author / reader» [3, p. 8]. We agree with this viewpoint but with reference to the popular science text it should be noted that in this case two personalities act as addressers: the author and the scientist (expert). The author's

functions in a popular scientific text are «similar to the functions of the author in a scientific text which means that the variety of facts must be united under a certain point of view, and the author's viewpoint plays a crucial role» [9, p. 24]. The author comments facts in an emotional way, thus shaping a model of the situation for the readers because the journalist can choose necessary linguistic means of persuasion [6, p. 9]. As for the scientist, he acts as a representative of science and expresses an expert opinion, and the author acts as a mediator between the scientist and the addressee together with expressing his own opinion on the topic of the article.

The recipient of the popular science media text is a wide audience. As a result, the newspaper text «can simultaneously meet the needs and interests of different people, that is, be addressed to different people and in each case the article will be understood by any reader» [5, p. 145].

Interaction of the author and a scientist in the text creates a virtual dialogue, which involves the reader, as well as contributes to the author's intention which is to persuade the recipient that scientific research and the application of its results plays an important role in everyday life of the society. It is important that this dialogue between author and reader takes place within the semantic structure of the popular science text.

Analysis has established several regular patterns and models of the interaction between the main communicants in a popular scientific text. In most cases, the statement of one of the communicants is followed by the statement of the second communicant who specifies (explains, adds, clarifies or confirms) it and expresses their evaluation of the new scientific knowledge. Such statements are marked with linguistic units with the meaning of explanation (because, *probably, likely, explain, show, suggest, appear (to), cause, therefore, to explain*, etc.), confirmation (*confirm, admit, report, support, verify*), elaboration (*add, theorize, to tell, to refine*). Cf.: *Researchers have deciphered the atomic three-dimensional structure of the brain's opioid receptors, the protein molecules that are intimately involved in the control of pain and feelings of wellbeing, as well as being the target of the opioid drugs such as morphine, codeine and heroin* (author's commentary). <...> *They said that unravelling of the structure of the opioid receptors on such a minutely detailed level will accelerate the development of new drugs that can alleviate anxiety and depression as well as novel treatments for chronic pain and addiction* (scientist's commentary); *Парадоксально, но пока приборы фиксируют вполне благополучные данные, жители окрестных домов жалуется на пошатнувшееся рядом с вышкой здоровье* (author's commentary). – *Медицинского подтверждения эти жалобы не находят, – возражает Юлия Стадольник. – По-видимому, имеет место субъективная оценка причин своего недомогания* (scientists commentary).

The narrative in the article is a sequential alternation of author's commentary and scientist's commentary. Thus a dialogue involving the reader is created. The analysis shows that there are the following types of interaction models of the communicants:

Model 1. Author's commentary (research results, a scientific problem or a phenomenon) → scientist's commentary (specification).

Model 2. Author's commentary (a story or an example) → scientist's commentary (specification).

Model 3. Author's commentary (a solution of the problem) → scientist's commentary (specification).

Model 4. Scientist's commentary (research results) → author's commentary (specification).

Model 5. Author's commentary (research process) → scientist's commentary (specification).

Model 6. Author's commentary (question) → scientist's commentary (answer, a solution or causes of the problem).

Model 7. Author's commentary (a scientific problem or a phenomenon) → scientist's commentary (specification) → author's commentary (specification of the scientist's statement).

The most common model used in English texts is Model 1 – the model in which the *author's commentary* contains information about research results or about a scientific problem and the *scientist's commentary* is a statement containing specification and evaluation of a particular aspect of a scientific problem (61,6%). In both cases, this model promotes orderly and logical presentation of which enables the recipient to understand it well.

A wide use of this model demonstrates the importance of the expert's viewpoint. As a rule, the *scientist's commentary* contains lexical units with the evaluative meaning: adjectives with the meaning «useful, efficient, new, unique» (*important, useful, great, beneficial, large, pioneering, exceptional, profitable, многообещающий, интересный*), causative verbs (*lead to, help, cause, provide, allow, позволять, воздействовать, влиять*), nouns with similar meanings (*breakthrough, improvement, преимущество, спасение, шанс*). Various aspects of the research are subject to evaluation: the relevance of the study, the practical significance of the study results, research results, novelty of research results, as well as the scale of a scientific problem. Evaluation expressed by an expert «serves as a way to display the author's position in the text, and therefore as one of the ways to influence the mass consciousness» [7, p. 285].

The analysis shows that in Russian articles several models are used in more or less equal proportions. Model 1 is also widely used in the Russian articles (28,8%), and the author's commentary describes the actual scientific problem or phenomenon, or the subject of the article.

Another typical model used in Russian texts is Model 3 – the model in which the author verbalizes a solution of the problem and the scientist's commentary contains a specifying statement evaluating the practical significance of new knowledge (26,2%).

In addition, there is a question-answer model (Model 6) more often used in Russian articles in comparison with English ones (17,3%): The author's commentary includes a question, and the scientist's (or author's) commentary states the answer to this question. These question-answer systems «contribute to the idea scientific speech as a dialogue» [11, p. 34].

Conclusion

The popular science text is a subgenre of the scientific text. The prototypical components of its semantic structure are the author's commentary and the scientist's commentary which form the core semantic structure of texts under analysis because they can be found in any popular science newspaper text. The author plays a key role in a popular scientific text because it organizes the narrative in the article. The author elaborates the message about research results giving information about solutions of scientific problems, life stories and examples from the life including statements of experts into the text of the article, which accounts for dialogueness in the popular science text. This conclusion is confirmed by the fact that the most widely used model of interaction between the author and scientist in English and Russian articles is a model in which the author's statement is followed by the scientist's statement containing evaluation of a particular aspect of the topic. The organization of the narrative in the form of a virtual dialogue between the author and the scientist helps to promote new scientific knowledge to the mass audience, as well as creating a positive public opinion about the practical significance of new scientific knowledge in everyday life.

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