Cosmos and History: The Journal of Natural and Social Philosophy, vol. 16, no. 1, 2020

ON THE ONTOLOGICAL STATUS OF OBSERVATIONS

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ABSTRACT: The problem of observations is one of the cornerstones of science. It connects with several ontological, epistemological and methodological questions. The nature of science depends on how we answer these questions. Modern science is at the stage of a new revision of its fundamental basis. In addition to science, the problems of the essence of observations and the status of an observer are actively discussed in modern philosophy. Such philosophical trends as speculative realism, etc., tend to resume the old discussion about the role of the observer in the study of natural phenomena. This is done based on modern scientific discoveries and theories. The solution to the problem of observation is important for the further development of quantum physics and other branches of natural science. However, there are several difficulties in achieving this goal. One of them is the inadequacy of the concepts of scientific language to describe the ontological specifics of observations. The concepts of a scientific language tend to reduce or to simplify a complex phenomenon to a monosemantic description. At the same time, there is an aspiration to connect the ontological nature of observations with the functioning of human senses. We study this situation with the example of one of the new articles devoted to the problem of the essence of observations and their role in the construction of a scientific model of the world.

KEYWORDS: Observations; Ontological position of observer; Quantum physics; Speculative realism; Participatory anthropic principle; Quantum consciousness.

I. INTRODUCTION.

The problem of observations is one of the oldest problems of philosophy and science. Lots of great philosophers and scientists from Plato and George Berkeley to Werner Heisenberg and Niels Bohr tried to solve it. This problem concerns not only the question of the epistemological foundations of scientific activity but also the fundamental question of the ontological nature of the objects of reality. Drs. Vipul Arora and Laxmidhar Behera in the 14th Volume of *Cosmos and History: The Journal of Natural and Social Philosophy* again raised the question of the ontological status of observations in the context of modern physics achievements in the cognition of nature (Arora & Behera, 2018). The previous attempt to solve this problem within the framework of science led to a serious revision of the fundamental concepts. Quantum physics faced with the inability to use the classic concepts and terms, which based on our everyday experience, for describing the phenomena of quantum reality. The solution of this problem was the creation of the mathematical apparatus, the semantic correlation of which with sensually perceived reality was not obvious. However, the constant revision of the scientific paradigm doesn't suit many scientists. Vipul Arora and Laxmidhar Behera try to create the conception of observations that will be resistant to the revision of scientific theories. In this paper, we analyze their new variant of the ontological view on the role of observer and observations.

II. SENSES AND DETECTORS.

Any concepts and definitions are the results of the abstracting, i.e. the mental activity of separating the nonessential properties of objects from their main properties. The nonessential properties may be ignored in the future cognition of the object according to the subject's goals. We need to do this because reality has an infinite variety of properties and qualities. The human intellection can't get to cognate all of them. Contrariwise an abstract concept, which is the result of abstracting, can be meant as a mathematical symbol that has unambiguous meaning. Unfortunately, the vast majority of our concepts come from sensual experience and depends on the features of human perception and thinking. This gives the reason for some philosophers to talk about the fundamental falsity of information coming to us from the senses. Moreover, there are some limitations in using an everyday language for the formation of scientific theories. Neo-positivistic and analytical traditions in the philosophy of science are trying to solve this problem from the time they appeared to this day. However, there is an opinion that this problem is not fundamentally solvable and it is impossible to completely formalize the scientific language. This conclusion is also deduced from Gödel's incompleteness theorem. After its creation, several mathematical and logical theories studied the features of formal systems including the formalized language of science. We can conclude that: 1) notions, which were abstracted from our senses, shouldn't be regarded as absolutely appropriate to the properties of reality; 2) all scientific theories are the models of reality which are influenced by features of human perception and thinking. Metaphorically we can say that we have to study the 'Kantian things-in-themselves' while being in the 'Platonic cave', whereas our thinking is weighed down by 'Baconian Idols of the mind'.

Drs. Vipul Arora and Laxmidhar Behera wrote that they 'present a notion of primary properties where the observer plays an important role' (Arora & Behera, 2018, p. 253). If one does not take into account the various variants of subjectivism and solipsism, this is a very bold statement in the philosophical sense. Their mathematical and epistemological models are very promising but also contain many difficulties. One of them is a kind of semantic reductionism. They used to apply words like a 'sense' and 'detectors' without specific content. Thereby the important problem of philosophy and science is avoided. We suppose that the concept of a detector is broader in its logical content than the concept of a sense organ. So, we can reason at least about the three types of detectors: 1) the sense organ (as an integral part of the organism, which has a nervous system); 2) the detector (as a technological system); 3) the 'natural' detector (as an integral part of the natural object, which has not a nervous system). In the latter case, we are talking about an open, non-equilibrium system that is capable of exchanging matter, energy and information with the environment. But in the context of this discussion, we are interested in the first two points. All types of detectors are influenced by a kind of prerequisites: the natural laws and scientific theories (which are correlated with the natural laws in turn). That is why the conversation about detectors, in general, should serve only as an introduction to the study of specific cases. It is necessary not only to affirm that certain concepts of physical quantities can be abstracted from concrete senses or indications of detectors. It is necessary to take into account the non-absolute status of detectors or sense organs relative to reality. In some form, this problem is posed by Drs. Vipul Arora and Laxmidhar Behera as a problem of primary and secondary qualities. But their proposition that the primary properties of reality can be abstract out from our senses or detector information can be questioned in turn.

Let us try to imagine the world, where all people are blind. Or, if we want to use scientific language, let's model the world, where all the 'observers' cannot 'observe' electromagnetic waves in the visible spectrum. According to the Vipul Arora and Laxmidhar Behera's logic (Arora & Behera, 2018, pp. 250-251) classical mechanics could not able to be created in this world. Because of the inability to see the movement of objects, we could not create a theoretical notion of mechanical motion as a change in the spatial position of an object over a certain time. Although hearing and tactile sensations can partially replace vision in this matter, the theoretical mechanics based on them would be completely different. Moreover, according to these scientists' logic, reality would lose some of its basic properties, because the necessary 'observations' would be absent. This conclusion arises from their reasoning. And then it remains to take only one step to come to the position of absolute subjectivism or solipsism. We are sure that this is not the goal of these scientists. However, willy-nilly, they again updated the old famous philosophical question: do roses smell if nobody sniffs them?

Modern science has a vivid example of what happens to the cognitive abilities of a particular person if one or several feelings are not available to him from birth. We mean lots of facts of people, who are suffered by Usher syndrome since birth, i.e. who are blind and deaf. The best known in the USSR and Russia person, who was suffered by Usher syndrome, was Olga Skorokhodova (another woman with a similar fate, Helen Adams Keller, is more known in the USA and Europe). She wrote several books about how she imagines the world around her. She said: 'Many people have asked me whether I have any idea of colours. Some people have even asked me whether I can feel different colours. My reply to both these questions is 'Of course not'' (Skorokhodova, 1974, p. 13). She also said about phenomena which she could not able to imagine: 'I am constantly obliged to use the language of people who can see and hear, for there is no separate language for the blind and the deaf' (Skorokhodova, 1974, p. 14). According to her idea, the primary qualities of objects are not depended on their perception. Objects have not any 'colours' for blind people, but objects still have the property of electromagnetic radiation. Also, all chemical reactions occur without smelling, sound waves spread without hearing, etc. That is, the removal of an observer's ability to perceive the world around him does not remove from the world any primary properties (although it seems quite interesting question how physical science could be organized in the world of blind or deaf 'observers'). Thus, removing any of human senses from the model of the world leads to the impossibility of the existence of the whole model but not of the whole world.

Another point of view on this problem is developed in several scientific and philosophical theories, according to which there is a joint development of the Universe and man as its observer. One such idea is the 'Participatory Anthropic Principle' (PAP), a version of a Strong Anthropic Principle. We will discuss it below. For this section, more relevant is the discussion of modern ideas about the quantum nature of consciousness. Henry Stapp, an American mathematical physicist, is developing one of these concepts. We have no purpose to fully analyze all his ideas. Focus only on one, important for our paper. Unlike the prevailing opinion about the fundamental incomprehensibility of quantum mechanics for our mind, he writes that 'Yet in the final analysis quantum mechanics is more understandable than classical mechanics because it is more deeply in line with our common sense ideas about our role in nature than the 'automaton' notion promulgated by classical physics' (Stapp, 2011, p. 7). To a certain extent, Stapp's idea that 'The observer does not create what is not potentially there, but does participate in the extraction from the mass of existing potentialities individual items that have interest and meaning to the perceiving self' (Stapp, 2011, p. 8) Skorokhodova's thought continues. Thus the sense organ and human consciousness do not create objects or their properties. They make it possible for them to exist in one specific state, which occurs after the collapse of the wave function. 'The collapse events in conventional quantum physics are, in fact, psychophysical: each one has both a psychologically described aspect, corresponding to an increase in knowledge, and also an associated reduction of the (physically described) wave packet (quantum state) to one compatible with the gain in knowledge' (Stapp, 2011, p. 122).

However, we can imagine a model of the interaction of the universe and the human mind in a different way. What if the senses act in the opposite direction and information from the outside world forces our consciousness (in the case of a quantum nature) to 'collapse' to one state? In other words, the Universe does not need us so that, thanks to our observations, it exists in a certain state. But we need the Universe so that our consciousness, our mind can exist. Something similar we can find, for example, in the Matthew P. A. Fisher's works. He explores the phenomenon of quantum entanglement between neurons, which occurs as a result of physicochemical processes in our nervous system. When the information supplied by our senses from the outside world is 'translated' into the 'language' of chemical reactions that is understandable to our nervous system, a correlation occurs between different neurons. This can be interpreted as the quantum effect of the collapse of the wave function of our consciousness and its reduction to one state.

> 'The phosphorus nuclear spins in phosphate ions serve as qubits, pairwise entangled during hydrolysis of pyrophosphate, engulfed and protected inside Posner molecules, inducing entanglement of the nuclear spins and rotational states of multiple Posner molecules, which can be transported into presynaptic glutamatergic neurons during vesicle endocytosis, with intra-cellular calcium being released by subsequent binding and melting of the Posner molecules, stimulating further glutamate release, thereby enhancing, and quantum-entangling, postsynaptic neuron excitability and activity!' (Fisher, 2015, p. 600).

Similar problems arise when we talk about the essence of the technical detectors. The most important question for this discussion is 'theoretical conditionality' of any technical detectors. Vipul Arora and Laxmidhar Behera described experiments with electron and concluded that 'Instead of assuming an absolute entity called electron and trying to formulate an absolute picture of it, we can talk in terms of a relational entity related to different detectors in characteristic ways' (Arora & Behera, 2018, p. 255). But any detector is a device, which was made by a human. It is meant that any detector is determined by scientific theory (or by primitive technical practice if we talk about society without science). If we use 'detector A' for experiment with the subject we get 'result A'. If we use 'detector B', which bases on another theory, we get 'result B'. Both results give us different information about the object, and that situation can lead to a different understanding of the essence of the object. Niels Bohr wrote of this paradox:

> 'Within the scope of classical physics, all characteristic properties of a given object can in principle be ascertained by a single experimental arrangement, although in practice various arrangements are often convenient for the study of different aspects of the phenomena. In fact, data obtained in such a way simply supplement each

> other and can be combined into a consistent picture of the behaviour of the object under investigation. In quantum mechanics, however, evidence about atomic objects obtained by different experimental arrangements exhibits a novel kind of complementary relationship. Indeed, it must be recognized that such evidence which appears contradictory when combination into a single picture is attempted, exhaust all conceivable knowledge about the object. Far from restricting our efforts to put questions to nature in the form of experiments, the notion of complementarity simply characterizes the answers we can receive by such inquiry, whenever the interaction between the measuring instruments and the objects form an integral part of the phenomena' (Bohr, 1963, p. 4).

We quoted such a large fragment of Bohr's article since this idea plays an important role in the structure of non-classical scientific rationality. We can affirm the dependence of the measurement results on the selected device and, accordingly, on the chosen theory. The theory, in turn, depends on the scientific paradigm, which tends to change during periods of scientific revolutions (Kuhn, 1996, p. 111). Therefore, we should recognize the Vipul Arora and Laxmidhar Behera's idea about 'modelling relationships amongst observations, without imposing any assumptions on the nature of underlying reality' (Arora & Behera, 2018, p. 248), as very difficult to implement.

III. THE ONTOLOGICAL POSITION OF OBSERVER.

Developing their ideas, Vipul Arora and Laxmidhar Behera use as synonyms such concepts as 'world' and 'reality'. But this is unacceptable if we are on the philosophical point of view. Authors are in captivity of 'pre-conceived notions', although they write in the article about the necessity of the avoiding of that (Arora & Behera, 2018, p. 256). We should divide the semantic meaning of these notions. We suppose that the notion 'world' in the context of our discussion means external and independent of the observer thing. 'World' can exist without any observer. If tomorrow all people cease to exist, 'world' will continue to exist. In its turn, the English word 'reality' is connected with the verb 'to realize', which denotes the activity of our consciousness and thinking. Therefore, we can only talk about the connection of observations with 'reality', but not with the 'world'. The reality, like a result of the interaction between our consciousness and the external world, depends on both the observations and the primal properties of objects. In this case, it is possible to speak of observations as building blocks of reality.

We have already mentioned that there are several scientific and philosophical theories, which pay lots of attention to the role of observer. For example, according to John Wheeler's idea, it follows that “observers are necessary to bring the Universe into being” (Wheeler, 1977, p. 27). This point of view, very flattering for mankind, is well correlated with the position of the authors under discussion. Participation of the observer in bringing the Universe into the state of existence implies a special ontological status of observations. We do not aim to discuss the problem of the observer in terms of quantum physics or cosmology deeply. However, the problem of the ontological position of the observer needs to the philosophical conclusion. We will try to solve it in terms of speculative realism, which is one of the modern concepts of philosophy. The most important for our discussion thesis of the speculative realism was formulated by Quentin Meillassoux. He wrote:

> “We shall therefore maintain the following: all those aspects of the object that can be formulated in mathematical terms can be meaningfully conceived as properties of the object in itself. All those aspects of the object that can give rise to a mathematical thought (to a formula or to digitalization) rather than to a perception or sensation can be meaningfully turned into properties of the thing not only as it is with me, but also as it is without me” (Meillassoux, 2008, p. 10).

In this sense, it turns out that "mathematics" is the fundamental basis for the existence of objects, since it can exist without "mathematicians" or observers, in the context of our conversation. We are not talking about the Pythagorean ontologization of numbers or hypostasis of intangible objects. The ability to be expressed in the language of mathematics is equivalent to the ability to exist. Therefore, quantum phenomena that can be expressed in the language of mathematics (even without the fact of this expression) exist and can be understood by our mind. That strong thesis gives us an initial basis for combining the efforts of philosophy and science in solving the problem of the observer. The Kantian tradition in philosophy studies in a special way the relationships between the subject of cognitive activity and the external world. We can describe this special way as a ‘correlationism’. “By ‘correlation’ we mean the idea according to which we only ever have access to the correlation between thinking and being, and never to either term considered apart from the other” (Meillassoux, 2008, p.

13). So, if we tell about the abstracting of physical quantities from the sensations of our sense organs, we follow the path of correlationism. In this case, we can't affirm that the observations can be building blocks of the world or at least reality. Numerous facts of deception of feelings, limits of subjective cognitive activity, etc., which had been well known since the Antiquity, will not allow us to do this. However, the special parts of mathematics give us lots of new opportunities to explore the objective qualities of the external world. Therefore, we categorically welcome the Vipul Arora and Laxmidhar Behera's attempts to build "a mathematical framework of relational properties" (Arora & Behera, 2018, p. 257).

Next, when we talk about something that wasn't and couldn't be directly observed, we must take the observer's role in studying this phenomenon differently. For example, when science tries to describe the initial stage of the development of our planet, it faces certain difficulties.

> "Since we do not know of any observer who was there to experience the accretion of the earth - and since we do not even see how a living observer would have been able to survive had she experienced such heat - all that can be formulated about such an event is what the 'measurements', that is to say, the mathematical data, allow us to determine: for instance, that it began roughly 4.56 billion years ago, that it did not occur in a single instant but took place over millions of years - more precisely, tens of millions of years - that it occupied a certain volume in space, a volume which varied through time, etc." (Meillassoux, 2008, p. 24).

Quantum phenomena can be even less accessible for our observation than the example given above. We can describe them with the Schrödinger wave function, but its real physical meaning eludes the ordinary consciousness of a human. And if indeed an observer is necessary for the existence of the Universe, according to Wheeler's conjecture, therefore it is necessary to rethink our understanding of the essence of the observer. We are used to the fact that the observer is always anthropomorphic, has a human mind and will. It is this observer that is necessary to create a science that will study nature based on observations. But is such an observer really necessary to create the Universe? Such an observer may be either God, the statements of which in this case we would like to avoid, or the self-observing Universe. There is one question, which solution is out of the goal of this paper, about the ontological nature of artificial intelligence as an observer. We also can develop our thought about the 'natural' detector as an integral part of the natural object, which has not a nervous system. As a result, we come to the provocative idea that observations can exist without any observers in the traditional sense. In other words, the ability of an object to perceive information from another object makes it a kind of 'observer'. In this case, one can try to create a scientific theory that considers the relationship between 'observations' as the information basis of the world. This observer is the part of the observable in the ontological sense. With the help of this assumption, a certain logical contradiction, which arose in the study of quantum phenomena, is eliminated. Now we don't need to formulate statements about quantum reality that are fundamentally impossible in terms of common-sense experience.

IV. CONCLUSION.

There is a successful example of the observer problem solution. Since science created useful methods for determining the absolute age of rocks and objects, in general, we have got an opportunity of the revision of the philosophical problem of the observer in the field of geology. We have got the tool for making the independent measuring scale of the geological processes. With all the shortcomings of the methods of radioactive analysis, now we have a workable model of geological stratification. Thus, it was possible to solve the problem also related to the ontological status of the observer. Scientific statements on the problem of 'ancestrality' (in the terms of the speculative realism) received a new logical and epistemological status. Methods of radioactive analysis are the link between the descriptive part of geology and mathematical discourse. This discourse in its turn is characterized by "mathematics' ability to discourse about the great outdoors; to discourse about a past where both humanity and life are absent" (Meillassoux, 2008, p. 47). But the method of radioactive chronology is inherently connected with the solution of some problems in the field of quantum mechanics. Therefore, the solution to this problem will allow success in several branches of science. From ourselves, we can add those mathematics can reason not only about the past, where there was not a human observer but also about quantum processes where a human observer can't be in principle. We hope that the Vipul Arora and Laxmidhar Behera's efforts to study the problems that have been discussed above will be successful and allow us to form a new view of nature.

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REFERENCES

Arora, V. & Behera, L., 2018. Observations: The Building Blocks of the World. *Cosmos and History: The Journal of Natural and Social Philosophy,* 14(1), pp. 247-258.

Bohr, N., 1963. Quantum physics and Philosophy: Causality and Complementarity. In: *Essays 1958-1962 on Atomic Physics and Human Knowledge.* London: Wiley, pp. 1-8.

Fisher, M. P., 2015. Quantum cognition: The possibility of processing with nuclear spins in the brain. *Annals of Physics,* Volume 362, pp. 593-602.

Kuhn, T., 1996. *The Structure Of Scientific Revolutions.* 3rd ed. Chicago and London: The University of Chicago Press.

Meillassoux, Q., 2008. *After Finitude: An Essay on the Necessity of Contingency.* London: Bloomsbury Academic.

Skorokhodova, O., 1974. How I perceive the world around me. *The UNESCO Courier*, 10 March, pp. 11-14.

Stapp, H. P., 2011. *Mindful Universe: Quantum Mechanics and the Participating Observer.* 2nd ed. Berlin: Springer.

Wheeler, A., 1977. Genesis and Observership. In: R. E. Butts & J. Hintikka, eds. *Foundational Problems in the Special Sciences.* Dordrecht: Springer, pp. 3-33.