International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878, Volume-8 Issue-3, September 2019

Randomness and Pattern: Social and Philosophical Perspective

Khabibullina Zilya Nailovna

Abstract: ***Themodernpictureoftheuniverseisalmostcompletelydescribedbyanumberoffundamentalscientifictheories. However, despite the presence of patterns that perfectly explain almost all the observed natural phenomena, the manifestation of random deviations remains a big problem. If, prior to the beginning of the twentieth century, each new theory relied on a solid experimental and factual foundation, today, probability has become an integral element, having a genuinely philosophical implication, for science. This article attempts to uncover the relationship between the accidental and the natural in terms of the natural course of development of philosophical ideas about necessity and chance.***

Keywords: randomness in science, the paradigm of necessity for Democritus, the paradigm of Epicurus, positivism, determinism, self-organization, synergetics.

I. INTRODUCTION

By the end of the XIX century, a fairly stable and seemingly consistent picture of the entire universe was obtained due to the efforts of scientists. The Newton' s laws of mechanics allowed to explain both the movements of celestial bodies and everyday life phenomena. The phenomena of electromagnetism, which had no explanation in mechanics, were convincingly analyzed by Maxwell - his differential equations still serve as a basis for electrical engineering and other applications of electrodynamics. Most scientists have tried to find a direct link between Newton's mechanics and Maxwell's electromagnetism, and even to derive one from the other. Thus the fact of homogeneity of space and time was admitted absolutely obvious. Moreover, time was also considered to be an absolute, evenly flowing over the whole universe.

For a long time, scientists have imagined the world around them as it was presented to us by our senses. At the beginning of the twentieth century, a real revolution took place in physics, which changed all the ideas of mankind about the fundamentals of the structure of the universe. Several scientific concepts appeared at once, such as quantum mechanics and the theory of relativity, which contradicted the classical concepts. This was also reflected in philosophy, which underwent a revolution in views simultaneously with the development of natural sciences [Inozemtsev, 2014, p. 116].

In general, randomness and patterns are reflected in the ordinary human consciousness, constituting a somewhat more complete and understandable concept of fate. Referring these or those events in life to random or absolutely natural (expected), we can find certain interrelations of existence of a particular individual, group, society, state, civilization. From this perspective, the question of the correlation of randomness and patterns looks interesting. This question worried though thinkers of the ancient world, who reduced it to determinism as a search for the reasons of everything happening in the surrounding world. At the same time, all everyday tasks were solved on the basis of the principle of patterns, when, for example, temples were built in a certain way, oriented to the Sun, the position of the Moon in certain periods, etc. Even then, the search for general patterns seemed extremely attractive and urgent [Levin, 2015, p.103].

Ancient Greek philosopher Democritus believed that the world is more governed by the law than by chance. This has entered history as a paradigm of Democritus' necessity. He was supported by Plato, who believed that the divine mind and reason of the philosopher (i.e., philosophers should govern the state) were an orderly and streamlined law, while everything else was more or less chaotic. Empedocles took a contrary view, forming the paradigm of the priority of randomness that forms the surrounding reality everywhere. These views were most strongly supported by Epicurus. Aristotle, on the other hand, was ready to recognize the accidental as an integral part of any subject, but only as a secondary one in relation to the natural [Inozemrsev, 2014, p. 116].

During European Middle Ages, the dispute acquired a frankly theological character, as Augustine of Hippo considered the will of God to be the supreme law, which predetermined everything in advance. The free will of man was considered a randomness. The famous distance dispute of Augustine and Pelagius became the most vivid form of reasoning on the priority of forces in the surrounding world. Later, as the influence of the church weakened, the dispute began to acquire a truly scientific character [Razin, 2015, p.10].

For rationalists represented by Descartes, Spinoza, Leibnitz pattern prevailed, as they approached to an explanation of any phenomena from the mechanical point of view, deducing strict judgments and proving on their basis new ones. Empiricists such as Bacon, Hume, Locke considered the manifestations of randomness only as a reason for an experiment establishing some more general patterns.

Manuscript published on 30 September 2019
* Correspondence Author
Khabibullina Zilya Nailovna*, Doctor of Philosophy, Professor, Department of Philosophy and Political Science, Bashkir State University, 32 Z. Validi str., Ufa, Bashkortostan, Russian Federation
(email: Habibullina_Z@mail.ru).

In general, the philosophy of the New Age searched for patterns, trying to tame the chaos of natural phenomena and events as much as possible. Newton's mechanics developed against this background was an excellent example of the correctness of
this approach [Razin, 2015, p.11].

In German classical philosophy Hegel managed to develop Aristotle's idea, finally ceasing to distinguish between random and natural, considering them as complementary manifestations of one whole process of development of an absolute idea. Later on the achievements of science and technology, changes in social, economic and historical realities gave philosophers more and more food for thought. Some of them deduced the considered categories directly from the peculiarities of human thinking, while others, for example, neo-positivists considered only logical connection between the notions, which they managed to find, to be logical. It follows from this that the randomness in case of finding such a logical connection also becomes natural [Razin, 2015, p. 12].

The philosophy of the leading scholars of the twentieth century was characterized by the absence of a core line: depending on the essence of the issue and the problem under consideration, they could act as materialists, as positivists, and as idealists. For example, the great Einstein constantly used a mental experiment, which played an outstanding role in the formation of a special theory of relativity. Therefore, it is no coincidence that Einstein saw any theory as a system of restoring order in the sensual perceptions of the human being. It follows from this that the theory does not reflect the objective patterns of the outside world. He often repeated that the introduction of the conceptual construct and systems consisting of these concepts has value only in terms of overcoming human insecurities due to impossibility to explain something.

Einstein believed that the very cognitions of the real world consists in the formation of the concept of corporeal objects and various types of corporeal objects. Further the man allocates those sensual perceptions which are repeated, and compares them with the deduced concept of object. In this case it is possible to trace the meaning of experiments, which try to analyze facts in order to order them. Therefore, human cognition cannot be considered true, as it is based on arbitrary positions. The ideas of positivism were clearly traced in these Einstein's judgments. However, despite this, for Einstein positivism was not a way to cognize the world, but to present the task of this cognition in all its complexity [Levin, 2015, p.98].

In general, the positivist approach did not satisfy many scientists and was not recognized by them as the ultimate truth. They considered positivism a philosophical prejudice. For the same reasons, Einstein rejected quantum mechanics, motivating the impossibility of spontaneous transition from describing the objects of the world to describing the probabilities of behavior of these objects. Einstein believed that the protection of statistical interpretation of quantum mechanics is the protection of positivist views. It was difficult to take an accident as a basis of the global theory. Criticizing quantum mechanics, scientists appreciated the conclusions that it allowed to make. However, true scientists do not accept solipsism, according to which there is no external world, and agnosticism, postulating the impossibility to cognize the world [Karpenko, 2014, p.119].

Today, it is almost impossible in order to explain the laws of the surrounding world to be a follower of a particular philosophical concept, as all scientific concepts are associated with the world of sensual perception, and therefore, there is no need to be afraid to independently connect the concepts with the world of feelings and become a little empiric in your studies, as it can be extremely fruitful for science. The art of being a philosopher is largely related to balancing rationalism and empiricism in relation to the real world. This is the only way to construct theory, not just as a compressed record of experimental facts, but as a reflection of the whole picture of the world in its interrelationships, which are not easily traceable from experience itself. Therefore, the theory cannot be based only on physical experiments: explaining a certain experience, it has no structure without internal contradictions [Mlodinov, 2010, p.213].

It is possible to prove the already existing theory by experience, but it is impossible to pave the way from the experiments themselves to the harmonious theory. Conclusions of the theory must be in accordance with experience, otherwise the theory will be empty and unnecessary. Experience acts as a test, as a general measure of evaluation of the theory, which has already been created. The scientist's task then is to find such patterns which do not come down to anything anymore. The fewer laws and concepts there are that are not based on anything and do not come down to anything, the better. It is also desirable that these laws be as simple and elementary as possible. Accidental as a factor does not allow to simplify the situation and can be considered as an additional obstacle.

Therefore, the statement of the theory is not just a fact of perception, but the formation of an integral logical system, the conclusions from which should coincide with the old and new sensations. It follows from this that there is a world outside of the human being and that the theory, together with experience, expresses this world. In this way, in our reasoning, we inevitably come to rationalism, without which modern knowledge can't be imagined.

One of the founders of rationalism, Descartes, was looking for the preconditions of knowledge from which all knowledge could be derived, when, having the initial link of the logical chain, we can follow the way of reasoning and consistently come to the truth. It is impossible for Descartes to comprehend the world completely, which is denied by modern science. The French mathematician and philosopher put forward a hypothesis about inherent ideas, which are given by the creator of the world. Such ideas he considered logic of Aristotle, geometry of Euclid, etc. While Descartes derives all the consequences from initial principles and congenital ideas, thus building some sequential structure in relation to any question or problem, the modern physical theory has an attempt to build a single closed structure describing the whole universe. So far, all attempts to create a single big theory have not been successful [Parker, 2001, p.125].

It should be noted that any theory describing the world is built only on the basis of logic, following the laws of reason, as the theory is a pure generation of reason. The task is to connect at least somehow the perception of man with the realities of the outside world. How the theory relates to the outside world can be deduced from the way it successfully explains this world, ordering it in our consciousness. The human mind builds a theory not from experience, yet not by chance, but by selecting those "bricks" of concepts, which are able to pass the outer world, meet the world of feelings, explain and order it. If the theory should respond to the facts, its components can be arbitrary, but necessary for logical consistency. Logic gives us an opportunity to do it, and for the general construction to justify itself, we need to choose laws in such a way that experience confirms the correctness. This idea belongs to the French mathematician H.Poincaré [Inozemtsev, 2014, p. 114].

The process of cognition should begin with the establishment of some experimental relations, which will connect the values with each other. There can even be contradictions here, but it does not matter. The next task is to connect everything logically. Sometimes this solutions takes many years. The result is a theory that not only summarizes some data, but goes beyond it, revealing real objective connections in the outside world. If the relationships found are correct, then the theory created will inevitably allow us to find objects and phenomena that were not previously visible. Thus, the theory plays a heuristic function [Parker, 2001, p.126].

II. ANALAYTICAL RESULTS & DISCUSSIONS

Correspondingly, the process of generalizing not just some ordinary events or experiments, but really fundamental ones takes place. In fact, any scientific theory follows this path. However, the theory of quantum mechanics did not find support among many scientists in spite of the fact that it was based on experiments from which its correctness followed. Probabilistic character of the electron in the atom did not satisfy and does not satisfy many people today. The theory seems fantastic, and the chosen causalities are wrong. It is about the inability to accept the probabilistic approaches to the description of the microcosm, that is, such approaches that do not give a strict and unambiguous answer. Today quantum mechanics is a recognized scientific theory, which is confirmed by many studies, including the synthesis of new chemical elements [Sorokina, 2012, p.132]. The main problem of randomness in science has always been the chaos caused by these fluctuations. Strict laws that allow predicting the behavior of any systems (primarily mechanical) have not been combined with unpredictability. This was the case before the discovery of the phenomenon of self-organization [Inozemtsev, 2014, p. 115].

One of the basic concepts of modern science is the system as a certain special set of objects united by common laws not only of existence, but also of development, evolution and transformation in time and space. It is remarkable that the general laws are found both in organic (biological objects) and inorganic nature. Mankind has cognized nature on several levels, from the microcosm with its paradoxical laws, different from the usual mechanics, to the universe as a whole as a global comprehensive object.

We have already noted a positive assessment in society of such properties as sustainability, confidence, predictability and pattern. Personal growth and development are associated with achievements and successes associated with generally accepted values in society. However, it is impossible to be ready for different unpredictable situations, and an individual cannot always act as he or she should. In life, in spite of all contingencies and situations of uncertainty, a person strives to prove his solvency and ability to be realized in any situation [Khabibullina, 2019, p.196].

At any level, there is a clear desire for self-organization, which became apparent relatively recently, as it was believed that if the entropy of the system can only grow, then nature must irreversibly strive for chaos. It turned out that this was not the case. The very fact that there are casualities often already forms a feedback phenomenon characteristic of any system, especially the one controlled by any process. Systems are studied mainly from three perspectives: the theory of synergetics of H.Haken, the nonequilibrium thermodynamics of Ilya Prigogine and the theory of catastrophes. All these approaches are characterized by the following unifying features of system behavior [Kochergin, 2014, p.36].

Firstly, the systems must be recognized as open and in reality this is usually the case. Our systems are non-equilibrium (i.e. there is a constant exchange of energy, matter and information in them), they do not possess stability and at a certain moment come into a state of "fall", a critical change of characteristics at the point of extreme bifurcation, that is, at the point where the system is located in the most unstable state. There comes a short state of chaos, but only for the period of phase transition (in the society of people it can be an economic crisis), followed by a transition to a new stable state, which is characterized by a much stronger orderliness and complexity of the processes taking place.

There may be several possible new stable states, such states are called attractors and their peculiarity is that it is impossible to predict what kind of system will be "chosen" by the system for its evolution. The state of bifurcation is very short and divides up long periods of stability. In addition, our systems represent dissipative structures, i.e., they transfer energy into the form of dissipated energy, for example, heat. This energy transition is called dissipation. The theory of catastrophes describes this process exactly as a sharp destruction, followed by stability and a new form.

Thus, the changes in the systems do not occur according to statistical calculations and forecasts, but contrary to the random deviations (fluctuations). The process of formation of new biological species is seen here, when a random mutation can be useful and will allow a certain population to stand out on a certain territory, to withstand natural selection and, finally, to form a new species, related to its root biological taxon. And the mutation is fixed at the genetic level, which is really tracked by methods of modern biochemistry and biophysics. It is the randomness and low probability of changes in the systems that does not allow predicting them and, therefore,

for a man looks like a catastrophe and chaos, and not a natural manifestation of the evolution of the surrounding world [Kochergin, 2014, p.38].

In recent decades, research in supramolecular chemistry and physics has helped to establish the ability to organize

oneself for some structures even under conditions close to thermodynamic equilibrium. One of the key concepts for the study of systems was the concept of information and its exchange between systems and the surrounding world [Inozemtsev, 2014, p. 116].

The current information situation is such that the real world and the virtual world are mixed up. A person often finds himself in a situation of quasi-choice, which deprives him of his freedom, pushing him into unpredictable actions. [Khabibullina, 2018, p.53]. Modern society, possessing a high degree of informativeness, creates a situation of uncertainty and randomness.

The world science of the second half of the last century made two large generalizations, which changed the whole view of the world. These are the presence of quasi-stochastic regimes for certain areas of deterministic systems and understanding of possible self-organization in space and time for initially homogeneous systems under the influence of random processes. These achievements are of great importance for the structuring of all our knowledge of systems. Including real economic systems in which human society functions. Therefore, for the modern picture of the universe, randomness is rather a part of the general fundamental patterns than an antipode of strict laws discovered by scientists.

REFERENCES

1. Inozemtseva Yu.V. Categories of necessity and chance in philosophy, science and social knowledge // Izvestiya Moskovskogo gosudarstvennogo tekhnicheskogo universiteta MAMI [News of MSTU "MAMI". 2014]. No. 2 (20). V.5. P.113-117.
2. Karpenko I. A. The problem of connection between quantum mechanics and reality: in search of a solution.-Epistemology & Philosophy of Science, 2014. No. 2(40). P. 110-126.
3. Kochergin A. N. Processes of self-organization in natural, social and cognitive systems. - Nauchnyy vestnik MGTU GA [Scientific Bulletin of MGTUGA], 2014; No. 203. P. 36-42. (In Russ.) https://doi.org/10.26467/2079-0619-2014-0-203-36-42
4. Levin GD Necessary and random in reality and knowledge // M.: Filosofiya nauki i tekhniki [Philosophy of Science and Technology]. 2015. V. 20. No.1. P. 82–106.
5. L. Mlodinow.(Ne)sovershennaya sluchaynost'. Kak sluchay upravlyaet nashey zhizn'yu[(Not)quite by accident. How chance governs our lives]. – M.: Livebook/Gayatri Publ.,2010. 352 p.
6. Parker B. Mechta Eynshteyna: V poiskakh edinoy teorii stroeniya Vselennoy [Einstein's Dream: In search of a unified theory of the Universe]. — SPb.: Amphora Publ., 2001. 333 p.
7. Razin A.V. Freedom and necessity. - M.: Vestnik Rossiyskogo universiteta druzhby narodov. Seriya: Filosofiya. [Bulletin of the Russian University of friendship of peoples. Series: Philosophy]. RUDN Publ., 2015. No. 2. P. 9-15.
8. Sorokina N. K. Modern quantum mechanics and some actual problems of integration of physics and philosophy. - Integratsiya obrazovaniya [Integration of education], 2012. –No. 4. - P. 36-41.
9. Khabibullina Z.N.Social choice as an accident // O vechnom i prekhodyashchem. Sbornik nauchnykh trudov [About eternal and transient. Collection of proceedings]. No. 9: –Ufa: RITS Bashgu Publ., 2018 - 148 p. P.50-54.
10. Khabibullina Z.N., Mezit Yu.V. (2019) Neobkhodimost' i sluchaynost' v sotsial'nom razvitii [Necessity and accident in social development]. Kontekst i refleksiya: filosofiya o mire i cheloveke [Context and Reflection: Philosophy of the World and Human Being], 8 (1A), pp. 191-198.