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Research article

Hermeneutics in Research Practice

Evgeniy V. Maslanov (✉)
Inter-Regional Non-Government Organization “Russian Society of History and Philosophy of Science”.
1/36 Lyalin Lane, build. 2, Moscow 105062, Russian Federations,
evgenmas@rambler.ru

Abstract
The article analyzes the role of hermeneutics in science and technology. Hermeneutics involves both an attempt to interpret texts and the fact that the person changes in the process of interpretation. In normal science, hermeneutics plays a secondary role. This is due to the fact that it is built around common ideas that scientists agree with. At the same time, joining a cohort of scientists implies a transformation of the person. Thus, the learning process is associated with the need to use hermeneutic procedures. Analysis of the interaction of interdisciplinary teams shows the importance of forming at least a situational understanding between representatives of different disciplines. Its achievement requires the formation of trading zones. In them, it is possible to achieve mutual understanding, which requires the implementation of hermeneutic procedures. Scientific activity itself requires not only the interpretation of a scientific text, but also practical research activities. Hermeneutics is necessary for the interpretation of research methods presented in scientific texts. It can be based on the use of tacit knowledge. This allows us to show that the use of technical artifacts and technology in general require hermeneutic interpretation. To work with them correctly, it is necessary to master the methods of working with them, their inclusion in our life world. The example of the interface as a technological mediator when working with new information and communication technologies demonstrates that they can construct our ways of perceiving information spaces. In this case, the interface becomes not just a media, but a specific mechanism for constructing the digital world around us.

Keywords: Hermeneutics; Science; Technology; Trading zone; Practice; Technoscience

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Научная статья

Герменевтика в исследовательской практике

Евгений Валерьевич Масланов (✉)
Межрегиональная общественная организация “Русское общество истории и философии науки”,
Лялин пер., д. 1/36, стр. 2, комн. 2, 105062, Москва, Российская Федерация
evgenmas@rambler.ru

Аннотация:
В статье анализируется роль герменевтики в науке и технике. Герменевтика нацелена как на попытку интерпретировать тексты, так и на изменение субъекта в процессе интерпретации. В нормальной науке герменевтика играет второстепенную роль. Это связано с тем, что она строится вокруг общих идей, с которыми согласны ученые. При этом вхождение в когорту ученых подразумевает трансформацию субъекта. Таким образом процесс обучения связан с необходимостью применять герменевтические процедуры. Анализ взаимодействия междисциплинарных команд показывает важность формирования хотя бы ситуационного взаимопонимания между представителями различных дисциплин. Для этого требуется формирование зон обмена. В них возможно достижение взаимопонимания, которое требует реализации герменевтических процедур. Сама научная деятельность связана не только с интерпретацией научных текстов, но и с практической исследовательской деятельностью. Герменевтика необходима для интерпретации представленных в научных текстах исследовательских методов. Она может базироваться на использовании неявного знания. Это позволяет показать, что использование технических артефактов и технологии в целом требуют герменевтической интерпретации. Для корректной работы с артефактами необходимо освоение способов взаимодействия с ними, их включения в наш жизненный мир. Пример интерфейса как технологического посредника при работе с новыми информационно-коммуникационными технологиями демонстрирует, что они могут конструировать наши способы восприятия информационных пространств. В этом случае интерфейс становится не просто медиа, но специфическим механизмом конструирования цифрового мира вокруг нас.

Ключевые слова: Герменевтика; Наука; Технология; Зоны Обмена; Практика; Технонаука

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INTRODUCTION

The question of applying hermeneutics to the analysis of science and technology is complex and relevant for various disciplines and research projects. It can be related, for example, to the description of the role of hermeneutics in the natural sciences (Heelan, 1998), the analysis different strategy of citizen science (Ottinger, 2017), the analysis of experiment (Wu & Hu, 2023). The use of cognitive strategies of hermeneutics is associated with two key points: a) a change in the subject in the person of getting to know a work of art and b) considering a work of art as a holistic world. "[T]he reader is subject as well as object, agent as well as patient in the hermeneutic process – when I read a literary work, philosophical or legal text, the text happens to me just as much as I happen to the text" (Nordmann, 2023, p. 193). Understanding a work of art requires its deciphering, searching for its meaning. This process turns out to be associated with a change in the person. Hans-Georg Gadamer notes that in order to understand a work of art, it is necessary to have certain cultural prejudices that allow it to be deciphered, a certain cultural horizon with the work of art. "Given the intermediate position in which hermeneutics operates, it follows that its work is not to develop a procedure of understanding, but to clarify the conditions in which understanding takes place. […] The prejudices and fore-meanings that occupy the interpreter's consciousness are not at his free disposal. He cannot separate in advance the productive prejudices that enable understanding from the prejudices that hinder it and lead to misunderstandings" (Gadamer, 2006, p. 295). If these prejudices that form the horizon of understanding are not present, then in order to adequately become familiar with the work, it is necessary to acquire a certain set of knowledge, at least to master the language of the work, which will also require immersion in cultural realities. It is clear that this leads to a change in the person who has decided to enter the world of the work of art. If this horizon exists, then the very acquaintance with the work will add new experience to the person's existing experience. But can we talk about such experience when we become acquainted with the achievements of science and technology? Is hermeneutic work necessary when mastering scientific texts or working with experimental equipment? Is hermeneutics necessary for working with technology, since most often we can work with it without even understanding its internal structure?

HERMENEUTICS IN SCIENCE PRACTICE

Within the framework of normal science, it is difficult to talk about a "change" in the subject. A scientific article or book that a scientist reads provides him with certain information that he assimilates using the language of science that he has. The terms in it are unambiguous, the relationships between them are described quite transparently, the use of the language of mathematics allows one to avoid inaccuracies in understanding the constructions used. In this case, everything controversial turns out to be associated with solving puzzles. Scientists struggle with them together; when one of them finds a successful solution, the problem ceases to be of interest. It will be solved using well-described methods, a standard and understandable theoretical language. The community of scientists will move on to solving new puzzles. There are no changes in the subject.

He simply learns a new set of facts. The only situation when "acquaintance" with scientific texts can lead to a change in the subject is a scientific revolution. But these revolutionary changes always end with the formation of new normal science (Kuhn, 1962). Therefore, science cannot be considered as a project associated with changing a person in the process of scientific work. It would seem that normal science does not need hermeneutics.

At the same time, it is worth paying attention not only to the immediate work of the scientist with specific scientific texts, but to the very acquisition of scientific knowledge, the processes of socialization in science. Perhaps it is there that one can find the hermeneutic beginning of normal science. Moreover, science itself began, among other things, as a project of "reading" the book of Nature. Acquaintance with science requires not only mastering the language of science, but also the appropriation of the ethos of science, the interiorization of the norms of science, its values and virtues, and the acquisition of scientific practices. Science is not only reading the texts of other authors as the practice of independent research. In this case, acquaintance with scientific knowledge turns out to be associated with a change in the self of a person. For example, Lorraine Daston and Peter Galison, describing the types of objectivity existing in science, distinguish such a type as trained judgment (Daston & Galison, 2010). It requires training from the researcher, as a result of which he will be able to detect objects that he could not distinguish before. For example, only a researcher who has undergone a certain training will be able to say something about the traces of particles in a cloud chamber; a physicist who has not undergone special training will hardly be able to correctly interpret the data. Will mastering this type of objectivity change the moral and ethical ideas of the researcher? Most likely not, but not every work of art is capable of achieving such a result. But, of course, mastering this new practice will change the way the researcher looks at the world; images of objects will appear in it that an untrained person is not able to distinguish. "Instead of the four-eyed sight of truth-to-nature or the blind sight of mechanical objectivity, what was needed was the cultivation of a kind of physiognomic sight – a capacity of both maker and user of atlas images to synthesize, highlight, and grasp relationships in ways that were not reducible to mechanical procedure, as in the recognition of family resemblance" (Daston & Galison, 2010, p. 314). In fact, this learning-cultivation turns out to be the hermeneutic practice that the scientist masters.

From this point of view, the very interpretation of a scientific text is associated with a certain horizon of foreknowledge that its reader has. It includes not only knowledge of the theoretical language of description used in the scientific text, but also an idea of a certain set of practices that its authors can use. This is background, tacit knowledge that is necessary for the correct interpretation of the presented results. The text of a scientific article contains attempts to represent it explicitly in the methods and methodology section, but a correct understanding of this section requires the reader to have tacit knowledge similar to the author. Science is not only reading texts, but also a set of research practices. Getting to know them means overcoming the prejudices that Gadamer wrote about. They allow one to understand the text of an article more adequately and launch a hermeneutic circle that makes it possible to place the text in context and find meaning in it. The difference between a scientific work and a work of art is that an

invariant of the meaning of the text can be found in it, which turns out to be unchanged for a large number of specially trained readers. A fiction text can form a different set of answers and meanings, thanks to a larger set of contexts from which it can be considered.

Moreover, if we turn to the analysis of not just normal science, but the functioning of science in modern conditions and describe it as postnormal science (Funtowicz & Ravetz, 1993), science in Mode 2.0 (Nowotny et al., 2003), megascience or even proto-megascience (Pronskikh, 2019) or, in general, as technoscience, we can pay attention to the fact that it often implements complex projects that require the involvement of interdisciplinary teams. In this case, as Galison showed, there is a problem of finding mutual understanding between researchers. For example, the successful solution of problems in the field of radar required the correlation of efforts between specialists in the field of theoretical physics, electrical engineering, circuit design, engineering and other specialties (Galison, 1997). All of them had a general scientific background, but they had undergone specific training related to their specialization. They find themselves in a situation where they need to try to develop a common language to achieve a result. It may not convey quite correctly the complex scientific ideas used by different groups of scientists, but it allows them to find common understanding (Nikiforov & Dorozhkin, 2023). It is formed in specific trading zones of scientific ideas and artifacts. Thus, in the situation of modern interdisciplinary research, the issue of hermeneutic understanding of scientific texts is especially relevant.

The analysis conducted by Harry Collins, Robert Evans and Michael Gorman (2007) shows that the formation of a space of common understanding in trading zones has several development scenarios. A situational unity may form, which is necessary only for solving a specific problem. In this case, after achieving the goal, it will simply disintegrate. But it is also possible to form a new research area. For example, the development of research in the field of lasers would not have been possible without the combined efforts of specialists in the field of technology, theoretical physicists in the field of quantum mechanics, and experimental physicists capable of creating experimental equipment. Thus, Inna Mihailovna Belousova (2014), one of the participants in the work to create the first lasers in the USSR, notes that the prerequisites for the creation of a laser at the S.I. Vavilov State Optical Institute were "deep scientific groundwork in the field of spectroscopy and luminescence of crystals ..., in the field of physical optics and pulsed light sources ..., as well as first-class scientific schools of optical engineering and design ... and active media of lasers" (p. 5). In this case, the formation of a new research area is associated with changes in the structure of scientific knowledge and the emergence of a new, unified type of knowledge and skills among scientists in this field. Science can be associated with the fact that the scientific practice of theoretical research and experimental work itself will require hermeneutic work to understand the results and achievements of colleagues. The text of the article should be divided into semantic parts. Various headings and subheading of the study can be decided by authors. The headings will be depending on the nature of the paper - a quantitative empirical investigation will be structured differently than the critical discussion of a philosophical text.

HERMENEUTICS AND TECHNOLOGY

The appeal to research and experimental practices raises an important question about the use of technology in scientific work. They can also be looked at from the standpoint of hermeneutic analysis. Technical objects, like works of art, are unique worlds that we can enter (Bylieva & Nordmann, 2023). We are able to master them, and they can change us. This characteristic of technical objects turns out to be key to their analysis from the standpoint of hermeneutics. Technology, as Martin Heidegger noted, is closely connected with practical actions, but it originates in the techne of the ancient Greeks, which has not only an applied meaning, but is also connected with poiesis, although modern technology, in his opinion, departs from poiesis (Heidegger, 1977). In this case, technical devices and technologies as a whole are really similar to works of art. After all, a technical artifact is conceived and endowed with a certain function by its author. All technical objects turn out to be specially created artifacts and form their fundamental difference from natural objects. Lynne Rudder Baker (2011) notes: “Unlike natural objects, artefacts have an essence, a nature that depends on mental activity. Technical artefacts depend not only on individual mental activity, but also on social institutions and customs” (p. 62-61). The treatment of technical objects requires a serious system of interpretation of their function and purpose. Incorrect interpretation of such objects can lead to rather strange attempts to reproduce technical artefacts and endow them with functions that are not inherent to them, an example of which can be various cargo cults. In them, technical artefacts, for example, airplanes and runways, are not only recreated in such a way that they cannot perform their functions, because they are made of trees and palm leaves, but also endowed with other functions. It is assumed that they themselves should bring benefits, which with their help are delivered to local residents.

All this indicates that any technical object requires a hermeneutic procedure of understanding it in order to be used. It is associated with recognizing its function and the ways of using it. It is also worth noting that technical objects, and especially instruments of scientific knowledge, exist in two modes: as understandable elements of our life world, the interpretation of whose function occurs almost instantly, and as alien, unfamiliar objects that do not fit into our ordinary life world. Working with the former does not cause difficulties; we may not think about them at all. For example, interpreting the mechanisms of using a knife does not require us to constantly work on deciphering its purpose and the mechanisms of its use. It is simply part of our everyday life world. Perhaps, in some cultures, difficulties will arise with its use. In this case, it will exist as an object outside the usual life world of the bearers of this culture.

Technical devices of the second type, unfamiliar to the life world of some culture, break the automatic circle of hermeneutic interpretation. This is precisely how they reveal an important characteristic of artifacts. They are not only capable of transforming under human influence, changing their function, but also adapt a person to themselves. Thanks to them, unique worlds of the improvised are formed, characteristic of representatives of various social groups. The improvised life world of a nuclear power plant operator differs in many aspects from a similar life world of a peasant. Operators learn for a long time to handle the control panel of a nuclear power plant, read signals from various sensors and

displays, and respond to emerging difficulties. They adapt to technical objects and therefore change themselves. The process of learning to handle these artifacts turns out to be associated with the restoration of the automatic passage of the hermeneutic circle of interpreting the function of the artifact. Its restoration will lead to a change in a person. It turns out that a technical artifact, like a work of art, can affect how people position themselves and relate to the world.

This is especially noticeable when analyzing the functioning of new information and communication technologies. It seems to us that their use does not cause us any difficulties, but initially training in interaction with such devices is required. They shape the way we interact with and perceive the digital environments we work with. At the same time, very different digital environments may have dissimilar interfaces. As part of a cursory analysis, it can be noted that, for example, various social networks have similar, but not identical interfaces. This forces us to relearn the mechanisms of working and interacting with them when moving from one to another. It can be noted that in such systems, interfaces act as structures that themselves shape our mechanism of interaction in them. "The interface acts as a structure that allows us to form the user's "lifeworld" and develops his behavioral habits" (Maslanov & Feigelman, 2020, p. 78). In this case, it is quite possible to talk about a hermeneutic analysis of the interfaces of various information and communication environments. They both create mechanisms for working with them and shape our ideas about what is possible in them and what is not. Even simply mastering the interface becomes an important task that changes our very way of existing in the world. It gives us the opportunity to join a new life world that has the properties of intersubjectivity, but is accessible only to those who have undergone a certain procedure of learning-transformation of their own experience. Interfaces turn out to be the most important media. In the case of interfaces, the media is not only a message, but also a mechanism for creating a separate life world.

CONCLUSION

Hermeneutical work is a part of all scientific practice. At the same time, in normal science there is practically no place for hermeneutic work. Scientists of the same discipline understand each other well, have a common and fairly unambiguous terminological vocabulary and methodological approaches to solving problems. They do not need hermeneutic work to understand the texts of their colleagues. At the same time, the very process of entering science turns out to be associated with the hermeneutic procedure of mastering a new and not very well-known culture. After all, one can become a scientist only in the process of mastering scientific knowledge and one's own research activity, which implies the formation of a self with specific characteristics associated with the ethos of science. Therefore, the process of becoming a scientist is a process of self-education, which implies changes in oneself under the influence of mastering scientific texts and practices.

At the same time, scientific practice itself is permeated with procedures of hermeneutic mastering of work with technical objects. It is necessary not only to understand their involvement in research activities, but also to find out how to work with

them. These objects themselves form different life worlds of both researchers and ordinary people. A different set of technical tools, especially those that involve mastering different skills for working with them, forms different cognitive skills in people. And if in general it seems to us that there is no hermeneutic work on mastering technology, this is due to the fact that most often we interact with technical tools that have already entered our life world. The technology that is not included in it causes us concern. This is due to the initial lack of understanding of the mechanisms of its use. It is unclear what results can be obtained with its help. Such technology requires us to work hard to understand and master it, to develop skills for working with it, to include it in our life world. And this work may require a revision of ideas about the world not only from an individual, but from all of humanity.

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СВЕДЕНИЯ ОБ АВТОРЕ / THE AUTHOR

Евгений Валерьевич Масланов
evgenmas@rambler.ru
ORCID 0000-0002-6403-8003

Evgeniy V. Maslanov
evgenmas@rambler.ru
ORCID 0000-0002-6403-8003

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