Forum

In Response to Kalanov: How Many Truths Exist in Science?

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Abstract

During past five thousand years, scientists have used all existent approaches. Owing to their subjectivism the scientists turn each time from one approach to the other. Old theories were replaced by the new theories, which were more appropriate to modern stand of spirit of the people. Thus, what is necessary to be done now, if a modern scientific theory is not true? Is it sufficient to correct the Bacon law or is it needed something else? I think that first of all it is necessary to construct a new theory and then publish the new theory in an Open Journal System such as the Prespacetime Journal. And then maybe much patience is needed within the next 100 years to wait until the scientific society accepts this new theory.

Key-words: truth, science, new theory, patience.

1. Some definitions

What is science? Science is a method of obtaining the answer to a question in order to gain some benefit for people. People can answer on the base of own ideas; this method is named idealism. People can answer, comparing own ideas with observation in nature; this method is named materialism. Until today people use both methods.

Science as a method is expressed through a language. The special language, symbols of which connect to the objects of nature and their motions, was invented by men for science and named mathematics. The mathematical method to obtain the answer in some area of natural phenomenon is science theory. What is a truth in science theory? Truth is the answer, which a person gives about a phenomenon and which he believes that describes best the reality. In the framework of idealism each person has his own answer. In other words, a great number of truths exist here. In this case we do not have a constant (invariant) picture of the phenomena. Therefore it is not interesting to consider this case.

Since Nature is only one, in framework of materialism only one answer to each question must exist as well as one picture about each phenomenon. Thus, here truth in science is answers, which Nature gives. However, people are the ones who take these answers from nature. This fact and the requirement "in order to get some benefit for person(s)", makes a truth in science have some subjectivism. Methods that are used in order to obtain the answers from Nature are named the methodology of science. Methodology of science is a number of regulations. Therefore they are the subjective laws.

Thus, a truth in science can be considered in connection to scientists, as subjective sentient beings, and in connection to scientific theory, which must be independent from scientists. Truth in connection to individual scientists is not science methodology problem, but social problem of ethic and crime. This is not our theme; it is problem of laws of states and of international laws. Truth in connection to scientists as a world society is also not a science problem, but is a problem of trust in conventions, which the scientific society accepts. We cannot have an influence upon its decisions. Therefore, the only thing that makes sense to discuss is the methodology of science and the science history.

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The basis of methodology of scientific theory is nowadays a law (which conditionally can be named "Francis Bacon law of science methodology" (http://plato.stanford.edu/entries/francis-bacon/): "*Global scientific society consents that any theory is truth, if it is in agreement with experimental results when experiments are invariant with respect to the space, time, experimentalists, technical means and some other conditions*." In short, Bacon law say: "*The coincidence of theoretical results with experimental results is the truth in science*".

As the science development shows, there is some incompleteness in the Bacon law: this law says nothing about the method of construction of theory and about theory structure. Today at least two different theory constructions and theory structures exist, which are in complete accordance with Bacon's law. According to R. Feynman these two variants can be named "Babylonian approach" and "Greek approach" (they can also be named "algorithmic approach" and "axiomatic approach" (See in detail http://prespacetime.com/index.php/pst/article/view/14; and, recalling the T. Kuhn analysis, we can also name these methods "Babylonian paradigm" and "Greek paradigm" (See Thomas Kuhn. *The Structure of Scientific Revolutions.* 1962) or "neo-positivistic approach" and "classical approach" (See Gerald Holton. Mach, Einstein, and the Search for Reality. *Daedalus*, Vol. 97, No. 2, Historical Population Studies [Spring, 1968], pp. 636-673).

In framework of "Babylonian approach" (for example see below the Ptolemeus astronomy theory) it is allowed to obtain the answer by any method. Here, in some area of science for each separate phenomena the separate axioms can be used, which are not connected with each other. Any mathematic apparatus can be invented here to obtain the result, without understanding its connection with other part of theory.

According to "Greek approach" for each area of science must exist one of the equivalent systems of axioms, and all mathematic results of the theory must follow consecutively from this axiom system (for example see below the Euclid geometry). Thus, problem of truth in the science is connected also with the "Bacon law". As we see, any scientist can choose for his theory construction any "truth" listed above. I think that this is the origin of modern crisis and of all crises of earlier times.

To change anything in this area, we should at least modify the Bacon law. This means that it is necessary to convince the scientific society about this change. In what way can this be done? To answer this question let us consider in short some examples of theories' constructions and their changes.

2. Historical examples (30^{th} centuries BC – 16^{th} centuries AD)

The sciences of Ancient Egypt, Mesopotamia and China (30^{th} centuries BC – 6^{th} centuries BC) were very developed, but they were constructed entirely on the base of "Babylonian approach". The Ancient Greek Ionian natural philosophy (physics, geometry, biology, astronomy, etc) was materialistic axiomatic science (VI-IV BC). The zenith (acme) of this direction in physics were the works of Democritus and Epicurus (for a account of their studies see "On the Nature of Things" of Titus Lucretius Car http://classics.mit.edu/Carus/nature_things.html). From Greek philosopher Plato (428/427 BC – 348/347 BC) began the idealistic philosophy: science, based on the person ideas. Later in mathematics we have the example of fully axiomatic theory of Euclid of Alexandria (300 BC): "Elements".

The *Almagest* of Claudius Ptolemaeus (around 168 AD) was an algorithmic astronomy theory. In the base of this theory lies the incorrect hypothesis that the Earth is the centre of Universe. Ptolemaeus found the prescription of geometric construction and arithmetic calculations as approaches to real movement of planets and Sun, according to observation (the theory of epicycles). But each new observation demand correction of construction and calculations. This method is the same for all algorithmic theories

(noteworthy that Heisenberg indicates that these calculations relate to Fourier series expansion for orbit of planets).

From 5th until 17th centuries were the "Dark Middle Ages" of "Christians science", based on the Bible postulates of World creation. This science was idealistic, used the axiomatic geometry of Euclid, logic of Aristotle and algorithmic approach of Ptolemeus in astronomy.

Due to Renaissance (from Italian: *Rinascimento*, from *ri-* "again" and *nascere* "be born"; 4th to the 17th century - a cultural movement to rebirth of Ancient Greek and Rome science and culture), a period of classical physics (17th -19th centuries) began, i.e. materialistic axiomatic physics, based on the Bacon (1561–1626) methodology (Galileo Galilei, Newton, Faraday, Maxwell, Kelvin, J.J.Thomson, Lorentz and many others).

3. Examples of the end of 19th to 20-21th centuries theories

(a) Theories of bodies moving with high velocities near the speed of light

Today there are two different theories of bodies moving with velocities near the speed of light, which have different basis and different structure:

1) electromagnetic theory of matter (ETM) of J.J.Thomson-Larmor-Lorentz-Poincare (19th century). (E. T. Whittaker, *A History of the Theories of Aether and Electricity*, 2 vols. (1951–1953)).

2) special theory of relativity (STR) of Einstein, (20th century). (Gerald Holton. On the origins of the spetial theory of Relativity. American Journal of Physics, 28, 627 (1960) http://scitation.aip.org/getpdf/servlet/GetPDFServlet?filetype=pdf&id=AJPIAS000028000007000627000001&idtype=cvips&prog=normal).

These theories have identical mathematical results, which are with full accordance to all experimental results. Thus, according to Bacon's law, the STR is an absolutely correct theory. But ETM is also an absolutely correct theory, since (*Ehrenfest*, *Paul. Zur Kris*e der *Lichtäther-Hypothes. Berlin,* 1913): "*Einstein's theory, denying ether, requires the same as the ether theory of Lorentz. On this base the observer must, according to Einstein's theory, observe on the moving measuring bar, clock et cetera, the same reductions, time difference et cetera, as according to Lorentz's theory. Let us note in this case that such experimentum crucis, which would solve the dispute in favor of one or the other theory, is principally impossible*."

(b) Quantum theories of elementary particles

Today there is one universally accepted theory of elementary particles – theory of Standard Model (SM). SM is constructed in framework of "Babylonian paradigm" as algorithmic theory (see http://prespacetime.com/index.php/pst/article/view/14) (compare with Ptolemeus astronomy). Until recently all its mathematical results corresponded to the experimental result. This means that SM is true (correct) theory. Only lately the SM has difficulties with Higgs boson and some other problems. (Note that a new theory of elementary particles was proposed by me (see e.g., short view in the book "The Nonlinear Quantum Field Theory as a Generalization of Standard Model."). It is built on the base of the axiomatic approach. In the framework of this theory all equations of SM are obtained on the base of one system of axioms. It answers questions about physical sense of wave function, dualism wave-particle, origin of commutation relation and uncertainty principle, and so forth. The interpretations of QM and SM does not contradict to the results of nonlinear theory: they follow from physical interpretations in framework of nonlinear theory. But this theory needs discussion to be accepted by the scientific society).

(c) Classical thermodynamics

Statistical mechanics or kinetic theory of atoms and molecules are not the base of classical thermodynamics. Classical thermodynamics is a fully consummated materialistic axiomatic theory with high effectiveness in technique applications (see e.g. known axiomatic of K. Karatheodori (or C. Carathéodory):

http://www.worldlingo.com/ma/enwiki/en/Constantin_Carath%C3%A9odory *"In 1909, Carathéodory published a pioneering work "Investigations on the Foundations of Thermodynamics" (Untersuchungen ueber die Grundlagen der Thermodynamik, Math. Ann., 67 (1909) p. 355-386) in which he formulated the Laws of Thermodynamics axiomatically, using only mechanical concepts and the theory of Pfaff's differential forms. He expressed the Second Law of Thermodynamics via the following Axiom: "In the neighbourhood of any initial state, there are states which cannot be approached arbitrarily close through adiabatic changes of state." Carathéodory coined the term adiabatic accessibility. This "first axiomatically rigid foundation of thermodynamics" was acclaimed by Max Planck and Max Born."*

(d) Statistical mechanics

Statistical mechanics is also a materialistic axiomatic theory, but until now has some difficulties (See, e.g. ergodic hypothesis, H-theorem of Boltzmann http://www.umpa.ens-lyon.fr/~cvillani/Exposes/boltzmann-pisa.pdf, etc). Statistical mechanics can actually be used for substantiation of laws of thermodynamics, but only as laws of nature. These laws in thermodynamics are not deduced, but postulated as results of experiments.

4. Conclusions

As the above examples show, during 5 thousand years the scientists have used all existent approaches. Owing to their subjectivism the scientists turn each time from one approach to the other. Old theories were replaced by the new theories, which were more appropriate to modern stand of spirit of the people (as, e.g., the Ptolemeus astronomy was replaced by Copernicus-Kepler-Newton astronomy in the end of the Christian epoch). Thus, what is necessary to be done now, if a modern scientific theory is not true? Is it sufficient to correct the Bacon law or is it needed something else?

I think (as a subjective person), that first of all it is necessary to construct a new theory. It is also necessary to publish the last one in an Open Journal System such Prespacetime Journal. And then much patience is needed within the next 100 years to wait until the scientific society accepts this new theory. We are not the first, ones to ask these questions.

60 years ago Erwin Schredinger was also not satisfied with modern development of physics (Part I. The British Journal for the Philosophy of Science, Vol. 3, No. 10 (Aug., 1952), pp. 109-123 (http://www.jstor.org/stable/685552); Part II. Vol. 3, No. 11 (Nov., 1952), pp. 233-242) (http://www.jstor.org/stable/685266)

(**Quotes from Part I**) *The innovations of thought in the last o years, great and momentous and unavoidable as they were, are usually overrated compared with those of the preceding century; and the disproportionate foreshortening by time-perspective, of previous achievements on which all our enlightenment in modem times depends, reaches a disconcerting degree according as earlier and earlier centuries are considered. Along with this disregard for historical linkage there is a tendency to forget that all science is bound up with human culture in general, and that scientific findings, even those which at the moment appear the most advanced and esoteric and difficult to grasp, are meaningless outside their cultural context. A theoretical science, unaware that those of its constructs considered relevant and momentous are destined eventually to be framed in concepts and words that have a grip on the educated community and become part and parcel of the general world picture - a theoretical science, I say, where this is forgotten, and where the initiated continue musing to each other in terms that are, at best, understood by a small group of close fellow travellers, will necessarily be cut off from the rest of cultural*

mankind; in the long run it is bound to atrophy and ossify, however virulently esoteric chat may continue within its joyfully isolated groups of experts...

The disregard for historical connectedness, nay the pride of embarking on new ways of thought, of production and of action, the keen endeavour of shaking off, as it were, the indebtedness to our predecessors, are no doubt a general trend of our time...

There is, however, so I believe, no other nearly so blatant example of this happening as the theories of physical science in our time...

There have been ingenious constructs of the human mind that gave an exceedingly accurate description of observed facts and have yet lost all interest except to historians. I am thinking of the theory of epicycles.

(**Quotes from part II**) *A great many of our educated contemporaries, not equipped with the mathematical apparatus to follow our more technical deliveries, are yet deeply concerned with many general questions... Whatever abbreviated language we physicists may find convenient or use among ourselves, we... must be careful not to veil or distort them by indulging in loose speech. Science... gains value only within its cultural milieu.*

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