Философия науки и техники
2022. Т. 27. № 2. С. 20–30
УДК 165.0

Philosophy of Science and Technology
2022, vol. 27, no. 2, pp. 20–30
DOI: 10.21146/2413-9084-2022-27-2-20-30

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The problems of scientific realism today

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The article describes scientific realism and the debate around this position. It shows that initially (in the scholastic tradition) the debate between realists and antirealists was purely ontological, since it was accepted that when we know, we know the real – knowledge cannot be anything other than knowledge of the real. The question about the reality of the object of our knowledge, about whether the world beyond our representations is equal to the world we represent to ourselves, distinguishes modern philosophy from classical philosophy and arises from the claim that we know our representations and not the real. A twofold problem is formed: first, to demonstrate the existence of the world beyond our representations, and second, to demonstrate that that the knowledge we have constitutes precisely the knowledge of the world in which we live and is, in fact, actual knowledge, not chimer. Thus the problem of realism takes on an almost exclusively epistemological meaning. Nevertheless, contemporary realistic positions often confuse ontological and epistemological theses, which leads to internal contradictions. The same is true of the proponents of anti-realist views. The question of the causes of the anti-realistic tendency in the philosophy of science is raised and it is shown that the initial attitude of the modern science was realistic. It was undermined, on the one hand, by anti-realistic interpretations of the cognitive process (starting from Kant), on the other hand, by difficulties of theoretical order arisen in physics, and the main thing was that science began to deal with the unobservable, undermining the cognitive basis of radical empiricism. However, the new cognitive situation does not necessarily lead to anti-realism, another way of development relies on an understanding of the complexity and problematic relationship between theory and experience. A number of reasons in favor of scientific realism are concluded.

Keywords: scientific realism, knowledge, representation, reality, observation, truth

I will limit myself to outline the essential features of scientific realism, of the debates it has raised and of its conceptual tradition, according to some indications that I have already provided in some of my publications. The problem of scientific realism can be of interest also to those who are not specialists in philosophy of science, because it does not concern only epistemology, but involves more general philosophical reflection and many other fields of inquiry.

Let us begin with a question: is there a reason for which we speak of *scientific realism* rather than of realism tout court? In asking this question we raise a problem of historical character and at the same time of theoretical interest. In fact, in the philosophy of science, at least since the beginning of the twentieth century, a tendency that has been qualified as *anti-realist* has been imposing itself, while previously it had never happened that scientists, or those who reflected on science, attributed to it such a characteristic. Here is the question: What happened to provoke this trend reversal (which represents an attack on the cognitive scope of science), and why did it not meet the opposition of realistic counter-trends for a long time? In order to answer these questions, it is necessary to be aware that, in the theses advanced by the different anti-realist positions, the complex heritage and the different historical roots of the "question of realism" (as it has been configured in the history of Western thought) meet and mix, almost always at an unconscious level. For these reasons, before addressing the problem of how to distinguish scientific realism from what we will call realism tout court (i.e. realism in general) we will have to specify what exactly is meant by realism within the Western philosophical tradition and, consequently, what is meant by anti-realism.

The ontological meaning of the question of realism

In the history of Western thought, for a long period of time the question of realism has been strictly *ontological* in nature, according to two distinct ways of understanding this adjective: first, as an attempt to determine which are the entities that "really exist"; second, as an effort to specify what "kind of reality" belongs to certain entities. Historically, the problem of realism arose, in the Middle Ages, when the above ontological questions were debated with regard to those well determinate entities that were called *universals*, that is, in essence, genera and species. In the midst of that debate, as we have learned from school textbooks, some positions emerged that were denoted as *realist* (though according to different shades of meaning), to which others were opposed that we could call anti-realist (also not univocally). In fact, the two extremes are constituted, on the one hand, by the so-called *exaggerated realism* (according to which genera and species "really exist" in themselves in the guise of immaterial substances) and, on the other hand, by *nominalism* (according to which universals have no existence, but simply a linguistic function, being reduced to pure "names" that serve to group individual representations having a certain similarity). This last position can be called *anti-realist* in a strong sense (but always taking into account that it concerns the reality of "certain entities", i.e., the universals). Within this dichotomous polarity of exaggerated realism/nominalism there have been many intermediate solutions, more or less sophisticated, which attest the richness and charm of the metaphysical positions

of the medieval debate, and which are usually summarized under the names of *conceptualism* and *moderate realism*. They are characterized by the fact that they do not answer with a peremptory yes or no to the question of whether universals exist, but rather determine what "kind of existence" can pertain to them. Thus, while the "exaggerated" realists attributed to universals a *substantial* reality in a world analogous to the Platonic world of ideas, the conceptualists argued that universals do have an existence, but only in our minds (i.e. as concepts). However, with this, they kept their distance from the positions of the nominalists, according to whom universals do not exist even as *entia rationis* because they are only "names" under which we group our different and multiple intuitions. We could say that they were recognized a simple existence of *linguistic* type. To these positions was added the one called *moderate realism*, according to which universals do not exist in themselves, but exist in certain respects *in re* (i.e. *in things*, insofar as they are certain properties which individuals of a certain species or genus *really have in common* and which distinguishes them from individuals of other species or genera). Moreover, again according to moderate realists, universals also exist *in our intellect*, as representations of those general characteristics that they embody in things.

Why have I summarized this rich medieval debate? In order to clarify that at those times never the following question occurred: "when we know the world, do we actually know *reality* or not"? This is the question that characterizes *epistemological realism*, quite different from the *ontological* questions that animated the debate on universals. On the contrary, we can say that all the theoretical positions that emerged in that debate shared an undoubted epistemological realism. In short, it was taken for granted that, when we know, we know *the real*. The reasons that led to assume this realist point of view can be summarized in the following question: if we do not know the real, what do we know? The real was still characterized somewhat radically as whatever is present to the mind. Good or bad, one cannot know without knowing *something* that is, evidently, actually *real*, as the mind merely "opens" to reality.

The gnoseological meaning of the question of realism

Who can really tell me that what I know is actually the real or some other thing? And which thing? This question represents a kind of watershed between "classical" and "modern" philosophy, precisely because it expresses a problem that classical philosophy had not explicitly posed, and that instead to moderns (and still to us), seems very clear and fundamental: how can we know that the "external world", beyond our representations, is equal to the world I represent to myself? This question presupposes, in its apparent simplicity, another question that is anything but clear. In fact, let us ask ourselves what exactly the adjective "external" means. External to what? To our cranial box, to our body, to our skin, to our five senses? How do we construct the notion of "external" and what meaning does it have with respect to our image of the world? Before modernity, the question of "exteriority" did not arise, insofar as it was believed that knowledge could be nothing more than knowledge of the real. With modernity, however, the tacit assumption is established that we know our *representations or ideas* and not the real. This is the non-figurative

sense of the "exteriority" mentioned above: it expresses that "presupposed gnoseological dualism" (to use an expression of Gustavo Bontadini) that has imposed on modern philosophy an impossible task, that of *knowing* how the real is "outside knowledge".

In fact, already in the late scholasticism had begun to insinuate what became the way to formulate the problem of knowledge in modernity: what we know are always our *representations* and not the real things; therefore, it is necessary to address a twofold issue. First, the existence of the world must be demonstrated. Secondly, it is necessary to demonstrate that the knowledge we have constitutes precisely the knowledge of the world in which we live and is, in fact, actual knowledge, not chimerical. These are the philosophical problems that we find clearly formulated (with their respective attempts at solution) in Descartes, and that were taken up by various modern philosophers up to and including Kant: between thought and reality there is a gap that is difficult to bridge, if we start from the assumption that the act of thought and the real world are two completely heterogeneous and clearly separate realities.

Faced with such issues, we could ask: on the basis of what evidence or arguments can we say that what we know is, for example, the representation of the bottle and not the bottle itself? There is no justification for such a statement, which, moreover, is based on another presupposition: that the "external" world exists. In fact, how can we affirm that the world exists, if we do not know it? In fact, we assume, first, that the world exists; then, second, we strive (indirectly) to know it even though we know directly only (its?) representations.

This new context defines the contours of the issue of realism in modern thought, which now has an almost exclusively epistemological (or gnoseological as it may be called) meaning. Accepted that we know our representations (ideas) and not the real objects, are qualified as *realists* those who believe that, albeit through indirect guarantees, we come to know *reality* as it is, while are qualified as *idealists* those who believe that our knowledge cannot go beyond the scope of *ideas* and therefore does not attain reality. In this way, the concept of realism is determined by opposition to idealism, initially on a gnoseological level, but it did not take long to expand to the ontological level when, with Berkely, the *esse* was reduced to *percipi*, that is, when the existence of things depended on their being known by some subject. At first, this position was considered extravagant and, for example, in the *Critique of Pure Reason* Kant devoted a paragraph to the "Rebuttal of idealism" and specified his position qualifying it, at the same time, as a "transcendental idealism" and an "empirical realism", believing that the thought could be attributed the ability and the function of constructing the objects of knowledge, but not that of constructing reality. However, the later German transcendental idealism, denying the otherness of being and thought arbitrarily introduced by gnoseological dualism, supported the thesis of the *ontological identity* of both and made reality a product of thought.

This is an interpretation of the issue of realism that, more or less consciously, is also found in some current debates. But it is neither the only one, nor the prevailing one, so that, unfortunately, the theoretical situation of the same defenses of realism appears as a curious melange of different philosophical theses in which, so to

speak, one recognizes a quarter of ontological realism, which is connected with two quarters of gnoseological realism and, finally, with a quarter of pragmatic realism – linked to what Santayana called the "animal faith" through which we orient ourselves in everyday life. This curious mixture of different realisms, although veined by inevitable internal tensions, constitutes a more widespread solution than one might think, through which some authors end up unduly mixing different presuppositions, giving them a semblance of theoretical coherence. It is clear that just as much, if not more, is the mixture of different semantic components in anti-realist positions.

Science and realism

So far we have made a general discourse, but now we want to narrow our attention to the problem of scientific realism and so we ask ourselves whether or not modern science has been realist (and up to what point). The answer we must give is that yes, modern science has been realist from its Galilean origins until the end of the nineteenth century, and it has been so in both an ontological and a gnoseological sense.

The "Galilean revolution" is implanted on a solidly realist ground in the ontological sense, that is, as a new methodological proposal for a better knowledge of the "natural substances" that exist in *rerum natura* and are what they are independently from our knowledge of them. Galileo, simply, was convinced that nature could be studied much better if, instead of striving to understand its mystery by grasping the *true and intrinsic essence* of physical bodies, we limited ourselves to investigate some *affections*, that is, to study certain well-defined *properties*, asking, so to speak, to nature itself some precise questions and forcing it to answer them through experiment. According to Galileo, therefore, the answers that nature gives us, however limited and partial, allow us to grasp the true reality of the world (even if only with respect to some aspects of it). Galileo never nourished any doubt either about gnoseological realism, that is, about the fact that we are actually able to know the realities we are addressing to. Suffice it to say that, as far as mathematical knowledge is concerned, he even asserted that our knowledge is as intensive as the certainty of the divine one (though remaining infinitely inferior to it as far as the extension of knowledge is concerned) and, also as far as the physical world is concerned, he was always convinced that man was able to know – in an absolute way – the true structure of reality, even if limited to certain aspects.

Even if limited and partial, in fact, the contents of scientific knowledge are always real for Galileo, and this because they are not directed to the unattainable intimate essence of things, nor to the subjective qualities of them. Not for nothing in *The Assayer* he had distinguished the qualities later called "secondary" (related to sensory perceptions, and therefore subjective) from those called "primary" (which are mathematical characteristics of objects and do not depend on subjective appreciation) and had called these *real accidents*. Galilean science proposes to study, using mathematics, these real accidents, actually knowable, and therefore Galileo can consciously declare itself a realist. The counterproof is given by the fact that Galileo never accepted to attribute to the Copernican theory a purely instrumental meaning

(as it was proposed, for example, by Bellarmine). In a famous letter to Pietro Dini, in fact, he clearly affirms that Copernicus, who in his youth had carried out the mathematical task of explaining celestial phenomena using Ptolemaic theory, at a certain point "putting on the clothes of the philosopher" (i.e. concerned with establishing what is the true nature of the world), he had proposed his theory which, besides being mathematically capable of carrying out that task, described the "true disposition of the parts of the world". Indeed, Galileo with his science always tried to answer questions concerning the reality of the world. Not for nothing, when he was an old man and already condemned by the Inquisition, he liked to repeat that in the course of his life he had discovered "half a dozen truths", but these "truths" seemed to him certain, absolute, unchangeable and such as to describe real aspects of the world. This "cumulativistic" conception of science is based precisely on the conviction that the scientific enterprise allows us to develop an authentic knowledge of the real world.

Galileo did not use the word *phenomenon* in his writings, and we can see the reason for this in the fact that, for him, the "apprehensible" natural aspects coincided with the real aspects of the world. This term, however, occurs abundantly in the writings of Newton, but it is necessary to clarify what is the meaning of phenomenon for the great English physicist. It is certainly not the Kantian sense! For Newton phenomenon is only what is shown, that is what is *manifest* (while for Kant phenomena are "pure appearances"). According to the old authors, the explanation of phenomena had to consist in deducing them from the essential properties of things, as they were contained in their respective substantial forms. In line with Galileo, Newton rejects this methodology: when science tries to explain phenomena, it can undoubtedly postulate certain causes, provided that they are not abstract and occult realities, but characteristics inductively derived from the experience of what is manifest. In this he revealed his empiricist conceptual framework, which gave to induction the primary importance. Galileo, on the contrary, believed that even a single accurate and reliable experimental confirmation was sufficient to establish the absolute validity of a physical law, which is not at all derived from experience by generalization, but formulated as a plausible hypothesis by the intellect as a "supposition" to be subjected to experimental control. He thought so because he was by no means a radical empiricist and believed that experience was able to help the intellect to grasp the universal characteristics of nature which, once determined, are found confirmed in all single cases of that particular species, but do not need to be continually rechecked. Consequently, Galileo attributed to natural laws a characteristic of universality and certainty that, vice versa, is much more attenuated in Newton, for whom only the particular experience is the guarantee of certainty that, inductively, cannot be transmitted in an absolute way to empirical generalizations. It is a fact, however, that the rapid development of the new mechanical science, and its rigorous mathematical dress, led to the general belief that it offered a universal and necessary knowledge about the physical world.

It may therefore be surprising that the first explicit anti-realistic interpretation of science was offered by the philosopher who nurtured a great admiration for the new physics and, moreover, considered it as a knowledge endowed with universality and necessity. This is, of course, Kant; but this can be explained if we take

into account the fact that he also crushes scientific knowledge within the "gnoseological dualism" mentioned above. It is no coincidence that his distinction between *phenomena* and *things in themselves* is introduced *apertis verbis* and is recognized as inviolable (in the sense that knowledge is necessarily limited to phenomena and cannot draw on things in themselves). Then there is the problem of how to ensure an objective knowledge but, at the same time, not realistic. A problem to which Kant himself could not give a satisfactory solution because it was born from a false assumption; in fact, as Jacobi will observe, without the thing in itself one does not enter into criticism, but with the thing in itself one does not remain there. In fact, for Kant the thing in itself is an open problem in front of which transcendentalism, despite its realistic veins, leads to an overall skepticism.

This was Kant's position, which, however, was substantially irrelevant, because philosophers themselves, in general, took another direction. To be a realist means in fact "to eliminate the thing in itself" in the sense of affirming its full knowability, and the idealists did just that, even if they crossed the line, that is reducing being to thought. As for the scientists, they started from a very robust realist framework, believing that man really knows the world, little by little, by degrees, thanks to scientific knowledge. This, in particular, is the cultural climate that, favored by the great developments of nineteenth-century science, has inspired the philosophies of positivism, which certainly did not claim that science can lead to an exhaustive knowledge of reality, but affirmed the actual *possibility* of an indefinite extension of scientific knowledge, even if it reduces it to the observation of facts and, at most, of empirical regularities. According to this perspective, scientific knowledge is intrinsically historical, because the deepening to which the different theories lead are always realized in time and in a specific historical context. It is not by chance that Comte himself speaks of the law of three stages. However, it is also true that within this positivist horizon is traceable the aspiration to present scientific knowledge as an insurpassable phase in which the facts of knowledge play a decisive role.

The crisis of realism in science

Whereas Kant's transcendentalism, while renouncing intellectual intuition, continued to attribute to the intellect the function of being the "constitutive" factor of the horizons of intelligibility of reality, the positivist approach instead rejects intellectual intuition and also the function of intelligibility of the intellect and declares its intention to limit itself to a description of phenomena and of the constant connections that they empirically exhibit. Very soon, moreover, difficulties of theoretical order arisen in physics begin to make people doubt of the effective capacity to make our theoretical constructions and our scientific theories correspond to reality (I deliberately leave aside the questions related to mathematical sciences because they would take us too far). For example, it was not possible to propose satisfactory mechanical models of the electromagnetic ether, or of thermodynamic phenomena, which would allow to consider mechanics as the basic science, within which the fundamental properties of physical reality were determined. At the end of the nineteenth century Mach interprets these difficulties as a sign that science has neither the task nor the right to set out in search of such fundamental representations

of reality; proposing a form of radical empiricism, he systematically reduces knowledge to perceptions; he does not deny that the intellect has a role to play, but it is not properly cognitive, and, particularly with regard to science, he argues that theoretical concepts and scientific laws are merely convenient algorithms by which we synthesize a certain multiplicity of our experiences, but they do not express a true cognitive content.

Let's keep in mind that for modern science the theoretical background and conceptual frame of reference was constituted by what has come to be known as "classical physics", which was based on the assumption that even theoretical statements have a deep ontological connection with the real world. Therefore, in this classical perspective physics represented an authentic form of knowledge of the world. On the contrary, with Mach and with all the conventionalism affirmed between the end of the nineteenth and the beginning of the twentieth century, physics must give up any objective cognitive scope. If the same realities studied by science are only a complex of sensations and if scientific laws do not do anything but synthesize in a convenient formula a m a multiplicity of experiences, they are "conventional", in the sense that they can be substituted by other laws that are more comfortable or useful to synthesize those same experiences or, eventually, others that could be presented later. It follows that physical science is only a convenient tool developed by man for practical purposes and it is excluded that a physical theory can (or even intend to) tell us about the real world.

From what has been said, however, it does not appear clear why this denial of scientific realism has been produced almost suddenly, nor does it appear in what way this scientific anti-realism is characterized with respect to the forms of philosophical anti-realism already known. To clarify these two issues I will say that anti-realism emerges when science begins to deal with the unobservable, because then the cognitive basis required by radical empiricism and its claim to be able to reduce theories to the empirical plane, without residue, is lost. Then one begins to argue that the theoretical concepts we use are more or less arbitrary, that is, they receive an unduly ontological interpretation, while they can have no other sense than a function of coordinating experience without true cognitive scope. In this way, the undeniable presence and variety of theories in science has been interpreted unilaterally (by certain philosophers) as the evidence that scientific knowledge is in itself *conventional* and, therefore, completely arbitrary if we think it should describe reality to us, while it can be accepted as a more or less useful form of practical guidance to operate in reality. This is one of the most widespread senses of scientific anti-realism, traceable from Mach to, for example, van Fraassen.

To this position we can object that the realization that it is not possible to eliminate the theoretical dimension from the empirical sciences should instead have led scientists and epistemologists to realize that the theory/experience nexus is much richer and more problematic than the limited and poor empiricist epistemologies could ever suspect.

Reasons in favor of scientific realism

Observation, for modern science, is always an *instrumental* observation and therefore born from a complex relationship between "certain demonstrations" and "sensible experiences", as Galileo explicitly affirmed. Though today, with the "observation of the unobservable'', we do not find the same experiences as Galileo, we must however continue to affirm that ours are always *observations*. It is not true that we "do not observe" a certain galaxy or a certain elementary particle, just because we cannot discern them with the naked eye; on the contrary, we observe through instruments, as Galileo did, even if our observations are much more sophisticated and complex. But the scientific complication of observation does not mean impossibility of verification, nor does it make it less important on the methodological level. If anything, it can be argued that the sophistication of observation – started by Galileo with the "long sighted cannon" – has developed exponentially allowing us to discover new and infinite physical realities! But we have *discovered* these realities and we have not *invented* them, and this means that the *realist scope* of science is not affected by the fact that it enters the domain of what is "unobservable" for the "unaided" senses, but can be observable for the senses aided by instruments.

Immediate knowledge based on sensory intuition always continues to exercise its irreplaceable role. Nor could it be otherwise if it is true, as it is true, that human knowledge is constructed using *both* the theoretical and empirical dimensions, that is, both empiricity and logos. If a theory "introduces" unobservable objects, it does so because this is logically justified on the basis of *true propositions* and, in particular, at least some of them must be true because of their observability privilege, which makes them true about certain *immediately accessible objects*. This undoubtedly saves a certain form of scientific realism, the one that is willing to recognize as existing the directly observable entities. The most recent anti-realism is therefore the one that denies the real existence of theoretical entities, i.e. those entities inaccessible to observation that are admitted by scientific "theories" in order to explain what is observable. Is it possible to claim the real existence (i.e. not purely mental or abstractly mathematical existence) of these *theoretical entities*? The affirmative answer is offered to us by an analysis of the concept of truth.

In the most pertinent and specific sense, truth is a property of descriptive propositions, in the sense that descriptive propositions are necessarily true or false. It is clear that there are linguistic expressions that are not descriptive propositions (e.g. interrogatives or imperatives), but it is equally clear that singular observational statements are able to describe reality as it is and it is for this reason that they must be recognized as true. It is not said, however, that these are the only statements that can be true (or false): any descriptive statement intends to assert how a certain reality is or is not; it is therefore necessarily true if that reality is as it asserts, or false if it is not, and this independently from the fact that we have a criterion to establish *if and how* this happens, and even less from the fact that this criterion is empirical observation. Truth, then, always implies a *reference to something* of which the proposition speaks. Consequently if I admit that a proposition *can* be true, ipso facto I must also admit that the objects to which it refers *can* exist, and if I believe that *it is* true,

I must also admit that the objects of which it speaks *exist*. In particular I must also admit that the characteristics of the objects described in these propositions are exactly as they say.

Therefore, pace Popper, it is impossible to deny that a descriptive proposition is either true or false (even though we may not possess the *certainty* of its truth, which is quite a different matter) and therefore it makes perfect sense to admit, on the basis of good reasons, even if always revisable, the truth of a given proposition. But then the reasons for which I am induced to admit the truth of these propositions are exactly the same as those which induce me to admit the existence of the objects (be they observable or unobservable) of which they speak. With this we do not want to restore to the scientific truth an absoluteness that was too easily credited in the past. We just want to say that, if there is no reason to deny the truth of a certain scientific assertion (even theoretical) we cannot deny the real existence of the entities (even theoretical) about which it tells the truth. I know well that cheap skepticism claims that we are *never sure* to be able to affirm the truth of any proposition, which is like saying that man never has absolute certainties. However, this does not justify the radical and systematic doubt, since in the same ordinary life, we receive hundreds of certainties that are not absolute, but that we consider established beyond any reasonable doubt. Why should this not apply in the case of science? To the extent that there are no reasons to doubt the truth of a theory, there are also no reasons to doubt the existence of the objects of which that theory speaks. In addition, the existence of such objects receives a kind of practical confirmation by technology, which allows us to correctly manipulate the world: the correctness of this manipulation can only depend, in large part, on the ontological adequacy of those theories of which technology is "real" application. So the possibility to operate with a certain elementary particle (even if "unobservable") attests us that it is not a pure figment of our imagination and not even a simple "mental construct". On the contrary, we can argue that our theoretical "fantasy" has enabled us to grasp – with truth – an aspect of reality, through which we can operate on the world. Ultimately, the reasons for realism coincide with the reasons for our knowledge and our own actions in the world.

Современные проблемы научного реализма

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В статье дается характеристика научного реализма и дебатов вокруг этой позиции. Показывается, что изначально (в схоластической традиции) дискуссия между реалистами и антиреалистами имела сугубо онтологический характер, поскольку принималось, что когда мы нечто знаем, мы знаем нечто реальное – знание не может быть чем-то иным помимо знания чего-то реального. Вопрос о реальности объекта нашего знания, о том, равнозначен ли мир за пределами наших представлений миру, данному в представлениях, отличает современную философию от классической и возникает из признания того, что то, что мы знаем, является нашими представлениями, а не реальными вещами. Формируется двойная проблема: во-первых, установить реальность мира

за пределами наших представлений, во-вторых, доказать, что наши представления являются знаниями об этом мире. Так проблема реализма приобретает почти исключительно эпистемологическое значение. Тем не менее конкретные современные позиции смешивают онтологические и эпистемологические тезисы, что приводит к внутренним противоречиям. Тем же самым грешат и сторонники антиреалистических взглядов. Ставится вопрос о причинах возникновения антиреалистической тенденции в философии науки, показано, что изначальная установка новоевропейской науки была реалистической. Ее подорвали, с одной стороны, антиреалистические интерпретации познавательного процесса (начиная с Канта), с другой – теоретические трудности в физике, главным же стало то, что наука стала иметь дело с ненаблюдаемым, подрывающим когнитивную основу радикального эмпиризма. Однако новая познавательная ситуация не обязательно приводит к антиреализму, другой путь развития опирается на понимание сложности и проблематичности связи теории и опыта. В заключение приводится ряд доводов в поддержку научного реализма.

Ключевые слова: научный реализм, знание, репрезентация, реальность, наблюдение, истина