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## **The Problem of Aim of Science in the Philosophy of Scientific Realism**

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### **Abstract**

The article deals with the problem of immanent aim of the scientific cognition. The relationship between science and reality is viewed from the standpoint of scientific realism, resting upon the axiom that theories are assertions about the reality independent of human experience and even of reason itself. The authors argue that the adoption of scientifically-realistic ideal of science gives us a simple and reliable criterion the demarcation of scientific and non-scientific knowledge. But the scientific realism can go beyond the bounds of “philosophical belief” only having turned itself towards the world of objectively practical activity – into the world of “artifacts”, created by human labour. It is in this objective world of material culture scientific theories are being “verified” or “falsified”, and science, in a whole, finds its highest aim and implementation. The authors conclude that the study of the “fourth world” of material culture, in which science finds its true practical implementation, should be the cornerstone of scientific realism.

**Keywords:** Scientific realism, truth, aim of science, demarcation of science, artifacts, social constructivism, conventionalism.

## **The History of the Problem**

The first philosophers did not see any problem in the question of the aim of scientific cognition. All of them tried to create the true picture of the world, based on some axioms and “first principles”, and they were strongly sure that human mind was able to disclose the truth. Such a position could be named as the naive realism. Nowadays, most of the scientists have a similar take on this issue.

In their time, sophists and skeptics shook the naively realistic self-confidence in the truth of the scientific picture of the world. They demonstrated the relativity and principal limitation of our cognitive abilities. In days of blossoming of the mechanical science, Humean and Kantian criticism totally destroyed the positions of naive realism. That criticism had a deep impact on the academic philosophy of science, which had appeared and had been developing for a long time in the bosom of positivism.

Positivism is aimed at elimination from the sphere of scientific cognition of any kind of “metaphysics” and of anything that was not available to direct and indirect observation. For their part, the adherents of scientific realism and constructivism considered that the elimination of metaphysical premises from scientific theories and methods is impossible in principle. No scientific theory can be understood without taking into account the “metaphysical space”, within which this very theory is born. Alexandre Koyré brilliantly showed that even Newton, being an ardent enemy of metaphysics, was captured by it, and the main vulnerabilities of his mechanics were hidden exactly in the “metaphysical ground”.

By the mid of XX century, the positivist philosophy of science had already accumulated a critical mass of contradictions, with which it was obviously unable to cope. Attempts to resolve these contradictions led, eventually, to the emergence of two dominant trends in modern philosophy of science – scientific realism and social constructivism.

It is not so difficult to formulate the position of scientific realism. It postulates the reality of objects described by scientific theories and their independence from the structure of our cognitive abilities and from the character of personal perception of these objects. But the scientific realism principally differs from the naive realism of empirical sense, based on the belief that the reality is given to our eyes directly as it is. The elemental assumption of the scientific realism, on the contrary, says that sensibly given “reality” is an inadequate

subjective structure, if not an illusion. Our senses are not able to accept the world as it is “in itself”. The natural science of XX century – physics and genetics, first of all, – has reached such a level of abstractness that common sense usually takes their statements as “crazy” or, at least, as the paradoxical ones. They almost never fit into the framework of everyday experience, basing, to a greater extent, on abstract logical reasoning and mathematical calculations rather than on observable facts.

In this regard, scientific realism is in contraposition to Neopositivism, with its boundless belief in the power of fact. From the perspective of a scientific realist, theories do not sum up experience, but they are assertions about the reality independent not only of our experience, but even of reason itself. The most radical proponents of the scientific realism assign science the role of “measure of all things”. So, the Wilfrid Sellars’s maxim says: “In the dimension of describing and explaining the world, science is the measure of all things, of what is that it is, and of what is not that it is not” (Sellars 1997, p. 173).

Nowadays, “scientific realism” is a label for a set of heterogeneous and even antagonistic conceptions in the philosophy of science. But “antirealist” conceptions vary even more. It is not the purpose of the present article to review them all or to compare their merits and shortcomings.<sup>1</sup> We confine ourselves to the problems of the immanent aim of scientific cognition and of the relationship between science and reality.

### **Modern Philosophers on the Aims of Science**

As is well known, there is no unity among philosophers not only on the issue of aims of science, but also whether science has an aim at all. So, Arthur Fine insists: “As for ‘the aim of science’ ... this is a chimera, conjured up in response to misplaced hermeneuticism and fear of the irrational” (Fine 1986, p. 177). Possibly, it is true if we mean subjective aims and scientists’ intentions as well as statesmen and businessmen who promote, somehow or other, the development of science, whether it be a seeking after fame, wealth, *salus populi*, etc. Aims of this kind are external, not immanent to science. But at the same time, within the science itself, there is an aim, aspiration to which actually introduces a man into the sphere of science, turning him into a scientist. This inner aim sets the main vector of its evolution and determines the place of science among different forms of man’s activity in the system of

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<sup>1</sup> It is enough here to refer to the monographs by Ilkka Niiniluoto (1999) and Stathis Psillos (1999), that are usually mentioned as fundamental and the most original works in defense of scientific realism.

social division of labour. Obviously, such an aim of scientific studies is the acquiring of knowledge about the real world or, speaking otherwise, the truth. This axiom can be taken as the starting point of any reasoning about science. Even inveterate skeptics, who consider the truth elusive, admit this axiom, at least only as a subjective maxim.

Some authors, however, saw the basic difference between the immanent aim of science as such and the subjective intentions of scientists to that what they take as “true”. On this basis, in particular, Karl Popper came to the conclusion, that science is searching only for “satisfactory explanations” of the phenomena we meet in our life;<sup>2</sup> Hilary Putnam insists that science produces rationally substantiated concept of the world; for Larry Laudan, the aim of science is solving problems, in the broadest sense of the word; Bastian van Fraassen, one of the founders of the analytic philosophical branch in the scientific realism, considers designing of “empirically adequate” concepts to be such an aim.<sup>3</sup>

In our view, these aims and the similar ones, implicitly suppose or at least, as in the case with Laudan’s definition, do not contradict the axiom that has been introduced earlier. But Laudan’s definition is too abstract: indeed, it is not only science, and even not only the human being, but every living being deals with “solving problems”. Science is interested in any problem primarily for the sake of obtaining sound knowledge of the world, even if this knowledge is fraught with serious problems for the man himself or if it seems useless to him in practical terms. It is worth to be recalled here that the “father of logic”, Aristotle, considered the knowledge which was mostly useless in practice, to be the supreme one. That is why he set the “prime philosophy” (metaphysics) above all other sciences, to say nothing of a practice-oriented knowledge (*technē*).

Of course, the axiom of sound knowledge, as of the immanent aim of science, demands to be specified more concretely. Its meaning depends, utterly and completely, on how we understand the validity of knowledge, i.e., on our answer to the sacramental question “what the truth is?”, and whether the knowledge of truth is possible at all. But, be that as it may, the fact remains that science is always *striving for* the truth, regardless of whether or not scientists – including philosophers whose mission is to examine the problem of truth as such – believe the achievement of this aim possible.

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<sup>2</sup> “I suggest that it is the aim of science to find satisfactory explanations of whatever strikes us as been in need of explanation” (Popper 2013, p. 134).

<sup>3</sup> See Laudan (1986) and van Fraassen (2004).

Taking this fact as the starting point of our considerations, we are nose-to-nose confronted, right at the next step, with the problem of the relationship between science and reality. Scientific realism offers a positive solution – or, more precisely, a fairly wide range of solutions – to the problem. We should enlarge upon that point.

Another obvious fact, that deserves to be mentioned here, is that all knowledge has a certain object. The question is whether this object is real, and if it is, what is the degree of its reality. And, accordingly, to what extent science can succeed in understanding reality. This item is a fork on which the paths of scientific realism and social constructivism diverge. The latter rests on the assertion that science itself constructs its own subject, not so much in accordance with the reality as it is, but with the specific social structure. For science itself is one of the spheres of social activity and, therefore, it cannot be free from urgent requests and deep currents of social life. Further development of the theme can be carried out in the spirit of Marxism, pragmatism or postmodernism (e.g., with an emphasis on power relations in the society, as in Foucault).

Thus, social constructivism is a direct heir to the externalist philosophy of science, while scientific realism continues the line of internalism, focusing its attention on the inherent aims and laws of the evolution of scientific knowledge. Of course, scientific realist (at least if we speak about the prominent representatives of this trend) would hardly deny that society has an influence on science. Another thing is that scientific study of any natural or social object demands, at first, to put aside all external influences, in order to understand the given object in its pure form. As a result, we get the utmost abstractions, such as the "ideal gas", "perfect crystal", "genotype", etc. Any of these abstractions capture a certain goal or state, to which all things (in the above examples – gases, crystals and living beings) are tending to approach. Similarly, in our case, the abstraction of an "ideal science" is formed. And it is based on the concept of truth as the inherent goal of scientific knowledge. Only after that, already on the basis of such "immanent" abstraction or the ideal model of an object, it becomes possible to study reactions of the given object to different kinds of external influences – in particular, the determination of scientific researches on the part of civil society, government or industrial corporations, whose interests can be very far from the search for truth, and their aims might be even directly hostile to this immanent aim of scientific knowledge sometimes<sup>4</sup>.

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<sup>4</sup> See, for example, Moskovkin 2011; Nevleva 2013; Kalinina & Rimskaya 2015.

## Arguments of the Scientific Realism

The adoption of scientific-realistic ideal of science automatically gives us a simple and reliable criterion the demarcation of scientific and non-scientific knowledge. It is that very criterion which Neopositivists were searching for such a long time.

Those and only those cognitive processes are scientific, which are based on the desire to understand the internal causes and laws of existence of natural phenomena. Scientific cognition, in the words of Plato, is "hunting for truth."

It is necessary to mention here that the *results* of cognition need not be necessarily true. The false theory does not cease to be *scientific* if it appears to be false or insufficiently proved. And there is no such mistake that cannot be corrected by means of understanding the cause of the mistake, thereby having transformed the false scientific statement into the true one. Actually, in such a way all new scientific theories emerge. Copernicus corrected Ptolemy's "geocentric" mistake, Galileo rejected Aristotle's prejudice that mathematical description of movement is impossible, the founders of genetics refuted Lamarck's theory of inheritance, etc. In relation to this criterion of demarcation of scientific and non-scientific knowledge, Neopositivist concepts of "verification" (Rudolf Carnap et al.) and "falsification" (Karl Popper) are the special cases to which the universal status was erroneously assigned.

The strongest argument in favour of the scientific realism is the fact that science has allowed man to achieve great success in practical transformation of the external world and of himself and of the society as a whole. How can it be possible if scientific concepts and theories do not reflect reality as it is in itself? That very argument, since the XVII century, promoted most of all (and nowadays continues to promote) the growth of the authority of science and scientists in the eyes both of the enlightened public and of the man in the street. Among philosophers, it is especially emphasized by Marxists (not so much by Marx himself, as by his imitators) and American pragmatists. The latter even erected practical utility to the rank of the criterion of validity of all our knowledge. Closer to our times, the argument from practice was picked up by some Postpositivists who tried to use it to overcome the inherent limitation of analytical philosophy with the sphere of language (in the broadest, semiotic sense of the word – as a system of signs and symbols).

This argument got the largest popularity in Putnam's formulation:

The positive argument for realism is that it is the only philosophy that doesn't make the success of science a miracle. That terms in mature scientific theories typically

refer (this formulation is due to Richard), that the theories accepted in a mature science are typically approximately true, that the same term can refer to the same thing even when it occurs in different theories – these statements are viewed by the scientific realists as not necessary truths but as part of the only scientific explanation of the success of science, and hence as a part of any adequate scientific description of science and its relations to its objects (Putnam 1975, p. 73).

That constant talking about “terms”, and relations between terms and things, shows that we face here a scientific realism of the analytical philosophical cast. It persistently tries to “pick out” reality from the language of science. Putnam tried to do this with the help of the concept of “referentiality”. As Ian Hacking aptly remarked:

Pity poor Hilary Putnam... Once the most realist of philosophers, he tried to get out of representation by tacking ‘reference’ on at the end of the list of elements that constitute the meaning of a word. It was as if some mighty referential sky-hook could enable our language to embed within it a bit of the very stuff to which it refers (Hacking 1983, p. 130).

Hacking itself, opposing the “contemplative” analytic philosophical theory of knowledge, anchors his hope on an experiment in which thinking is almost merged with the objective action: “I study experimental science, and find in it the sure basis of an uncontentious realism” (Hacking 1983, c. 131).

A Pragmatist Hacking agrees with Marx that reality reveals itself not so much in the sphere of pure thought, but in the sphere of practical activity, par excellence. Science should not content itself with explanations of the world. Science must change the world – this is the necessary condition for the science to fasten the reality as it is “in and for itself”.<sup>5</sup>

No wonder that this position met sympathy and warm response from the Marxists. Thus, the Russian philosopher of science E.Ya. Rezhabek, analyzing the key arguments in the controversy between scientific realism and social constructivism, declares his agreement with Hacking’s criticism against anti-realism that grows on the basis of linguistic philosophy. With great perseverance, Rezhabek attacks the conventionalist theory of truth, according to which the consent of all members of the “linguistic community” (Quine) with respect to a perceived situation is the aim of science and the sole criterion of truth of scientific theories. Rezhabek

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<sup>5</sup> “My attack on scientific antirealism is analogous to Marx’s onslaught on the idealism of his day. Both say that the point is not to understand the world but to change it” (Hacking 1988, p. 282).

contrasts to this philosophical position the perspective of praxis, creating what he calls “experimental artifacts” in the course of immediate, the most direct interaction with reality. The environment, maintaining active resistance to the experimenter, thereby corrects and directs the progress of scientific thought.

If the active intervention into the material world helps to achieve the proportionality between a cognitive construction and an industrial or experimental artifact, then the truth assessment ceases to be something unattainable, as it appears in the case of purely logical formulation of the question. ... A comparison of the artificial form of reality with the natural form of reality, carried out in a practical way, means that thought transcends itself, goes beyond the limits of consciousness into the world as such (Rezhabek 2007, p. 219).

Within conventionalism and linguistic philosophy, scientific realism remains to be some “philosophical belief”. It can go beyond the bounds of that belief only having turned itself towards the world of objectively practical activity – to the “artifacts”, created by that activity.

Popper wrote about the existence of the “third world”, populated by “linguistic entities” and opposing, on the one hand, to the real objects (“World № 1”), and on the other – to the inner world of the knowing subject (“World № 2”). Meanwhile, there exists a *fourth* world which entirely dropped out of sight both the Postpositivist versions of scientific realism and antirealist conceptions in the philosophy of science. This is the world of things, historically created by man for man, the things constituting man’s artificial, “inorganic body” (Marx). The laws of this world were first studied by Hegel, in his *Phenomenology of Mind*. He introduced into philosophy the concept of labour as a form of active thinking and “exteriorisation” (*Entäußerung*) of Mind. Thus, the great German dialectician laid the foundation stone, which should, in our opinion, be a cornerstone in the construction of philosophy of the scientific realism. It is in this objective world of material culture scientific theories are being “verified” or “falsified”, and science, in a whole, finds its highest, practically true implementation.

## **Conclusion**

Today, the practical orientation of scientific knowledge is more than obvious. Turning science into the “immediate productive force” (Marx) is the main and most powerful *historical* argument for scientific realism. Pragmatists, including Ian Hacking, understand badly (if understand at all) the *concrete historical nature* of scientific thinking. Their mental horizon



seems much narrower. The experiment, to which they habitually appeal, cannot prove, by itself, the truth or falsity of a scientific theory (as this is perfectly demonstrated by Imre Lakatos). Rather, the experiment is a kind of applied “micro-theory”.

In Marxism, practice is specified as *labour* – including also the struggle for objective conditions of labour, i.e., property relations. Science itself is only a form of labour, it is the “universal labour” (*allgemeine Arbeit*), as Marx said. Therefore, the aim of science and the measure of validity of scientific theories historically vary, depending on the function and role of science in the general structure of the productive forces.

The historical challenge, facing humanity, is to turn labour from a simple means of life into the *goal of human life*, into the mode of man’s creative self-realization. At this time of day, this is possible only for the few. Science is called up to open such opportunity for each and every person. The more science masters the social life and overmasters the “inorganic body” of a person, the closer is its practically historical goal – the liberation of man from any uncreative, routine activities. There is no doubt that, sooner or later, this goal will be achieved. In the final analysis, therefore, the immanent aim of science, viz. the pursuit of truth, coincides with the solution of a specific task – the task of forming a society of men-creators, engaged exclusively in “universal labour”, i.e. in science as such.

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