Do the laws of physics lie?

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Cartwright (1983) claims that the laws of Physics lie. There is causal power of things and specific interpretation of objects, which make the author reconsider the basic concepts of physics. First, the core idea of Cartwright is to underline the main goal of physics or the description of things happening around. Physicists accumulate some data, process them and summarize them to get general laws of physics. The author argues that in fact these laws cannot clarify a real state of events and they are used like artificial blocks of summarized ideas. She refers to Newton’s law of gravity and describes electrostatic attraction, but this law does not explain the events happening in the world. She wonders if the laws of physics correlate laws of ideal circumstances or they really refer to causal powers. In other words, the author correlates both the opposition of law and the role of philosophy. The descriptive power of physics is beyond any doubts. It is more important to focus on factual laws rather than on descriptive ones. The role and essence of laws if they represent a factual basis is clear for Cartwright. A more powerful aspect of laws in physics is their descriptive potential. If all these laws are only about description, why should humans perceive them as true ones? These and other related considerations occur in the minds of readers.

Though some things are identified as ‘ the laws of physics’, these laws can describe one or another situation in a partial way. The real situation from life requires a diversified and multifaceted approach. The laws of physics are applied to some parts of real situations. Physics does not describe what really happens. Through an empirical perspective, these words mean that some events really happening and they should be observable.

Cartwright underlines that these explanations if correlated with the laws of nature define the essence of causal powers, which are not obvious and evidently observable. There is a need for distinguishing between " thing that happens as a matter of observable, empirical fact, from ' hidden causal structure" (Cartwright, 1983, p. 55). It is possible to agree with the author but also it is necessary to focus on other issues. For example, are any other forces involved? What are the essence and the main meaning of these laws? Of course, the author claims about idealistic conditions as non-violating of physics law value. What about other cases when conditions are violated and no perfect surrounding is given? Another idea is to suppose the existence of idealistic laws, which will be effective in different cases. This is a matter of a super law question. Cartwright answers to this idea in two perspectives: first, humans cannot always generate super-laws. Secondly, the existence of Newtonian mechanics and a concept of vector support the idea of idealistic laws. In such a way, it would be possible to explain what happens and there would be a chance to explain any given situation. It is possible to agree with the author of this article that physical laws create ideal conditions for explanation or explanation of some events or objects. In the case of idealistic conditions violation, the laws of physics are inefficient.

When applying the concept of ' phenomenological laws', Cartwright would support the idea of their descriptive power. Basically, Cartwright evokes considerations about facticity of laws and their explanatory power. From the point of view of the author, causes explained by laws are more important than their factual role in the world. Of course, the author agrees that the laws of physics confirm some facts, but it is difficult to observe these facts.

They cannot be easily traced for sure. I totally agree with the claim that only something that is evident defines a factual basis or concerns some facts. Otherwise, any avoidance of facts underlines insufficiency of a hypothetical or potential theory.

It is possible to argue with Cartwright's ideas and consider the following example: after Einstein's work on the photoelectric effect, the photon became an integral part of our understanding of light. Nevertheless, there are many other scientists involved in optics, who challenge the reality of photons. In terms of fundamental theories, a photon is an artifact of existing theories. For example, if to refer to some background knowledge, Lamb does not believe that the existing theory of light is absolutely wrong. He believes that a more reliable theory will retain most of the current views on light, but will show that the effects we associate with photons will be transferred to another aspect of nature. From this perspective, a scientist may be a realist in general, but an anti-realist in relation to photons. Therefore, there are some elements, objects or events associated with a factual basis. Even if some researchers agree upon the existence of one or another object or process, they should prove their point of view basing on some reliable data or facts. Unseen or unproven suggestions do not relate to science.

Such partial anti-realism is the subject of optics, but not philosophy. Nancy Cartwright defends the principle of causes. In her opinion, if there is a reason, it is possible to make a serious statement. Reasoning plays an important role in the ideas of Cartwright. It is better to realize why a certain type of regularity leads to a certain effect. Perhaps, the clearest proof of this understanding is that we actually use events of one type in order to produce events of another type. Therefore, in her words, positrons and electrons should be called real, because we can spray them on a niobium drop thereby changing its charge. It is quite clear that this will happen in the result of spraying. In other words, a process (spraying) reveals certain features of analyzed elements. There are some particular experimental instruments, which will lead to these effects. It is possible to talk about the reality of electrons, not because they are basic structural elements, but because we know about their rather specific causal forces.

Cartwright goes further. She denies that the laws of physics establish the facts. She also denies that models that play a central role in applied physics are literal ideas about the arrangement of some things. She is an anti-realist about theories and a realist about objects. Her objective consideration about different objects or facts is of vital importance for setting the limits between science and philosophy. Thus, there is no true theory of electrons penetration in the structure of atoms, molecules, and cells. Rather, there are certain models and sketches of some theories. Cartwright emphasizes that in some areas of quantum mechanics a researcher regularly uses a whole arsenal of models of the same phenomenon.

No one thinks that any of them is complete truth, and these models may even mutually contradict with each other. All of them are intelligent tools that help us understand different phenomena and develop different aspects of technology experience. They explain some principles of correlated processes and create favorable conditions for the development of new and unimaginable phenomena.

What really “ makes things happen” is not a set of laws or a set of true laws. In fact, there are no true laws forcing anything to happen. Actions are produced by electrons and other related elements. Electrons are real and they produce some actions. This is a good example of reversing the empiricist tradition. According to this approach, only regularity and repetition of events are real. Cartwright, in the same manner, says that there are no deep and perfectly uniform regularities in nature. These regularities, she believes, are only a method of constructing theories, with the help of which humans try to understand the world of things. She produces a radical doctrine, which can only be understood in light of its detailed consideration.

Cartwright focuses on the essence of entities and claims that, on the one hand, modern physical science is responsible for such technical devices as lasers, optical fibers, electron microscopes, superconductors, etc. Cartwright agrees with the existence of fundamental physical theory. The author points out that the standard “ conclusions” of the phenomena underlying these technical devices are mediated by ad hoc auxiliary hypotheses, mathematical suppositions, and phenomenological constants. Mathematical conclusions fit with the context of physics. In other words, if applied in certain experiments and under ideal conditions, laws of physics can be effective.

For example, lasers and superconductivity exist on their own, and quantum electrodynamics is a separate fundamental and explanatory entity. That does not mean that the elementary particles electrons, protons, and neutrons can cause some effects, but in their essence, they do not exist as an entity. Human confidence in their existence rests not on belief in the validity of the fundamental theory, but on the possibility of manipulating these objects in studied conditions. Cartwright raises an important question of the scientific truth and its fundamental importance. Applied studies often underestimated technical sciences, and final conclusion of Cartwright creates an “ iron curtain” between fundamental and empirical laws and raises a number of doubts. Can theory exist without practice? If the laws of physics are ineffective, why they are widely applied in different research fields and human activities? What is the main role of theory? Maybe, the theory of physics is nothing more than a chain of assumptions or approximations? Anyone who used approximation methods that constitute at least half of the ways to solve problems that are significant in the sciences knows the following. In order to provide an approximate solution, when the main equation is not exactly solved, the exact definition of related parameters is a necessary condition for further successful implementation of these parameters.

For example, in the general theory of relativity, we have no general exact solution of the Einstein equations. But we can, for example, find approximate solutions to these equations for weak gravitational fields to get some conclusions from the Newtonian theory of tension if to apply the correspondence principle with the gravitational physics. In order to find approximate solutions, we decompose the metric in a series in powers of the gravitational potential and neglect quadratic and other terms. How can we get an approximate solution without the Einstein equations?

It is possible to conclude that structural realism allows one to “ grasp” the continuity of the transition of the mathematical formalism of the “ new” theory into the " old" formalism required by the correspondence principle. Cartwright concludes, " There is a simple, straightforward view of laws of nature which is suggested by scientific realism, the facticity view: laws of nature describe how physical systems behave. This is by far the commonest view, and a sensible one; but it does not work. It does not fit explanatory laws, like the fundamental laws of physics" (Cartwright). A standard narration of laws, " *If* there are no charges, no nuclear forces, . . . *then* the force between two masses of size *m* and *m′* separated by a distance *r* is *Gmm′*/ *r* 2" (Cartwright, 1983, p. 72).

These laws are perceived as true and objective ones. What does this law explain? " The laws of physics, to the extent that they are true, do not explain much. We could know all the true laws of nature, and still not know how to explain composite cases. The explanation must rely on something other than law" (Cartwright, 1983, p. 73). Of course, the value of explanation in science is very important. Scientific explanations use laws. Finally, the author claims, " If the laws of physics are to explain how phenomena are brought about, they cannot state the facts" (Cartwright, 1983, p. 73).

The author raises a question between factual content and explanatory power. From this perspective, a complex phenomenon one can explain in terms of the interplay between simple and causal laws. What is the main message of these laws? The operation of these laws, if they are isolated or in their interaction, should be the same. The author thinks that it is rather problematic to apply one law to describe or explain different things. If several unrelated factors are involved, how can one law explain one or another phenomenon if the conditions are not ideal ones? These and many unanswered questions make the readers think more and more about the main message sent by Cartwright.

References

- Cartwright, N. (1983). How the Laws of Physics Lie? Oxford Scholarship Online.