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THE CONCEPT OF TRANSGRESSION AND ITS USE IN MODERN SCIENTIFIC RESEARCH

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Abstract

In the second half of the XX – beginning of the XXI centuries, the interdisciplinary approach has become common. It is the interaction of different disciplines that allows you to get new, deep scientific knowledge. This approach is associated with transgressive acts and makes it possible to go beyond the traditions and stereotypes existing in scientific research. It is important to analyze the concept of transgression. Reflections on transgression and transgressive experiments are becoming part of modern science. In this regard, it is necessary to analyze the concept of transgression in philosophy and modern science in general. Modern researchers who view science as an autonomous system isolated from the rest of society use the concept of transgression in philosophy and sociology. Moreover, the boundaries between various scientific disciplines have traditionally been considered constant and clear. On the contrary, science is presented as an activity that constantly violates, erases and rebuilds disciplinary, social and scientific boundaries. While the old boundaries of scientific knowledge are being transcended, advances in knowledge are changing, or new boundaries are created within and outside a particular discipline. This shift in boundaries determined the entire historical process of scientific development. At the same time, modern sciences were forced to come to terms with the production of new knowledge in a new form.

Keywords: Transgression, modern research, experiment, interdisciplinary research projects, interdisciplinary collaboration

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1. Introduction

In the second half of the XX – beginning of the XXI centuries, the interdisciplinary approach has become common. At the same time, the object of research does not belong to any of the disciplines interacting in the research process. The fruitfulness of the interdisciplinarity approach is due to its ability to holistically study a complex object with a wide range of problems. It is the interaction of different disciplines with each other that allows you to get new, deep scientific knowledge. This approach is associated with transgressive acts, as a result of which it is possible to go beyond the traditions and stereotypes existing in scientific research.

2. Problem Statement

At the present stage of scientific development, the concept of transgression is used in various experimental studies. Lloyd and Thacker (1997) argue that in natural sciences, there are new technologies or brain research, social uncertainty and doubt related to the boundaries of the human and the natural which force to reconsider the role of technology and science in social development. Scientists have doubted whether they have made an excessive transition beyond the impossible, whether it does not harm human evolution and human existence. As a result, there is a need to develop codes of ethics that proclaim social responsibility for innovation, requiring interdisciplinary research between “social and natural scientists and participation of interested groups, including the public in research activities” (Lloyd & Thacker, 1997, p. 41).

3. Research Questions

Transgressive acts of modern science in terms of their moral, ethical, social, epistemological components are considered as the leading trend of interdisciplinary interaction and the basis of a new scientific paradigm.

1. The desire to go beyond the existing boundaries is inherent in the human nature. This desire is most clearly manifested in the scientific field, discoveries made outside the boundaries of specific scientific disciplines.
2. The concept of transgression delimits the realm of the present known to man. In the sphere of closing boundaries, the known is multiplied. This is achieved through the interdisciplinary approach that involves the use of transgressive experimental methods.

4. Purpose of the Study

The article aims to analyse the concept of transgression in philosophy and modern science in general. Examples of application of the transgressive experimental methods in physics biology are analyzed. Various aspects of experiments in modern science which are attributed to transgressive factors are analyzed.

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5. Research Methods

The methodological basis of this study is associated with the analytical approach, which made it possible to consider the interdisciplinarity of the term "transgression". The comparative method allowed us to identify peculiarities of the development of the term "transgression". The compilation method was used to collect factual materials from various information sources. When working with primary sources, Internet resources and scientific works, the method of interpretation was used.

6. Findings

In modern scientific research, the term “transgression” was taken from biology: “in the theory of heredity, it means that mestizos overcome those features that were characteristic of parental organisms. It also takes place in geology and geography: the transgression of the sea involves the flooding of land areas with water” (Kozielecki, 1987, p. 90).

Indeed, a person cannot be explained within one specific paradigm; therefore, theories explaining his nature can be inexhaustible. At the same time, theories can be created in different paradigms and in different disciplinary directions. It is the synthesis of various approaches in understanding the phenomena of human existence that makes it possible to understand the uniqueness and universality of a person.

The concept of transgression delimits the realm of the present known to man. In the sphere of border closure, the already known multiplies and spreads. The novelty is beyond the boundaries of this area. Transgression means going beyond, a breakthrough into the impossible, which is only within the given limits.

In the very nature of man, there is an implicit desire to go beyond the existing boundaries. The natural animal being of a natural person becomes human when going beyond the limits of its naturalness. Therefore, according to Foucault (1994), transgression is associated with the human nature, humanity, subjectivity, creative culture, technology, art, etc. Human activity is a gesture that is directed to the limit.

It is in transgression that philosophy is able to ask about the being and its limits. Therefore, in the philosophy of transgression, there are no dialectical contradictions. It is no longer a question of development associated with the unity and interdependence of opposites, a new quality. It is an abrupt transition to a different state of being. The transgression itself does not oppose anything, its main goal is to go beyond the invisible line-limit. In other words, the philosophy of transgression sees the opposition of being within the insurmountable border.

There is nothing positive or negative in transgression; it is the path to the “emptiness of the core” (Foucault, 1994). In other words, the development in a transgressive act is denied, since it is a way out of a certain border to the unknown. The limit is overcome for the sake of overcoming this limit, in order to accomplish the impossible and make it possible.

Transgression divides the world into profane, existing, sacred, and transcendental. It always contains otherness, and the essence of transgression is to go beyond the bounds. Transgression “violates, but does not destroy the profane world, being its complement. The sacred world is open to limited transgression” (Bataille, 2006, p. 13).

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Science is aimed to comprehend the being. A distinctive feature of its current state is its focus on transgressive actions. This is manifested in the desire to cognize, penetrating into the depths of the objects under study, and create something that never existed within the limits of being.

In addition, modern science aims to create something that was missing even in a potential state. Accordingly, it claims to acquire a new status – a creator that does not exist in the real natural world. Science cognizes, "but constructs: it does not study the real world, but creates the worlds that it studies" (Epstein, 2010, p. 23).

For example, science constructs spaceships, airplanes or computers; it has invented hand prostheses, heart valves, and even learned to reconstruct living things – plants, human organs, animals and man himself. This scientific focus is associated with the DNA molecule structure discovery made by F. Crick and D. Watson. This caused the development of a new scientific direction associated with the transplantation of genes that have changed the program of body's vital activity. Modern genetic engineering has developments in cutting and segmenting DNA, as well as splicing with the DNA of other organisms. For example, this leads to the transfer of “a human gene into a plant gene or an animal gene into a human one” (Shilovskaya, 2013, p. 89).

Modern science commits transgressive acts – it goes beyond the natural: scientific constructs enter reality, blurring the line between them.

The processes of transgression and re-creation of new frontiers, however, cannot be seen as a simple by-product of scientific development: current research policies are aimed at encouraging interdisciplinary research projects such as nano-bio-info-cognitive convergence. Research in life sciences, new technologies, or brain studies has generated social doubt and insecurity. They question boundaries between man and nature and force us to reconsider the role of science and technology in the dynamics of social progress. As a result, there is a growing need for the development and application of codes of ethics in these areas and socially “responsible innovation” that allow and require interdisciplinary collaboration between social and natural scientists and participation of interested groups, including the public, in research activities.

In their article "Science and Experiment", Heiden and Zschocke (2012) analyze experiments in modern science, which tend to be attributed to subjective, random transgressive factors excluded from the sociological and philosophical studies of experiments. Research is the main activity of modern science; experiments are the main activity of modern research. Research activity is a search carried out on the border between knowledge and non-knowledge. This is a concise but accurate description of the scientific research.

According to B. Claude, "the results of the experiment are designed to reveal something about which the experimenter does not yet have an accurate idea" (as cited in Fleck, 1979, p.40). The history of science is full of facts about such amazing discoveries. Fleck (1979) once called them the "Columbus effect": "you were searching for India, but have discovered America".

Experiment is a form in which modern science has established rules that are subject to historical changes. This is linked to the variety of elements that make up the experimental setup. These elements are both material and social, cultural and epistemological. It is impossible to specify the ideal type or ideal mixture. Rheinberger and Judson (1987) argue that “each researcher follows his own scientific path.

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Some researchers make preparations long before the experiment and follow a predetermined path. I reached the field of science through detours, and I got rid of the rules by finding a place between disciplines that others may not have dared to do" (p. 149). This transgressive position led Rheinberger and Judson (1987) to new views on physiology.

The ultimate goal of science is to acquire new knowledge, and yet, one cannot foresee what is new.

Thus, our options are limited. Anything that is really new must may happen in a scientific experiment. The experiment may not end with the result expected by the researcher.

The history of science is rich in examples of missed chances in the analysis of experimental results, but there are numerous cases of unexpected side discoveries resulted from scientific experiments. Their significance depends on whether they have been noticed.

In 1895, W. Roentgen worked with a cathode ray tube. During the experiment, he noticed that the shielded tube with cardboard and platinum-blue barium began to glow and the nearby objects also began to glow in the dark. The attempt to block the rays was unsuccessful: objects that were placed in front of the tube were subject to the same effect. Then V. Roentgen put his hand in front of the cathode tube. This led to a discovery that was called "X-rays" (X-rays). The scientist replaced the tube with a photographic plate and obtained the first X-ray. This technology has been adapted by "medical institutions and research laboratories" (18 random scientific inventions and discoveries that changed the world).

In 1928, A. Fleming made an unexpected discovery: on his return to the scientific laboratory after hisa month's absence, he found moldy fungi in a bowl, which had contained staphylococcus colonies. Other cultures of bacteria were not affected. Fleming attributed the grown fungi to *Penicillus*, and called the isolated substance *penicillin*.

This discovery was published in a British journal, but the scientific world did not properly evaluate this fact. Until 1940, the scientist tried to find a way to use the discovery, conducting experiments on the rapid release of penicillin. But the scope of application of this substance was discovered by British scientists G. Flory and E. Chain, who initiated the era of antibiotics" (18 random scientific inventions and discoveries that changed the world).

According to Toulmin (1961), "in science new things are as often unexpected and unintentional as in nature" (p. 30). For example, these are physical methods in biology. The application of transgressive methods in molecular biology has led to tremendous advances. The methods of physics made it possible to reveal the position of each atom in the molecules of globular proteins, separate molecules that only slightly differ from one another, see biological macromolecules, observe subtle changes in the shape of biopolymer molecules in solution, etc.

Scientific research was continued by various methods. To study the movement of electrons through the object's substance, the change in their trajectories and scattering, the method of electron microscopy is used. In addition, thanks to this method, biological macromolecules can be used in an electron microscope, where these macromolecules are placed on substrates (the thinnest films). For the thinnest films, copper meshes are used as supports made by weaving or using an electrolytic method.

To study low concentrations of the substance when studying biopolymers, the method of spectropolarimetry of dispersion is used in biology.

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To study the ability of atoms to move to a higher level when absorbing a quantum of light with a certain frequency, the methods of infrared spectroscopy are used. They help to study light, which begins to be "absorbed" at frequencies that are equal to the frequencies of vibrations of atoms in a molecule. This method is used when studying the biological macromolecules using an electron microscope.

The X-ray structural analysis method is used to determine the spatial arrangement of atoms in molecules. The X-ray diffraction methods are used to study fibers and single crystals which differ from each other (Lloyd & Thacker, 1997).

Research of crystals of viruses and proteins. Many proteins are prone to crystallization. There are viruses that can crystallize, but they are represented by a complex of nucleic acids and proteins, the resulting crystals are faceted and have a three-dimensional crystal lattice.

Biological studies of fibrous (fibrillar) structures. Fibrillar structures form the basis of most tissues in a living organism. For example, horny formations, connective tissues, muscle fibers, and skin consist of fibrous proteins. Globular proteins are capable of polymerizing and forming linear aggregates that form fibers. The fibers can be produced by concentrating solutions of the tobacco mosaic virus (TMV); particles of this virus have an asymmetric shape. When studying the structure of biopolymer fibers, scientists made such fundamental discoveries as the DNA structure and the alpha helix (Alberts et al., 1994).

7. Conclusion

Thus, the methods developed in physics are widely used and of great importance in biology. The use of methods used in physics has contributed to the most important scientific discoveries in biology. In the humanities, transgressive research identifies contacts that open up new horizons in the study of sociocultural problems. Transgressive experimental systems in modern sciences can be viewed as structures that allow new discoveries to occur in the process of scientific research. In other words, they are structures that allow us to assimilate coincidences and a prerequisite for creating a form of coincidence that can be assimilated in this way.

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