

The Scope and Multidimensionality of the Scientific Realism Debate

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Abstract At stake in the classical realism-debate is the clash between realist and anti-realist positions. In recent years, the classical form of this debate has undergone a double transformation. On the one hand, the champions of realism began to pay more attention to the interpretative dimensions of scientific research. On the other hand, anti-realists of various sorts realized that the rejection of the hypostatization of a “reality out there” does not imply the denial of working out a philosophically adequate concept of reality. Against the background of this double transformation, new arguments in the realism-debate emerged. The present Introduction is an attempt at systematizing these arguments within the spectrum of doctrines between the poles of scientific realism (exposed and defended by Howard Sankey) and hermeneutic realism (advocated by Dimitri Ginev). The authors try also to demonstrate that after the classical debates the issue of scientism has to be addressed in new ways.

Keywords Scientific realism · Hermeneutic realism · Anti-realism · Scientism

1 I.

Many years ago, Howard Stein typified a credo of historians of science concerning the realism-antirealism debate. He stressed that each of the opposing doctrines, interpreted with excessive simplicity, is inadequate as a theory of the dialectic of scientific development. Important moments of these doctrines are present together in such a way that the alleged contradiction between them vanishes.¹ To be sure, most of the participants in the

¹ See Stein (1989).

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debates on scientific realism would not subscribe to this credo. Nonetheless, there are philosophers of science who are inclined to support Stein's views. There are also philosophers who are looking for a way of thinking that bypasses the very debate itself. Let us consider the last case as a point of vantage for elucidating the concept lying behind the collection of papers in this special Section devoted to the multidimensionality of the realism debate in the philosophy of science.

A notorious example of the attempts to overcome the opposition between realism and antirealism is Arthur Fine's conception of the natural ontological attitude (NOA) that proclaims the possibility of a stance that is neither realist nor antirealist. This is a conception that should promote a particular approach to the philosophy of science. NOA is a "viable non-realist position for post-realist times" that dispenses with the epistemological and metaphysical dogmas of realism and anti-realism.² Both the realist and the anti-realist account of the scientific enterprise fail to get rid of "premade philosophical programs".³ Fine disputes the basic hypothesis of realism that there is an extratheoretical relation between accepted scientific theories and the world. Anti-realism is rejected for its commitment to behaviorism in elaborating on the concept of truth. The anti-realist goes wrong when he tries to fashion out of the ordinary practices a completed concept of truth. His mistake is that in diagnosing correctly the disease of realism, he admits another version of essentialism.

Fine holds that the arguments in favor of realism and anti-realism provide no rational support for belief in these positions. Though Fine admits that the concept of truth is neither an epistemological nor a metaphysical notion, but the "fundamental semantical concept", he argues that it cannot be pushed aside when dealing with the growth of science. In making room for an open-ended concept of truth, NOA rules out the perspective of epistemological eliminativism which tries to substitute either naturalist or social-scientific vocabularies for discourse about knowledge and justification.⁴ This is why NOA points to a third, *philosophical* way beyond realism and anti-realism. Notoriously, NOA opposes all global accounts of scientific rationality and "meta-narratives" about the cognitive specificity of modern science. The conception of the natural ontological attitude offers a particularist and non-essentialist attitude to science. Fine goes on to recommend a "piece-by-piece approach to science" as an open, intersubjective activity. He believes that in following this recommendation, the philosopher of science will recognize that science has a history, rooted in everyday thinking and practices. Science is not governed by specific standards of rationality that have to be justified by developing meta-scientific interpretations, theories, construals, and pictures of scientific practices. Science's internal ontological attitude toward the objects under research is governed by the same standards of evidence and inference that are employed by science itself.

By undoing all philosophical supplements to this attitude, one jettisons essentialist ideas about the "nature of science". The important consequence of NOA for the present discussion of the multidimensionality of the realism debate is that the issue of essentialism as it is handled by Fine can no longer be bypassed by any global, philosophical account of science. We should state right away, however, that this issue can be addressed in two significantly different ways. On the one hand, essentialism is thought to be a metaphysical doctrine about natural kinds and their essences. This orientation is epitomized by Brian

² See Fine (1996b, 254).

³ See Fine (1996a, 142).

⁴ This is also the reason why Fine is not quite enthusiastic about the neopragmatist and postmodern receptions of NOA.

Ellis's work on the "logic of natural kinds" in which at issue is the reconstruction of the structured hierarchies of entities in the objective reality dealt with by scientific research.⁵ On the other hand, essentialism is the doctrine about science's "essential nature" described by demarcation criteria. To be sure, essentialism in terms of the logic and ontology of the natural kinds might be tied to essentialism about science's nature by arguing that the most important criterion for demarcating the scientific enterprise is that among all intellectual activities science only operates by means of the logic of natural kinds. Now, this combined treatment of the issue opposes essentialism to views like cognitive relativism and contextual constructivism. Yet essentialism might be considered as alternative to existentialism as well. With regard to the essentialism-existentialism contradistinction, essentialism is the view about how existence (the modes of being in the world of practices) is determined by (cognitive, linguistic, and other) essences. On this approach to the issue of essentialism, in admitting that there is (a dichotomy between) a mind and a reality that is independent of mind, one is adhering to a kind of essentialism. An existentialist alternative to essentialism would be that one, which will account the alleged essences (structures, codes, codices, systems of norms, and so on) in human existence in terms of interpretative constitution of meaning within projected horizons of possibilities.

We think that today, 30 years after Fine suggested the initial version of his conception, nobody can ignore NOA's criticism not only of scientific realism (and what he calls "scientific anti-realism"), but of the very realism debate. In accordance with the distinction between two ways of treating the issue of essentialism, we shall address in what follows two radically different reactions to NOA, whose only common denominator is the rehabilitation of a certain kind of realism. Stressing this common denominator has an important implication: Both reactions to NOA's criticism support philosophical positions that resist the postmodern "deflationary accounts" of the philosophy of science's ontological dimension. In both cases the claim is raised that one needs "more ontology" than NOA seems to allow. The reactions we are speaking about either (a) articulate the view that essentialism (as essentialist logic of natural kind reasoning, and as demarcation criteria of science's cognitive specificity) is not a flaw; or (b) go on to engage with advocating the thesis that by overcoming essentialism (in all connotations that make it the antipode of existentialism), the efforts of demarcating science from the "rest of culture" should not be given up.

Fine's position might be characterized at the same time as a zero-degree of realism debate.⁶ Presumably, all "higher degrees" of this debate that demonstrate commitments to realist or anti-realist positions involve some kind of essentialist or anti-essentialist (hermeneutic, phenomenological, existential) ontology. Fine's challenge demands from all contemporary champions of realism to address the following question: How to legitimate

⁵ See, for instance, Ellis (1996).

⁶ We think that Fine would agree with this claim. The zero-degree of realism debate is what he takes to be the core position about entities that exist and propositions that are true. On his view, the higher degrees of this debate take place when conflicting philosophical doctrines are added to the core position. Introducing such additions is a common business among the philosophers of science. Yet in the form of epistemological and/or metaphysical credo additions to the core position are not unusual for the working scientists as well. However, in this case—so Fine's argument goes—the additions are not brought in the world by the intrinsic dynamics of scientific research. They are reactions to the cultural context into which the research activities are embedded. Thus, realism and anti-realism play the role of motivational doctrines. Fine makes use in this regard of the psychoanalytic concept of an imago. In this "psychoanalytic account", Einstein's realism, for instance, proves to be a replacement for the "religious paradise of youth". Like any other kind of realism or antirealism, it is not advocated in terms of cognitive appeal, but rather in terms of what motivates, enlivens, and gives meaning to one's activities.

ontological claims about science that go beyond the working scientists' traditional ontological attitude?

The reactions we mentioned typify the extreme poles in realism debate within philosophy of science. One of them stems from epistemological-metaphysical positions; the other is inspired by doctrines developed in hermeneutic philosophy. They suggest in quite different manners arguments in favour of restoring a global, philosophical perspective on science. On the epistemological-metaphysical reaction, the local scientific practices do have meaning in the frameworks of scientific theories. It is the interpretations of theories by the working scientists (and not by "professional philosophers") which bring into play positions of realism and anti-realism. Thus considered, these positions are quite "natural" (or "native" in the context of scientific research). They are not additives to a natural attitude that presumably do not have a "metaphysical picture". Alan Musgrave stresses that NOA does not describe the authentic scientific attitude that precedes the realism debate. The NOA is rather a posterior simplification of scientific realism. The core position of NOA is not a "pre-philosophical attitude", but a minimalist exposition of a thoroughly realist position.⁷ (By implication, the NOA is not philosophically neutral between realist and anti-realist interpretations of scientific theories.) On the hermeneutic reaction, all local scientific practices presuppose a global horizon of scientific research. The critique from this perspective is concentrated on the insufficiency of the piecemeal approach championed by Fine's program. Each configuration of local practices takes place in a characteristic situation whose elucidation requires taking into consideration a global project of doing research.⁸

Our aim in the remainder of this Introduction is to portray the two extreme (ideal-typical) positions aiming at the rehabilitation of the aforementioned ontological dimension. These are: (I) the position of scientific realism as *characterized by all of its core doctrines*, and (II) the position of hermeneutic realism as *distinguished by doctrines that oppose in a radical manner the tenets of scientific realism*. We are led by the assumptions that between the poles of these positions, there is a spectrum of stances that inform the multidimensionality of scientific realism debate. Thus, our hope in the analysis to follow is to provide an initial map in the thicket of this proliferating debate.

2 II.

Scientific realism is not a simple thesis that may be embodied in any one single claim. Rather, scientific realism consists of a set of doctrines. Not all scientific realists agree about all of these doctrines. Thus, scientific realism is best characterized as a family of closely related doctrines.⁹ Another way to put the point is to say that there is a variety of different versions of scientific realism. In this, of course, scientific realism is not alone. Anti-realism is also best thought of as a family of doctrines. As we shall demonstrate, the same claim is valid for hermeneutic realism as well.

⁷ Alan Musgrave (1999, 162–177) epitomizes the argument against NOA from the viewpoint of scientific realism. See also Rorty's (2007) defence of NOA against this argument.

⁸ Fine (1996b, 250) claims that his piecemeal approach does not suggest a global hermeneutic orientation.

⁹ For a sample of the varying characterizations of scientific realism found in the literature, see Devitt (1991, 98ff), Ellis (1990, 87–89), Hacking (1983, 21–31), Leplin (1984, 1f), Newton-Smith (1981, 29, 38f) and van Fraassen (1980, 8).

Despite being best characterized as a family of doctrines, some doctrines are more central to scientific realism than others. In what follows we will present six distinct doctrines which we take to form the core of scientific realism. There are, however, a number of other doctrines associated with scientific realism.¹⁰ The six doctrines which we will now present are doctrines which form the core of scientific realism. These doctrines are so central to scientific realism that a view which denies any of them can only lay claim to the title of ‘scientific realism’ in an attenuated sense. We present the doctrines in what we find to be a natural order of presentation. This order is not meant to suggest that any particular hierarchical or logical relation holds between the doctrines.

The *first* doctrine is a doctrine about the aim of science. According to it, the aim of science is to discover the truth about the world, and scientific progress consists in advance toward that aim. In the first instance, aim realism is a thesis about the aim of science. As such, however, it has immediate implications about the nature of scientific progress, which is why we formulate it in terms of both an aim and progress toward that aim. Because the aim of science is to obtain the truth, progress in science must consist in advance on that aim. Hence, scientific progress consists in advance on truth.

It is consistent with the doctrine of aim realism to deny that science has made much progress toward the aim of truth. Indeed, it is consistent with aim realism to deny that any progress at all has been made toward that aim. But scientific realists typically wish to say that a great deal of truth has already been discovered in at least some areas of science. Some may even be prepared to commit themselves to the truth of at least some of the well-established claims of the sciences.

However, along with most contemporary philosophers of science, scientific realists tend to understand science as an ongoing historical process that is, in all likelihood, far from complete. As a result, they do not assume that contemporary science has already achieved the aim of truth. At best, current scientific theories may be close to the truth, or they may be approximately true. Pursuit of the aim of science cannot, therefore, consist simply in the pursuit of the truth. It must also consist in seeking to advance toward the aim of truth by increasingly close approximation to that aim.

Three further points are worthy of note. First, the idea that truth is the aim of science is in need of further qualification. It is not just that science seeks truth. For there are endlessly many trivial truths of no particular interest to science. Rather, science seeks to discover truths which are particularly revealing and interesting. Since science seeks to explain phenomena, we may say that science seeks truths of an explanatory nature. Second, it is worth noting that the choice of the term “discover” in the formulation of aim realism is a deliberate one. For the realist, the aim of science is to discover truth about the world. We do not invent, construct or fabricate the truth, as might be said by some anti-realist philosophers or by constructivist sociologists of science. Third, it is important to consider the status of the claim that truth is the aim of science. It is not an empirical hypothesis or generalization about the motivations of scientists, considered either as individuals or as a group. Nor is it a semantic claim to the effect that the concept of science is the concept of

¹⁰ In particular, many realists combine the position of scientific realism with rejection of Humean regularity accounts of causation or laws of nature. Moreover, some scientific realists hold that the world is populated by independently existing natural kinds, the essential natures of which may be discovered by scientific inquiry. There is a close affinity between scientific realism and anti-Humean and essentialist metaphysical theories. However, we believe that the issues which arise in relation to such metaphysical theories form part of a distinct debate from the debate about scientific realism strictly construed. So, for present purposes, we shall treat theories about causation, laws of nature and natural kinds as optional, rather than as core doctrines of scientific realism.

an enterprise that is directed toward truth. Rather, it is an epistemological claim that the purpose of a knowledge-seeking enterprise such as science is the pursuit of truth.

This latter point leads to the *second* core thesis of scientific realism. This is a thesis which relates to the nature of scientific knowledge. On the doctrine of *epistemic realism*, scientific inquiry leads to genuine knowledge of both observable and unobservable aspects of the world. The scientific realist does not simply assert that science seeks the truth about the world. Rather, scientific realism has a fundamentally epistemological rationale. For the scientific realist, the scientific pursuit of truth gives rise to genuine knowledge of the natural world. Scientific realism therefore entails epistemic realism, according to which scientific inquiry yields knowledge of the truth about the objective reality investigated by scientists.¹¹

What most clearly distinguishes epistemic realism as a component of scientific realism is the insistence that scientific knowledge is not restricted to the observational level. It extends to unobservable aspects of reality as well. Epistemic realism is what characterizes scientific realism as an epistemological doctrine distinct from contemporary versions of empiricist philosophy of science which deny that it is possible to either have rationally justified belief or knowledge about unobservable states of affairs. It is also what epistemologically distinguishes scientific realism from neo-Kantian, constructivist views which deny epistemic access to the objective, mind-independent world, which lies beyond our phenomenal experience.¹²

The insistence that scientific knowledge extends beyond the observational level is further reflected in the *third* core claim of scientific realism. This is a thesis about the interpretation of theoretical discourse: Scientific discourse about theoretical entities is to be interpreted in literal fashion as discourse which is genuinely committed to the existence of real unobservable entities. Such realist treatment of theoretical discourse contrasts with an instrumentalist construal of such discourse. Instrumentalism denies the literal interpretation of theoretical discourse, treating it instead as fictional discourse. Theoretical entities are ‘convenient fictions’, useful only as an aid to prediction. By contrast with instrumentalism, the scientific realist understands theoretical discourse to refer to events and regularities that take place at the unobservable level. Scientists explain observed phenomena on the basis of underlying causal processes. The explanations they provide refer to unobservable entities whose behavior is responsible for the observed phenomena.

The realist treatment of theoretical discourse has both an ontological and a semantic dimension. At the ontological level, it is realistic about theoretical entities, since it implies that there really are unobservable entities which underlie observable phenomena. At the semantic level, it has general implications with respect to the reference of theoretical terms. For the point of a realist treatment of theoretical discourse is not just that theories are genuinely committed to the existence of theoretical entities. Rather, realist treatment assumes that theoretical terms may in fact succeed in referring to real theoretical entities. For the realist, the point of employing a theoretical term, such as ‘electron’, is specifically

¹¹ The question arises of how precisely the notion of knowledge is to be understood in the context of scientific realism. In the present context, it may be assumed that something along the lines of the traditional justified true belief account of knowledge is a minimal condition for a realist conception of knowledge. This is particularly the case, given the need to produce a clear distinction between realism and assorted relativist and social constructivist conceptions of knowledge with which it contrasts. For related discussion, see Sankey (2000, 219f).

¹² The prime contemporary example of a neo-Kantian constructivist philosophy of science is, of course, Kuhn (1970). For such an interpretation of Kuhn’s metaphysical stance, see, for example, Devitt (1991) and Hoyningen-Huene (1993).

to refer to the theoretical entities in question, namely electrons. The realist therefore takes it to be possible for the theoretical terms employed by scientists to enter into relations of reference with the unobservable entities whose existence is postulated by theories.

The requirement of the possibility of reference does not commit the scientific realist to any particular theory of the reference of theoretical terms. At most, the possibility of such reference gives rise to a constraint on realistically acceptable theories of the reference of theoretical terms. But it does not entail any specific account of how the reference of theoretical terms is determined. Indeed, there is a range of theories of reference compatible with the requirement that theoretical terms be treated as genuinely referential expressions.¹³

The *fourth* core component of scientific realism, the doctrine of metaphysical realism, is commitment to the basic metaphysical stance of realism about the external world: The world investigated by science is an objective reality that exists independently of human thought.¹⁴ Commitment to a mind-independent, objective reality is what most fundamentally characterizes scientific realism as a form of realism. On such a view, there is a world that exists independently of our thought, the existence, structure and features of which depend in no way on human experience, beliefs, concepts or language. It is a world of objects, properties, relations and facts, which we must discover by means of empirical inquiry. It is not a world which is in any way constituted or constructed out of the concepts or theories which we formulate as part of the process of empirically finding out about the world.

We employ the expression “metaphysical realism” in the ordinary sense of commitment to the existence of a mind-independent reality. This use of the expression differs from the way it is employed by Hilary Putnam, who uses it to stand for the view that there is a fixed totality of mind-independent objects, determinate relations of reference between terms and objects, and one true, complete theory of the way these objects are.¹⁵ We prefer a more minimal characterization of metaphysical realism in terms of commitment to a mind-independent world. But, rather than address this issue at this stage in the exposition, we will return to it in the following section.

The *fifth* component of scientific realism is a thesis about the nature of truth: Truth consists in correspondence between a claim about the world and the way the world is. On such a view of truth, for a statement to be true the world must be the way that the statement says it is. The statement must correspond to the facts. Thus, a theoretical claim about an unobservable entity is true if and only if the theoretical entity really is how it is claimed to

¹³ The requirement of referential realism may be satisfied by a variety of theories of reference, which range from pure descriptive, to causal-descriptive and pure causal accounts. See Sankey (1994). However, no commitment to a specific account of reference is required by the realistic interpretation of theoretical discourse.

¹⁴ The expression ‘external world’ is the expression traditionally employed by philosophers to formulate the claim that there is a material world, which exists independently of the human mind. However, the expression itself is objectionable, since it seems to imply an untenable metaphysical divide between internal and external worlds, as well as to suggest that we are not part of the world. A further problem is that talk of an external world may provide the basis for the sceptical problematic—e.g., Cartesian questions about the certainty of our knowledge of an external world—which should itself be rejected in favour of a naturalistic perspective which denies the legitimacy of such sceptical questions.

¹⁵ See Putnam (1981, 49).

be. For example, the sentence ‘Electrons have negative charge’ is true if and only if electrons have negative charge.¹⁶

It is important to note that there are a number of alternative theories of truth which contrast with the correspondence theory of truth. Among the most prominent of these are the coherence, pragmatist, consensus and internal realist theories of truth. According to such theories of truth, truth is a property which a belief or statement may have in virtue of some epistemic property of the belief or statement. Examples of epistemic properties which have been proposed by advocates of such theories of truth include internal coherence, practical utility, agreement with one’s cultural peers, and ideal rational justification. Because such theories of truth identify truth with an epistemic property of belief, they are sometimes called “epistemic theories of truth”.¹⁷

For present purposes, we understand the correspondence theory of truth in a broad sense. If a theory of truth holds that a statement is true just in case a given state of affairs obtains, then it will count as a correspondence theory. This means that minimalist theories which take truth to be exhausted by the equivalence scheme “‘P’ is true if and only if P’ are just as much correspondence theories as are the more substantive attempts to identify the relation of correspondence with causal relations between language and reality.¹⁸ What is characteristic of all such theories of truth is that truth is a relation of correspondence that obtains in virtue of the world in fact being the way that it is said to be.

Correspondence theories of truth contrast sharply with epistemic theories of truth, such as coherence or consensus theories, which identify truth with epistemic properties of beliefs. As has been shown by Alan Musgrave, epistemic theories of truth imply an idealist covariance of belief and reality, and therefore cannot be reconciled with realism about a mind-independent reality.¹⁹ Correspondence theories which treat truth as a relation between language and reality are the only theories of truth compatible with realism.

The *sixth* core component of realism makes explicit the relationship between the two preceding components of realism, namely, that it is the objective world that renders our claims about the world true or false: Theories or claims about the world are made true (or false) by the way things are in the mind-independent, objective reality investigated by

¹⁶ The issue of the truth of theoretical claims raises a question about theoretical discourse. Ian Hacking distinguishes between *entity realism* and *theory realism* (Hacking 1983, 27). Entity realism asserts the reality of unobservable entities discovered by science. Theory realism asserts that scientific theories may be true or have a truth-value. Traditional scientific realism combines entity realism with theory realism. However, Hacking notes that the two doctrines are logically distinct. The entity realist may allow that there are unobservable entities of which scientists possess knowledge, but of which no current theory provides a correct description. By contrast, the theory realist may assert that a theory is true though none of its terms denote unobservable entities, but refer instead to logical constructions out of experience. In thesis 3, we have characterized the realist interpretation of theoretical discourse as a defining principle of scientific realism. Given this, it is not possible for scientific realism to deny that theoretical discourse purports to refer to real unobservable entities. However, it is no great departure from scientific realism to assert the reality of theoretical entities while denying theory realism. Entity realism may therefore be considered a special version of scientific realism.

¹⁷ See, for instance, Devitt (1991, 36, 44–45).

¹⁸ While not all minimalist conceptions of truth may count as correspondence theories of truth in the broad sense at issue here, at least some do. Paul Horwich, for instance, argues that his own minimalist conception of truth is able to embrace ‘the idea that each truth is made true by the existence of a corresponding fact’ (1990, 112). For more substantive theories of truth, compare the attempt by Hartry Field and Michael Devitt to analyze the relation of correspondence as a function of a relation of reference between terms and their extension, where the latter is in turn to be analyzed by means of a causal theory of reference (Field 1972; Devitt 1991, 29).

¹⁹ See Musgrave (1999, Chapter 10). See also Devitt and Sterelny (1987, 194–197).

science. This thesis may seem redundant in light of the two preceding doctrines. However, we choose to state the thesis as a separate doctrine in order to explicitly rule out possible non-realist interpretations of the correspondence theory of truth. It is possible to incorporate the correspondence theory of truth within an idealist metaphysics. For example, the idealist may treat truth as a relation of correspondence between statements and states of affairs that are either solely constituted by mental states, or jointly constituted out of sensory input from the external world and the conceptual contribution of the human mind.²⁰

Thus, what the realist wishes to say about truth is not merely that there is an objective reality and that truth is a correspondence relation. In addition, the realist wishes to say that truth consists in correspondence with objective reality. Thus, whether or not a statement is true has nothing to do with whether we happen to believe that it is true. Rather, the truth of the statement is entirely determined by how things stand in the world, independently of us. This is a further reason why the realist is unable to countenance an epistemic conception of truth, since such a conception of truth removes the dependence of truth on an objective reality.

In sum, the thesis of metaphysical realism, says nothing explicit about truth. It only says something about the nature of reality investigated by science. The thesis of correspondence truth, says nothing about reality. It only says something about the nature of truth. The thesis of the objectivity of truth is needed in order to make explicit the relation between the thesis of mind-independence and the correspondence theory of truth. It combines the two preceding theses into the realist doctrine that it is the mind-independent world that makes our claims about the world true in a correspondence sense. The three theses about reality, truth, and the relation between reality and truth are distinct theses. In the interest of clarity, they should be stated as such.

3 III.

In the previous section, we noted that our use of “metaphysical realism” differs from that employed by Hilary Putnam. We now turn explicitly to this issue.

Putnam characterizes metaphysical realism in the following terms:

On this perspective [i.e., the perspective of metaphysical realism], the world consists of some fixed totality of mind-independent objects. There is exactly one true and complete description of ‘the way the world is’. Truth involves some sort of correspondence relation between words or thought-signs and external things and sets of things. I shall call this perspective the *externalist* perspective, because its favorite point of view is a God’s Eye point of view.²¹

Following this passage, Putnam goes on to characterize the internal realist perspective that he favored at that stage in his philosophical development. He then comments that:

There is no God’s Eye point of view that we can know or usefully imagine; there are only the various points of view of actual persons reflecting various interests and purposes that their descriptions and theories subserve.²²

²⁰ In choosing to explicitly add the thesis of the objectivity of truth to that of correspondence truth, we follow the lead of Michael Devitt, who remarks that the correspondence theory ‘is compatible with absolutely any metaphysics’ (Devitt 2002, 14).

²¹ Putnam (1981, 49).

²² Putnam (1981, 50).

Given that there is no God's Eye view available to us, metaphysical realism is not a position that can be justifiably adopted. For to adopt metaphysical realism would require us to occupy the standpoint of God, which is impossible for us.

The internal realist position that Putnam proposes in *Reason, Truth and History* involves a conception of truth that reflects Putnam's rejection of the God's Eye perspective. The central tenet of internal realism is that truth is an "idealization of rational acceptability".²³ Truth is what would arise if scientific inquiry were pursued to the ideal limit of inquiry.²⁴ It is "some sort of ideal coherence of our beliefs with each other and with our experiences as *those experiences are themselves represented in our belief system*".²⁵

The internal realist conception of truth contrasts with the metaphysical realist view of truth, according to which truth is a non-epistemic relation of correspondence between language and reality.²⁶ The internalist's epistemic conception of truth is therefore a repudiation of the God's Eye point of view. For the internalist denies that truth may be conceived as independent of either observer or conceptual scheme, as required by the metaphysical realist's God's Eye view of truth.

In sum, we take the thrust of Putnam's comments about the God's Eye point of view to be twofold. On the one hand, realism requires a God's Eye point of view in order to be stated or defended. On the other hand, it is impossible for us to adopt a God's Eye point of view. So realism is incoherent. For it is not possible for us to occupy the standpoint that we would need to occupy in order to be able to formulate or to defend the position.

While we have a number of reservations about Putnam's characterization of metaphysical realism, we take the God's Eye objection to apply to scientific realism as a special case of metaphysical realism. Let us briefly indicate the sort of qualifications that we believe need to be made about Putnam's characterization of metaphysical realism.

In the first place, it is not clear that the realist need be committed to the existence of "one true and complete description of 'the way the world is'", as Putnam suggests in the passage quoted above. To avoid relativism about truth or reality, it must of course be denied that there is more than one true and complete description of the world.²⁷ But the core commitment of metaphysical realism is to the existence of an objective reality whose existence, properties and structure are independent of human mental activity. It is an open question whether there need be even as many as one true and complete description of such a reality. Indeed, it is an open question whether any coherent sense can be made of the idea of such a description.²⁸

In the second place, it is not clear that the realist need be committed to the view that "the world consists of some fixed totality of mind-independent objects". For, as Alan Musgrave has pointed out in discussion of Putnam, the word 'object' is not an

²³ See Putnam (1981, 55).

²⁴ Cf. Putnam (1978, 125), where Putnam notes that metaphysical realism treats truth as 'radically non-epistemic', which implies that the ideal theory reached at the ultimate end of scientific inquiry might be false. Though Putnam does not, in so many words, assert that the ideal theory is true, this is the clear implication of his internal realist identification of truth with ideal rational justification.

²⁵ See Putnam (1981, 49f).

²⁶ See Putnam (1981, 55).

²⁷ More precisely, to avoid relativism, it must be denied that there may be true and complete descriptions of the world which are jointly inconsistent with each other. In principle, it might be possible to formulate alternative true and complete descriptions on the basis of alternative conceptual schemes. Provided that such descriptions are consistent with each other, no threat of relativism arises.

²⁸ For sustained criticism of the idea of a complete description of the 'way the world is', see Hacking (1983, 93–95).

individuating or sortal expression.²⁹ The question of how many objects exist is not, therefore, a well-formed question. Such a question has no answer unless a specification is given of what kind of object one has in mind. But this means that the claim that the world consists of a *fixed totality* of objects is not one to which any clear significance may be attached. While the realist might be committed to the existence of a fixed totality of some *specific kind(s)* of objects, there is no need—nor does it make any sense—for the realist to be committed to a general claim that there is a fixed totality of objects.

But let us set aside such reservations about Putnam's characterization of metaphysical realism. Our characterization of scientific realism departs from Putnam's metaphysical realism in a number of key respects. But we do not think that it does so in a way that would render it immune to Putnam's worry about the God's Eye view. For on our characterization of scientific realism, realism is committed to a non-epistemic conception of truth as correspondence to an objective, mind-independent reality. Such a conception of truth is surely the key constitutive component of metaphysical realism in the sense defined by Putnam. Thus, apart from the minor qualifications mentioned above, scientific realism in our sense is similar in spirit to metaphysical realism in Putnam's sense.

Let us now consider whether scientific realism requires a God's Eye point of view. It may immediately be conceded that it is impossible for us to remove ourselves from our human perspective and adopt a God's Eye point of view. We are unable to survey the world from the vantage point of an all-knowing supreme being. But neither does the doctrine of scientific realism require that we adopt such a viewpoint.

The realist who proposes a scientific realist interpretation of science does not thereby purport to occupy a God's Eye perspective. Rather, in proposing such an interpretation of science the scientific realist puts forward a hypothesis about the nature of science and the relation between science and reality. In particular, the realist claims that science is an activity, the aim of which is to discover the truth about observable and unobservable dimensions of a mind-independent, objective reality. But such a claim is not made from a God's Eye point of view. It is a hypothesis that the realist proposes from within our human perspective as an interpretation of a specific human activity, the activity we call science.

The hypothesis of scientific realism should be accepted as an accurate portrayal of the relation between science and reality. But such a hypothesis about the relation between science and reality makes no evident use of a God's Eye point of view. Quite the contrary, it is a hypothesis proposed from *within* our human perspective about the relation between science and reality. So far from laying any claim to omniscience, or direct access to reality, the realist claims that scientific realism provides the best explanation of a robust phenomenon that stands in need of explanation, namely, the empirical success of the sciences. So far from presupposing a God's Eye perspective, the argument is designed to persuade fellow occupants of our human perspective that a realist account of science provides the best account of the epistemic and semantic relations between the human activity of science and the largely non-human world that we inhabit.

It is worth remarking that the strategy we have just sketched of arguing that realism is a hypothesis which is to be accepted because it provides the best explanation of the success of science reflects a broadly naturalistic conception of realism in the philosophy of science. For to treat realism as a hypothesis about science, and to argue for the hypothesis of

²⁹ See Musgrave (2001, 41).

realism by means of inference to best explanation, is to treat realism as a hypothesis that is to be evaluated in a manner analogous to the evaluation of scientific hypotheses. As such, our claim that realism does not require a God's Eye point of view derives from a naturalistic attitude toward the position of realism.³⁰

4 IV.

Let us return to NOA. There are two points in Fine's conception whose critical revision opens the avenue to what we call "hermeneutic realism". First, Fine is wrong to claim that the use of transcendental arguments inevitably leads to admission of essentialist premises about the nature of scientific research.³¹ A crucial connection between the use of such arguments and cognitive essentialism about science might only exist under the supposition of the primacy of epistemology in treating scientific research. On hermeneutic realism, however, starting from the (ontological) primacy of the interpretative being in the world of practices over the epistemic dualism of subject and object requires making use of transcendental arguments without rehabilitating the spirit of essentialism. These are arguments about the circularity between projected possibilities and what gets articulated by the actualization of these possibilities.

Second, Fine champions the view that a "hermeneutical understanding of science has to be gained *from the inside*. It should not be prefabricated to meet external, philosophical specifications. There is, then, no legitimate hermeneutical account of science, but only a hermeneutical activity that is a lively part of science itself."³² The hermeneutic realist makes the objection to this declaration by stressing that the account based on an interpretation of science's interpretative practices does not amount to an external-philosophical specification of scientific enterprise. There is in this account a sort of "double hermeneutics" that does not violate the requirement of avoiding any form of externalist essentialism. This statement precisely expresses the anti-essentialist argument advanced by hermeneutic realism.

We shall start with an outline of hermeneutic realism as a general philosophical position, subsequently specifying it as a position in the philosophy of science. On the main tenet of hermeneutic realism, there is no objective reality that precedes the reality of being-in-the-world. Before having the "world out there" as opposed to (and represented by) mind (the human cognitive abilities), the human beings are always already in the world of practices. Even the contemplation of "the world as objective reality" is a practice *sui generis* that is embedded in a configuration with other (cognitive and non-cognitive) practices. In another formulation, the ways of being in a practical world precedes the world as represented (or cognitively constructed) by mentality. Furthermore, the subject-object relation comes always into being within configurations of practices. Human agents might construct objective knowledge because of their entangled participations in "work-worlds". Moreover, "representing the world" or "constructing objective knowledge about the world" are actually sophisticated arrangements of various practices that cannot be isolated from the rest of the world of practices.

Starting out from modes of being in the world of practices prevents one from an initial hypostatization of a dualism between the epistemic subject and the objective world (and the

³⁰ A related treatment of the issue may be found in Devitt (1991, section 12.6). Thanks are due to Michael Devitt for drawing attention to this point, and for pointing out the naturalistic provenance of the argument in this section.

³¹ Fine (1996a, 175).

³² Fine (1996a, 148).

dualism of conceptual framework and empirical content). To be entangled in the world of practices is an interpretative mode of being in the world. Human beings interpret themselves in accordance with the possibilities they can appropriate and actualize in this involvement. In so doing, they also interpret the world of practices within the horizon of possibilities they have at their disposal. Being in the world of practices amounts to interpreting the world (and one's involvement in it) as a world projected upon possibilities that are engendered by the very interrelatedness of practices. On hermeneutic realism, the "horizon of understanding the world" (as a prerequisite for having an objective knowledge about the world) is tantamount to the "world as a horizon of understanding". Thus, the hermeneutic circularity is to be ascribed not only to interpretation as a particular cognitive procedure, but first and foremost to the being of human existence as being in the world of practices.

Hermeneutic realism opposes all views that admit the following clauses: (a) the credentials of all truth claims must be checked by a foundational theory of knowledge; (b) the objective reality is organized into distinct objects, and the distinctness of each of them is prior to the constitution of meaning; (c) the mind of man is isolated from the world in a manner that enables it to represent the world through images, ideas, concepts and categories; (d) there is an invariant and universal semantic core in mind that contains series of meanings related to the basic structure of objective reality. Roughly speaking, hermeneutic realism is a kind of realism that gets rid of Cartesian dualism, epistemic representationism, foundationalism, and cognitive (including linguistic-semantic) essentialism. It is a common place for those who subscribe to a certain version of hermeneutic philosophy that the world is not out there, and mind is always within the world. Hermeneutic realism is opposed above all to metaphysical realism and by implication to scientific realism. Metaphysical realism is criticized for the postulation of ontic primacy of the dualism between mind and mind-independent objective reality over the totality of being in the "work-world" of practices. Thus, the metaphysical realist exempts himself from asking the question of how the mind that represents the world as a presence-at-hand comes into being within the work-world. Does not mind belong to the reality of being in the world of practices? Since most metaphysical realists are inclined to argue that mind is a part of objective reality, the hermeneutic realist focuses her criticism on the predicament concerning the reconciliation of the following two doctrines: (a) objective reality is independent of mind; and (b) mind is part of this reality.

Hermeneutic realism is the opposing pole to scientific realism (within the realism debate)—so our basic argument goes—because the former is a philosophical position that gets rid in a radical manner of any kind of hypostatized epistemic dualism. In all anti-realist alternatives to scientific realism this dualism is preserved in a certain form. Thus, for instance, in internal realism, it is the dualism of a particular framework attributed to a given standpoint and the reality as perceived from that standpoint; in the (neo)Kantian positions advocating some sort of constructivism, there are various versions of "conceptual scheme—empirical content" dualism; in constructive empiricism, it is the dualism (within a theory) between theoretical models and phenomena within the process of "saving the phenomena".³³ Notoriously, Bas van Fraassen tries to overcome this dualism by means of

³³ Hermeneutic realism is not to be confused with the interpretative version of the dualism of conceptual scheme and empirical content: Because we are always interpreting facts in conceptual frameworks, there are no facts, but only interpretations. Hermeneutic realism is not an interpretative radicalization of transcendental epistemology. To say that all kinds of reality (objective, semiotic, historical, social, and so on) are constituted meaningfully within the world of practices does not amount to holding a sort of (social) constructivism. Social constructivism is still succumbed to the (Kantian) assumption that there is an initial (amorphous) reality that gets designed by the processes of social construction.

envisaging a hermeneutic circle (his expression) between theory's semantic models and the particular phenomena.³⁴ This is why we treat constructive empiricism as the position in analytical philosophy which is closest to hermeneutic realism. However, van Fraassen goes on to conceive of the hermeneutic circle as an intra-theoretical procedure.³⁵ The hermeneutic realist makes the case that the intra-theoretical circle of interpretation is embedded in the broader hermeneutic circle of scientific research as a mode of being in the world. In extending the circle of interpretation beyond the scope of theory construction, the hermeneutic realist jettisons also the dualism between science's observable and unobservable objects, thereby suggesting a new reading of science's theoretical terms.

Van Fraassen is the most prominent philosopher combating today any hypostatization of science's theoretical objects. The program of constructive empiricism has no room for advocating an independent status of theoretical objects (and a reified status of science's mathematical structures). On this program, one cannot isolate the empirical content of science by dividing its language into two parts. The rebuttal of any attempt to draw a philosophically significant line between phenomena and the trans-phenomenal (i.e., science's theoretical objects) by means of a distinct vocabulary is a basic trait of constructive empiricism. Thus, van Fraassen rejects the bias of looking for transcendental grounds of scientific theorizing, while preserving the constructivist view about the empirical content of scientific theories.

For him, the "phenomena are saved" when they are exhibited as fragments of a larger unity delineated by theoretical models. Constructive empiricism lays a special emphasis upon the hermeneutic circle between scientific theory that suggests models about observable phenomena and the delineation of these phenomena.³⁶ By means of this circle, the constructive empiricist reveals the very idea of saving the phenomena without assuming an essential relationship between epistemological representationalism and ontological realism. A scientific theory designates certain areas of actual and possible observable entities. According to the anti-realist criterion of "theoretical existence" advanced by van Fraassen, to accept such a theory amounts to believing that what it says about observable phenomena is correct. Devising the hermeneutic circle of theory construction helps one to "dispel the lazy illusion" that we can understand the relation between science and reality "by means of the simple expedient of either reifying the models or conceiving of them as delineating the objective structure of a hidden qualitative content."³⁷

³⁴ See Van Fraassen (1980).

³⁵ Van Fraassen argues that all research practices are only the continuation of theory construction by other means. Practices of measurement, observation, experimentation and instrumentation get their meaning only within the horizon of a theory. By implication, the hermeneutic circle devised by constructive empiricism remains an intra-theoretical circle.

³⁶ See van Fraassen (1980, 56–59). Strictly speaking, this is not a hermeneutic circle in the sense of a theory of interpretation, but a kind of co-dependence, in whose treatment van Fraassen avoids vicious circularity.

³⁷ Van Fraassen (2006, 305). According to van Fraassen, structural realism and scientific realism are exhibiting two ways of destroying of the intra-theoretical hermeneutic circle. Reification and structuralist essentialism are the consequences. The exponent of empirical constructivism convincingly argues that it is embarrassing to start with the thesis that what is preserved through a radical change in science's development is the structure attributed to the reality under investigation, and to have to identify structure by noticing what has been preserved. On van Fraassen's account, the successes of older scientific programs are due to successful fitting the experimental and observational experience in mathematically codified theoretical models (mathematical structures), whereby the mutual interpretation of models and data gets accomplished. This hermeneutic circle reveals the structure, at some level of approximation, of the phenomena that are studied. The constructive-empiricist description of the deliverances of experimental and observational experience in terms of an intra-theoretical hermeneutic circle replaces the logical-positivist

Leaning on the semantic view of scientific theories, Van Fraassen is successful in his efforts to avoid a vicious circularity between theoretical models and observable phenomena. However, this is not sufficient to “enter” into the hermeneutic circle of scientific research. Though van Fraassen’s anti-realism depends strongly on various (semantic and pragmatic) kinds of co-interpretation between models and data, there are no resources in constructive empiricism to address the circularity between the horizons of opening a domain of scientific research (where a theory with actual and possible semantic models becomes established) and the growing number of particular phenomena that get saved in the process of domain’s theoretical and empirical articulation. To be sure, this circularity is not to be reduced to an intrinsic circle of a theory construction. Consequently, it cannot be recast in terms of a theory’s empirical adequacy and semantic interpretation. In reflecting upon this deficiency, one might argue that constructive empiricism can be developed as a consistent philosophical position, if and only if one integrates in its image of science a broader view about the interpretative nature of scientific research.

A purely empiricist philosophy of science cannot analyze critically those practices which make possible the circular relations between theory and phenomena. Accordingly, the hermeneutic circle must be no longer enclosed within the procedures of theory construction. It is, rather, a circle between configured practices (where each particular configuration informs a contextual horizon of reading) and particular items (experimental data, diagrams, data-models, formulas, equations, semantic revisions of theoretical terms, etc.) coming into being as a result of a reading within such a horizon. Since this is an iterative circle, there is a good reason to speak of an ongoing hermeneutic circularity. Scientific theory is not a ready-made existing beyond the hermeneutic circularity of scientific research. It gradually takes shape within the contextual horizons projected by configured practices. Thus considered, any intra-theoretical circle of saving phenomena does only have a meaning within the ongoing hermeneutic circularity by means of which a domain of scientific research is disclosed and delineated.³⁸

As a specific mode of “practical being in the world”, scientific research is predicated on a dynamics of changing configurations of routine practices of constructing instruments, designing and repeating experiments, preparing reports on observations, applying formal techniques for a graphical description, constructing systems of differential equations, calibrating instruments, controlling experimental systems, measuring control parameters of experimental systems, constructing various kinds of models, devising thought experiments, creating computer simulations, and so on. The routine reproduction of configurations of such practices constitutes the normal scientific everydayness of a certain research domain. It is the interrelatedness of practices of inquiry that projects an open horizon of possibilities for the research process. Such a horizon is always already transcendent with respect to the possibilities that get actualized in each particular situation of this process.

As a mode of being-in-the-world, scientific research projects its being of interrelated practices upon possibilities. There is an ongoing appropriation of these possibilities in normal science. Through this appropriation an ongoing articulation of a domain’s objects

Footnote 37 continued

description of the relation between phenomena and mathematical structure in terms of privileged observation statement. The dilemma that follows from destroying this circle—so van Fraassen’s argument goes—is that the mathematical formalisms codifying science’s theoretical objects are either describing identifiable things in the physical reality or revealing structures of unknown entities.

³⁸ This claim can be generalized in the following manner: the intra-theoretical hermeneutics that takes into account the interrelations between theoretical terms and empirical data has to be placed in the broader context of a hermeneutics that provides accounts of how practices of theory construction are interpretatively interrelated with the rest of scientific practices.

comes into being. The ongoing actualization of possibilities and the concomitant articulation of a domain of research objects are characterized by anticipations, expectations and orientations assigned to the community which carries out the research process. The possibilities projected by a normal scientific interrelatedness of practices are not to be confused with the possibilities stemming from a mental activity planning such a behavior, thereby providing an algorithm of how to choose and appropriate possibilities. Like the routine practices of research, the possibilities upon which the research process is projected do not have an autonomous reality *sui generis*. Any suggestion of a pure presence of possibilities projected before the practitioners of scientific research would rehabilitate essentialism in a new form. The existential possibilities of articulating a world are not independent of the ways of their actualization.

More specifically, the projection of possibilities by configurations of scientific practices is always entangled with choosing, appropriating, and actualizing them. In stating that the articulation of meaningful objects comes into being through an ongoing interpretative appropriation of possibilities, one assumes that the configurations of practices are predicated on an intrinsic interpretative potentiality. This potentiality is due to the fact that all scientific practices serve the function of readable technologies in scientific research. Within the range of the cognitive outcomes of implementing such technologies are reports on observations or experiments, diagrams, comparative tables of measurements, analytical techniques for selecting control parameters in investigating dynamic behaviour, systems of equations, etc. To be sure, these outcomes are always semantically integrated in larger theoretical frameworks. Yet all situational outcomes as well as the very process of their semantic (trans-situational) integration (by means of a theoretical framework) are *fore-structured* by the interrelatedness of practices.³⁹

Hermeneutic realism opposes not only scientific/metaphysical realism but structural realism as well. Notoriously, the point of departure of structural realism is a reading of the correspondence principle that allows one to identify in the development of science a sort of mathematical cumulativism (i.e., a cumulative growth at the formal-structural level that is not in conflict with the radical replacements of ontological frameworks in scientific change).⁴⁰ Hermeneutic realism makes two principal objections to this point of departure. *First*, the structural realist admits that there is something like a quasi-Kleinian hierarchy of mathematical formalisms at the structural level of the development of science. It goes without saying that such an assumption does not match the historical dynamics of science in its variability of structures. The structural realist goes on to suggest that the correspondence principle *determines* the development of the mature sciences with regard to the change of basic formalisms. A favored example of John Worrall in this regard is the replacement of Newton's theory of gravity by general relativity. Notoriously, Newton's equations reappear as limiting cases in the mathematical formalism of Einstein's theory.

Now, the question which is crucial for vindicating structural realism goes as follows: Is it acceptable to argue that if one restricts oneself to the level of mathematical equations,

³⁹ The hermeneutic realist champions the view that a domain of scientific research is disclosed within the interrelatedness of practices of Kuhn's normal science. The hermeneutic realist rejects the view that the constitution of a scientific domain starts out with a mathematical projection that determines the scope of inquiry. This view is refuted in the first place by the fact that there are no mathematical idealizations that resist change during the period in which a scientific domain becomes disclosed and articulated as a manifold of possible objects. Furthermore, the hermeneutic realist asserts that all cognitive structures of science are fore-structured within the everydayness of practices of scientific research (i.e. within Kuhn's normal science). This claim is valid also with regard to the scientific theories' "hardest" mathematical formalisms.

⁴⁰ See, in particular, Worrall (1989, 99–124).

thereby excluding the phenomenal level, there is a complete continuity in the switch from Newton to Einstein? Worrall states that there is no clear sense in which an action-at-a-distance force of gravity “approximates” space–time curvature. Yet, with regard to the correspondence principle there is an approximate continuity in structure. Hence, the applicability of this principle is evidence for structural realism. However, this “evidence” can only be accepted, if one restricts oneself to a *static-essentialist view* about (what Worrall calls) the structural level of science. In opposing this view, the hermeneutic realist states that the mathematical formalisms are not ready-made, but are constantly in a status of generation, being involved in varieties of *mathematical practices*. Thus, the nonlinearity of the field equations in general relativity (i.e., the nonlinearity brought into being by the group of the general relativity which demands that the simplest invariant law be no longer linear in the field-variables) implies various possibilities of relating Einstein’s theory to the classical theory of gravitation. Not all of these possibilities apply or appeal to the correspondence principle. Roughly speaking, there are possibilities (projected by mathematical practices) of confining the measurement procedures to local measurements. In actualizing such possibilities, one can always find a coordinate system in which the metric is locally linear. Obviously, this is an application of the correspondence principle, through which the classical linear equations reemerge in the new theoretical framework as limiting cases. The deficiency in making use of this principle in such a fashion is the loss of the nonlinearity of general relativity since nonlinearity shows up only when one investigates space–time globally. This is why the revival of general relativity in the mid-1950s was related to possibilities of developing mathematical scenarios that are not determined by the correspondence principle.⁴¹

Second, structural realism confuses two types of interpretation—the hermeneutic interpretation as it is informed by the readable technologies of scientific practices and the semantic interpretation which consists in the construction of models of theories’ mathematical formalisms. In extending the claim that the theoretical frameworks are constantly fore-structured by interrelated practices of scientific research, one can go on to aver that the “structural level” (in Worrall’s sense) is not an independent layer of science’s development. In other words, not only the theoretical frameworks (and their mathematical codification through, for instance, partial differential equations), but also all global changes of mathematical structures in science’s development are embedded in an interpretative milieu. Even when one establishes that the mathematical equations of the old theory reappear as limiting cases of the mathematical equations of the new theory, one has to go beyond the issues of semantic interpretation and ask questions from the register of hermeneutic interpretation. Since even in that case, one is in need of an account of the continuity of form or structure. And one would be not able to give such an account without reflecting upon the interpretative milieu of interrelated scientific practices in which this continuity takes place.

The hermeneutic realist puts forward a view about the status of science’s theoretical objects that dispenses with the dichotomy between the unobservable and the observable. Against this dichotomy the hermeneutic realist argues that the objects related to mathematical idealizations (like “the gravitational field energy density”) or to hypothetical explanatory scenarios (like “regulatory genes”) do exist at once as “inscriptions” on horizons of possibilities for doing research, and as meaningful entities constituted by (the readable technologies of) practices of formalization, experimentation, modeling simulation, calibration, measurement, and calculation in scientific research. Characterized by this

⁴¹ See in this regard Graves (1971, 215–232).

double status (within hermeneutic circularity) science's theoretical objects are projected upon possibilities to be made partially explicit in various spaces of representation constituted by configurations of scientific practices (as readable technologies). These objects have a potentiality-for-being in the spaces of representation constituted by the interrelated practices of scientific research. Each particular configuration of practices brings to the fore a space of representation, in which possibilities of making theoretical objects explicit become actualized. In actualizing such possibilities, scientific research defers constantly the spaces of representation, whereby each theoretical object gets scattered in a diversity of such spaces.⁴² The "inscriptions" of a theoretical object in a horizon of possibilities can be never totally transformed into finished entities existing in a finite number of spaces of representation. However complete a scientific domain and however advanced the research process, the possibilities of making a theoretical object explicit in deferring spaces of representation can be never exhausted. In each particular situation of normal science, the theoretical objects display possible aspects that could be revealed in the coming situations. In this regard, they constantly go beyond the actual state of affairs in normal scientific research.⁴³

To sum up, hermeneutic realism is *realism about the reality that is ready-to-hand within the "readable technologies" of interrelated practices*. This realism would specify not a range of entities but the conditions under which one would be able to take (within the interrelatedness of practices) an objectifying attitude concerning entities of a given type, thereby laying claim about the reality of these entities as an objective presence-at-hand. By posing the question of the possibility of objectifying attitudes, the realist view we are speaking about would serve a transcendental function regarding the study of the possibility of realist-ontic positions, each of which specifying a range of entities that are present-at-hand. In other words, this would be a kind of "critical realism" in double sense. On the one hand, it is "critical" in Kantian sense as a view that asks about conditions of possibility. On the other, it criticizes each essentialist reification and hypostatization of entities.

5 V.

In this final part of our Introduction we will address the issue of scientism as it is taken into consideration in the realism debate. Let us begin with what by now seems to be a standard view of scientism. We refer in this regard to writings of Richard Rorty who defined this view in a most succinct way. Rorty remains at the same time the most influential antagonist to scientism. According to him, the kernel of scientism is the idea that natural science has a distinctive method, one that makes it a better paradigm of rationality than other intellectual enterprises like historiography or jurisprudence.⁴⁴ In granting epistemological and metaphysical privileges to natural science, the proponents of scientism believe that scientific knowledge is the only source that gives us essences and necessities. In Rorty's view, those who support scientism think that pragmatist, conventionalist and instrumentalist philosophies of science and of language are dangerously irrational in declaring that all distinctions between necessities and contingencies are artifacts that change as our choice of description

⁴² See on this view Rheinberger (1997, 102–113).

⁴³ See Ginev (2006, 132–156), and Ginev (2008).

⁴⁴ Rorty (2004, 22). Some authors add to this minimalist definition of scientism an axiological moment. Thus, Steve Fuller (2006, 122) holds that in "its simplest form scientism is the doctrine that science can justify value commitments.

changes. The weak point of scientism is seen in “the inference from the fact that a certain descriptive vocabulary enables us to predict and utilize the causal powers of objects to the claim that this vocabulary offers a better understanding of those objects than any other.”⁴⁵

In our estimation, Rorty suggests a minimal basis for understanding scientism, a basis that is to be accepted by both the scientific realist and the hermeneutic realist. At the same time, his recommendation to get rid of scientism by giving up the attempts to preserve a certain picture of the relation between scientific language and the entities of the (non-human) physical world provoke critical reactions from both sides against this simplistic neo-pragmatist approach. Thus, scientific realism and hermeneutic realism develop in their own terms strategies for coping with scientism. Let us move now to the strategy of the former position.

Scientific realism is sometimes taken to be a form of advocacy of scientism as the doctrine that science is the sole legitimate source of empirical knowledge. While scientific realism may well sit comfortably with scientism (formulated, in particular, as a naturalist doctrine that the methods of natural science provide the sole means of epistemic access to the world), it would be quite mistaken to identify scientific realism with scientism. (To be sure, the scientific realist would not accept the positivist doctrine of scientism that cognitive significance is restricted to verification by means of scientific observation.)

First, let us note that scientism is no part of the family of scientific realist doctrines presented in the second part of this Introduction. Scientific realism does not depend on the claim that science is the only means of epistemic access to the world. The issue of knowledge only figures explicitly in the context of the *second* core thesis of scientific realism, the thesis of epistemic realism, which asserts the possibility of scientific knowledge of the objective world. But this in no way implies that science is the sole source of empirical knowledge. It is consistent with epistemic realism, as it is with the remaining principles of scientific realism, to allow that commonsense experience is a perfectly acceptable means of access to the world. Nor is there any reason for the scientific realist to hold that there may be no empirical knowledge in disciplines, such as historiography, which might fail to employ the methods of natural science. Thus, scientific realism does not entail a scientistic attitude toward knowledge. That is not to say, though, that it is incompatible with such an attitude. To see this, we will briefly trace a route that leads from scientific realism to scientism.

Let us suppose that the only things that exist are material objects. Let us also suppose that all material objects are constituted out of the fundamental constituents of matter of which we are informed by physical science (e.g., molecules, atoms, etc.). Finally, let us suppose that anything which is not either a fundamental constituent of matter, or made up of a fundamental constituent of matter, does not really exist. This rather austere metaphysical picture is the metaphysics of materialism, or, to use a more contemporary name, physicalism. Such a materialist metaphysics is consistent with scientific realism, since it may be arrived at by elaborating upon the realist commitment to theoretical entities which we have seen to be part of the third core doctrine of scientific realism. However, it is not entailed either by realism about theoretical entities, or by scientific realism in general, because physicalism is based on the further assumption that the only things that exist are the entities described by fundamental physics, and things which are made up out of such entities.

⁴⁵ Rorty (2004, 27).

We are constrained in what we can know by the nature of what exists. Hence, ontology constrains epistemology. If physical things are all that exist, then this imposes certain constraints on our knowledge. We may only acquire knowledge of the properties of physical things by means that are available within a physical world. Since we are ourselves physical beings, our only means of epistemic access to the physical world must be by way of our causal interaction with it. Either we acquire knowledge directly by means of causal interaction of the world with our perceptual apparatus, or we acquire knowledge indirectly by means of causal relations with things to which we do not have direct perceptual access.

The way is now clear to scientism. For if we are prepared to assume that the methods of science represent the sole epistemic use of causal relations with the physical world then we may conclude that science is the sole means of epistemic access to the world. No doubt, many scientific realists do not find this an intrinsically abhorrent conclusion. But it should be clear that the route from scientific realism to such a scientistic conclusion is a circuitous route, which requires further epistemological and metaphysical assumptions that play no part in the doctrine of scientific realism itself. It should also be clear that one may embrace scientific realism without taking the first step down the path to scientism.

Let us finally move to the issue of scientism from the viewpoint of hermeneutic realism. From this viewpoint, scientism is an ideology in the classical sense of “false consciousness”. To a certain extent, the hermeneutic realist accepts the view that scientism is a false attitude towards both the cognitive specificity of science and the cultural-historical role science should play in modernity. Scientism is a hidden ideology of many practitioners of scientific research. Yet among the working scientists there are several attitudes that combat scientism or are at least incompatible with it. Scientism is an ideological attitude distinguished by the idea that the more objective scientific knowledge is the more successful is science as a means for instrumental-technical control. Based on this consciousness, scientific research gets guided by the standards of instrumental rationality. Yet, in contrast to Habermas and many other representatives of Continental thought, the hermeneutic realist does not admit that scientific research is doomed to be tied to these standards solely, thereby lacking the opportunity to gain an identity alternative to that of scientism. Consequently, scientism as attitude, ethos and professional ideology is only a historically conditioned state of affairs.

From the standpoint of hermeneutic realism, the critique of scientism must be carried out as an *internal* critique of the nexus of epistemological objectivity and instrumental theory of rationality in scientific research. The critique of scientism suggested by hermeneutic realism is in many respects a strong alternative to the anti-scientism that dominates in the Continental philosophy.⁴⁶ Roughly speaking, the hermeneutic realist displays discontent with the mainstream forms of anti-scientism, in which the attitude of scientism is directly derived from constitutive characteristics of the epistemic rationality of science. The hermeneutic realist strongly opposes the linkage of the critique of scientism with the search for a political control of scientific research that threatens science’s cognitive autonomy. This linkage is typically supported by the champions of social epistemology and other branches of social-philosophical constructivism about the nature of scientific research. The plea for anti-scientism turns here into an appeal for demolishing the autonomy of scientific research in the name of a radicalization of democratic process. On the critical agenda of social epistemology, the society has to control not only the utilization of the outcome, but the very process of scientific research as well. Only in this way one might say farewell to scientism. In opposing the ideology of scientism, the hermeneutic

⁴⁶ See on this point, Carson (2010), and Ginev (1992).

realist defends the cognitive autonomy of science in terms of the interpretative openness of scientific research. Furthermore, the hermeneutic realist argues that scientific research has intrinsic resources to overcome the externally imposed identity of science as an enterprise being guided by instrumental rationality.

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