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**PROMOTION OF SCIENCE AND TECHNOLOGY IN  
RUSSIAN NETWORK MEDIA**

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***Abstract***

The authors examined publications of the popular-science journals “Machines and Mechanisms” and “N+1” aimed at the mass reader. Both journals are polythematic and interdisciplinary oriented. The publication was taken as the unit of analysis, the theme and the genre of publication became the unit of account. The research showed investigated journals are the integral part of scientific knowledge popularization system and perform an important educational function, and play the role of responsible and ethical intermediaries between the scientific world and the audience. The choice of topics in popular science journals is dictated by the main tasks of publications: to present complex scientific topics in an accessible and entertaining way and to satisfy the information needs of the audience. There are data on the audience structure of examined journals and the strategies of scientific information promotion in Russian publications specific genres and formats. Media, existing in the web-space, provide new development opportunities for popular science journalism which are directly connected with the use of multimedia tools, as well as hypertext systems. A small number of publications that acquaint readers with modern scientists, especially Russian ones, can be considered as the disadvantage of journals. And it is just a direction that deserves attention because one of the key functions of popular science media is to popularize the activities of scientists as leaders of progressive knowledge.

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**Keywords:** Popular science journalism, science communication, deontological values, genres.



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## 1. Introduction

Research data point to the steady increase in interest to popular science publications and online media, which tell about scientific achievements, discoveries, consider current problems of science and form public opinion about the state of various scientific and technical fields (Bauer, 2011; Lazutina, 2018; Tertychnyj, 2013; Vasilieva, 2016). A similar tendency corresponds to global trends in the development of popular science media (Bowater & Yeoman, 2013; Su, Akin, Brossard, Scheufele, & Xenos, 2015). The media contribute to the actualization of scientific knowledge, the creation of positive climate for scientific teams, the promotion and implementation of the products of scientific activities in everyday life (Bucchi, 2013; Bakanov, Egorova, Mayorov, Tumanov, & Tyabina, 2018; Frolova, Suvorova, & Ilchenko, 2016; Kontareva, 2015; Vasilieva, 2016). After a recent decline in interest in scientific topics, when some publications were closed and others refused to have printed version (Kalmykova, 2018) there has been a boom in popular science magazines. At the moment, there is a developed network of popular science universal and highly specialized mass media (National Geographic, Health, Schrödinger Cat, Quantum, etc.), as well as social media posts, podcasts, and Youtube channels (Scheufele, 2013; Volovetsky & Belkovsky, 2018; Boguslavskaya & Boguslavskiy, 2019). The following are popular: the Russian portal for young people - “Perpetum”, the portal “Research and Educational Projects TASS”, the lecture portal “PostScience”, the web-sites “Eureka! Magazine” and “Elements.Ru”. The magazines – “Naked Science”, “Popular Mechanics” and “Science 2.0” – are dedicated to future technologies and discoveries. One of the most popular magazines is “Machines and Mechanisms” and “N+1”. Science popularization environment is changing and first of all the specific features and structure of mass consciousness, especially the perception of information are changing (Klyuev, Vinogradova, Zubko, Misonzhnikov, & Melnik, 2018). Technology affects media consumption, today the media text is not ‘«recognized» but it is «formed» by the reader (user). Media as a whole begins to play a major role – the role of the navigator of the digital world (Boguslavskaya & Boguslavskiy, 2019, p.216), and popular science publications stand to the forefront of the movement. Qualitative changes are revealed in the formation of new genre forms and types of media (Besley, 2013; Diveeva, 2014). The language of the popularizer becomes more vibrant, clear and figurative. Texts are built on the principle of fascination and usefulness.

## 2. Problem Statement

- Along with the undoubted advantages of networked scientific information resources, there are real problems: the validity of the discussed scientific data, providing the audience with scientific falsifications, parascientific constructions, quasi-scientific mythologies instead of scientific data.
- Values, formed by popular science magazines, are influencing the personal characteristics, communicative strategies and behavioural reactions. (A number of authors note negative trends in the functioning of popular science journalism, considering commercialization to be the main factor in the deformation of deontological values, paying attention to the excessive

entertainment and sensational nature of publications (Brossard, 2009; Teplyashina & Pavlushkina, 2016). This question is discussed by various scientists.

- The audience and the scientific community still request for the professionalism of authors covering scientific topics (Miller, 1991). A narrow thematic range of publications about science and technology is notified.

Within the framework of individual information channels, one can note the desire to attract the attention of a young audience to science with the help of new forms of presentation and a variety of genres, as well as the ways of stimulating the participation and cooperation of recipients in the discourse. Media practices are improving. Magazines use queries, quizzes, integrated educational content, gamification, visual forms to attract an audience and to support customer loyalty (Kozhemyakin, 2019). The development of modern popular science publications is directly connected with the increase of scientific information volume. At the same time this process is considered to be the advantage and a problem of modern science, which is undergoing a period of differentiation (Kontareva, 2015; Kalmykova, 2018; Volovetsky & Belkovsky, 2018). New directions are being formed, on the one hand, specialists from different fields of knowledge are striving to join forces and on the other hand, they are understanding each other worse and worse.

### **3. Research Questions**

We may take as a hypothesis that today social networks popular science media have a number of unique features and act as the main resources for an Internet audience interested in science in terms of information consumption.

- What new formats, genres and types are used to present information about science and technology in printed and electronic publications?
- What are the subject-specific dominants of modern printed and online versions of popular science journals and how much do they meet the expectations of the audience?

### **4. Purpose of the Study**

The purpose of this article is to identify differences in popular science materials presentation in printed and electronic versions of the “Machines and Mechanisms” and “N+1” publications, to determine their specific genre and problematic thematic range.

### **5. Research Methods**

Structural and functional analysis and the content analysis method were used to conduct the study, 450 publications of the popular scientific publications “Machines and Mechanisms” and “N+1” were studied in the period from January to June 2019. The selection is continuous. Three categories of analysis were distinguished for the study: “thematic diversity”, “genre palette” and “coverage of scientists activities”, and comparative analysis of the results was carried out for each one. The goals, audience, functions, topics, categories and authors of the publications were studied during the comparative functional analysis of the edition.

The magazine “Machines and Mechanisms” was created in 2005 in St. Petersburg (Russia) by the “Fund for Scientific Research of the 21st Century”. It is distinguished by a deep analysis of scientific phenomena and has its website, updated daily news feed. The electronic journal “N+1” has been published since 2015 and positions itself as a popular science-based entertainment publication.

## 6. Findings

The research showed that the translation of scientific knowledge has its specifics: the problem in popular science text is transmitted to the reader in both ways. On the one hand, it is transmitted as the complex of science facts, and on the other hand, it is reproduced as the set of emotional conditions, which gives rise to a unique phenomenon for the scientific sphere, because accuracy, concreteness and logic are combined with emotionality and imagery.

An analysis of the audience showed that the readers of the publication *Machines and Mechanisms* are men (56%) and women (44%); By education: a significant part of readers have got higher education and are getting education in universities; 29% are specialists and managers aged 25-40, 11% of the audience are over 40, and the remaining 63% of entire audience are students of all types and forms of education.

The purpose of the print and electronic publications as a whole is the same: both journals are trying to translate scientific knowledge, transform it into a simple and understandable form for the general reader. The functions of these publications are also similar and differ only in the degree of manifestation. So, the recreational function in “*Machines and Mechanisms*” is less expressed than in “*N+1*”. Magazines differ in the number of headings and their substantive content. “*Machines and Mechanisms*” has each heading containing materials on a specific subject (field of science). At the same time, the “*N+1*” rubrics are closely related to the topics discussed in the journal (Astronomy, Physics, Biology, Robots and Drones).

The topics of publications are joined into three large groups - the humanities, applied and natural sciences. Thematically magazines cover 10 key areas presented in the tables 1. The analysis category “Thematic Originality” included topics: “technology”, “history”, “geography and geology”, “chemistry”, “physics”, “biology”, “space”, “nanotechnology or high-tech”, “genetics”, “society and the world”. We also focused on the category “Coverage of scientists personalities”, as we consider it is important to determine what areas of science are represented by persons, who stands behind serious scientific discoveries, what is the contribution of Russian scientists to world science.

Publications of the printed journal are distinguished by the high degree of topics elaboration. Most publications of the journal “*Machines and Mechanisms*” are directed at the educated, diverse, and interested audience.

**Table 01.** Subject-thematic characteristics of popular science texts in the magazines “Machines and Mechanisms” and “N + 1”

Topic	«Machines and Mechanisms»	«N+1”
Technology	28,4%	19,7%
History	24%	5,4%
Geography and geology	7%	6%
Chemistry	11%	6,3%
Physics	2%	10,2%
Biology	4,6%	16%
Space	2%	23,3%
Nanotechnology or high-tech	5%	3,7%
Genetics	2%	6,7%
Society and the world	14%	2,4%

In “Machines and Mechanisms” magazine the favorite topic is the subcategory “engineering”, which makes up 28.4% of all publications of the magazine for the research period, it’s followed by “History” and “Society and the World” (24 and 14%, respectively), considered in the aspect of the past and future. The specifics of the publication lies in a key topic, which occupies about 40% of all publications. The appeal to history is caused by the fact that the authors of articles are trying to identify cause-effect relationships giving rise to certain scientific phenomena. The electronic journal “N+1” focuses on such areas of scientific knowledge as physics, chemistry and space. The edition has few related topics, and if they exist, their interconnection is shown as hypertextuality, which invites the readers to make acquainted with additional materials by themselves.

One of the most popular and relevant (21.3%) topics in the “N+1” magazine is “space” (discoveries of astronomers, research by cosmologists, etc.); a significant number of publications are devoted to technical issues (17.9% of all publications).

In «Machines and Mechanisms» magazine much attention is paid to acknowledged inventors, domestic and foreign scientists or researchers. It is practically not told about modern scientists involved in promising developments and scientific communities and teams that conduct research. The magazine focuses the reader's attention primarily on explaining the essence of the phenomenon, the methods and results of the study, but not on the mental action and behavior of scientists.

In the electronic magazine “N+1” the situation is diametrically different: the edition practically does not tell about scientists of the past, but the comments of modern foreign researchers are found in 36.4% of publications. There is not a single journalistic text that would be completely dedicated to the personality of the scientist and his contribution to scientific and technological progress among all which have been revealed. It can be assumed that popular science journalism tends to attract attention to the fact itself and the result of the experiment, rather than to the role of the specific person behind it.

The analysis shows different approaches to covering scientific topics in print and electronic editions. If the printed journal “Machines and Mechanisms” provides the reader with a deep

understanding of technical discoveries and innovations, so the electronic journal “N+1” often publishes information in news genres.

The category “Genre originality” includes popular science article, news report (“note”), infographics, interviews and synthesis of genres, which could include features of all the above genres.

**Table 02.** Functional characteristics of genre models, %

<b>Genres</b>	<b>«Machines and Mechanisms»</b>	<b>«N+1”</b>
Popular science article	48%	19,2%
Infographics	16,5%	0%
Interview	2%	0%
News post	5%	47,5%
Synthesis of genres	28,5%	33,3%

The difference of used genres in the electronic and print editions is as follows: in the journal “MM” the priority is given to a popular science article (47.6%), while in “N+1” news from the scientific world (47.4%) are containing only the facts. The peculiarity of electronic media is related to the need for constant updating of content. It is logical that the magazine uses more graphic and multimedia tools. Less often, interviews are published in both electronic and print publications. As you can see: the emergence of new information technologies has affected the state of genres that popularize science (Table 02).

## 7. Conclusion

Our research showed that the studied journals are an integral element in the popularization of scientific knowledge, perform an important educational function, and play the role of responsible and ethical intermediaries between the scientific world and the audience.

The purposes of the print and electronic editions are the same: to translate scientific knowledge, transform it into a simple and understandable form for the general reader. The functions of editions are also similar and differ only in the degree of manifestation. So, the recreational function in “Machines and Mechanisms” is less pronounced than in “N+1”.

Technological advances in network media related to the use of multimedia tools, as well as the hypertext system, open up new opportunities for popular science journalism for development and reaching an audience. A small number of publications that acquaint readers with modern scientists, especially Russian ones, can be considered as a shortage of journals. This is a topic that deserves attention, since one of the key functions of popular science media is to popularize the activities of scientists as leaders of progressive knowledge.

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