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REALIST INQUIRY in SOCIAL SCIENCE

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SCIENTIFIC REALISM

INTRODUCTION

Within philosophy, the term 'realism' has a number of different meanings. It is used to name doctrines about the existence of universals, the directness of perception, the objectivity of morality, the nature of science, and more (e.g., Brock & Mares, 2007). Similarly, the term 'anti-realism' is employed to label the range of contrasting doctrines. These contrasts give rise to a number of different debates about realism and anti-realism. This chapter is concerned with *scientific* realism, and will, on occasion, refer to anti-scientific realism. For convenience, when speaking of scientific realism and anti-scientific realism, the terms 'realism' and 'anti-realism' will be used.

Concerning science, the question 'What is realism?' is very difficult to answer. Not only are there many different realisms, leading to innumerable within-family debates; there are also debates between many of the different versions of realism and anti-realism (see, e.g., Psillos, 1999). What follows, therefore, is a rather selective treatment of realism. Understandably, no attempt is made to present realism in all its variety, or to justify one particular brand of realism, or engage the ongoing realism/anti-realism debate. The primary purpose is to identify some of the important contours of the broad realist landscape in contemporary philosophy of science in the hope that readers might find it useful background material for the ensuing chapters on methodological concepts and research methods.

WHAT IS REALISM?

Minimally speaking, realism involves a commitment to the ideas that there is a real world of which we are part, and that both the observable and unobservable features of that world can be known by the appropriate use of scientific methods. Some versions of realism incorporate additional doctrines (e.g., the claims that truth is the primary aim of science, and that

successive theories more closely approximate the truth), and some also endorse specific optional claims that may, but need not, be used by realists (e.g., the claim that causal relations are relations of natural necessity). Because of this variety, realism cannot be given a straightforward characterization, and it will always be possible to take issue with one or other of its formulations.

The presentation of realism begins by describing its three core theses, and goes on to present a number of additional theses that serve to broaden its scope. The chapter then concentrates on the nature and place of methodology and scientific method in realism. Before concluding, three quite different forms of realism with particular relevance for the social sciences are canvassed. They are intended to help the readers think about realism in relation to their own particular social science. In all of this, the intention is to present realism as a broad-ranging philosophy of science.

Core Theses

Realism is often understood as a family of related doctrines or theses (e.g., Hooker, 1987; Psillos, 1999). Typically, three core doctrines are presented, although these are sometimes formulated differently. They are known as *metaphysical realism, semantic realism* and *epistemic realism*.

Metaphysical Realism

Briefly, metaphysical realism asserts that there is a real world of which we are part and which science investigates. It has a definite nature or structure, and exists independently of the minds of investigators. The world's nature is generally taken to be of a material kind, and its mind-independence is to be understood as conceptual or logical independence. The latter is taken to mean that our methods of investigation and our theories about the world do not determine or influence what the world is like. Metaphysical realism allows for a strong sense of objectivity, where the world is the arbiter of our conceptualization of it. It also allows realists to adopt a non-epistemic view of truth as correspondence with reality, and it opposes the strong constructivist view that the world is not already in existence, but is of our making. Although metaphysical realism is typically cast in terms of the mind-independence of the world, we will see shortly that this requirement will have to be relaxed for some parts of the social sciences. However, the acceptance of the idea that at least some aspects of the world are mind-independent does not commit one to relativistic versions of inquiry.

Semantic Realism

Semantic realism is characterized with varying degrees of precision. Minimally, semantic realism is the claim that scientific theories should be interpreted realistically, which means that they should be taken at face value. The entities that our scientific theories say exist, for the most part do exist, and have the properties that our theories describe. What makes these claims distinctively realist in character is their application to hidden or theoretical entities, not just to observed entities as empiricist philosophies demand. What makes such claims defensible is that they are made with reference to the successful theories of mature science. Relatedly, it is a part of the doctrine of semantic realism to claim that many factual and theoretical claims of mature science actually refer, or that such claims have putative factual reference. A modification of this formulation of semantic realism will be proposed later.

Epistemological Realism

Formulations of epistemological realism vary in both their strength and scope. Minimally, epistemological realism asserts that both the observable and unobservable features of the world can be known by the appropriate use of scientific methods. The thesis goes beyond empiricism's commitment to the instrumentalist view that science can only know about observables and their theoretical ordering. Epistemological realism is, therefore, both an optimistic and a risky position to adopt. In contrast to empiricism, epistemic realism maintains that we can have reliable knowledge of the unobserved realm, as well as the observed realm. However, because access to the unobserved realm is more indirect than the access we have to the observed realm, we are more likely to be mistaken in our claims about that realm. The possibility of error is explicitly acknowledged in the realist's commitment to fallibilism – the belief that our knowledge claims may be mistaken because human inquirers characteristically err. The realist's commitment to fallibilism is thorough-going, for it involves the recognition that all our knowledge is partial and incomplete, and results from the concerted use of methods to detect and correct error. The realist, then, takes science to be an ongoing process of intelligent trial and error detection, with theories competing and changing over time. As we will see, given the modest progress in theory construction in the social sciences, we might consider it more appropriate to speak of the *possible*, not the actual, existence of newly postulated theoretical entities.

The chapter turns now to consider two optional theses that are not normally addressed when characterizing realism, but which add to the scope of

realist theory. An additional thesis, methodological realism, is of central importance to realism, and will be dealt with separately in some detail later in the chapter.

Optional Theses

Axiological Realism

The thesis of axiological realism is primarily a thesis about the aim(s) of science. In the realist literature it is commonly formulated as the claim that science primarily aims for true theories. Karl Popper (1982) and Alan Musgrave (1996) are prominent advocates of this view of axiological realism.

Most realists subscribe to a version of the correspondence theory of truth. The correspondence theory of truth asserts that a proposition is true if and only if the world is as the proposition says it is. One attractive feature of the correspondence theory is that it enables the semantic realist to draw the distinction between the evidential basis for an assertion (an epistemic matter), and the referent which makes an assertion true (a semantic matter). Thus, the semantic realist can maintain that even though scientists cannot establish the truth or falsity of a given knowledge claim, the claim will remain a meaningful and significant assertion about the world because it is in fact true or false.

With its focus on truth as the primary aim of science, this standard characterization of axiological realism is overly restrictive. This is because science, carried out by human agents and embedded in institutions, attends to multiple goals that are pursued simultaneously. Moreover, the aims of science are genuinely problematic and are provisionally arrived at by debate within science's critical community (Hooker, 1987). Important among these aims are epistemic goals that include, for example, the pursuit of robust empirical generalizations and the construction of coherent explanatory theories. Further, science will legitimately seek non-epistemic goals, such as pragmatic fruitfulness and risk assessment, when engaged in policy formulation and the application of scientific knowledge.

Institutional Realism

It is a significant truism to say that science is a human social endeavour subject to institutional as well as theoretical determinations. However, to date, philosophers of science, including realists, have given limited attention to social, political and ethical questions that arise in science. Instead, their major focus has been on the 'internal' cognitive dimension of science, with a strong focus on theory construction. Consistent with this, they have

favoured a Cartesian view of scientists as individual cognitive agents, without regard for the 'external' social nature of their work. Two realist philosophers who do adopt a perspective of scientific activity as a social undertaking are Cliff Hooker (1987) and Philip Kitcher (2011). With their commitment to institutional realism, these authors extend realism's customary focus beyond the internal, cognitive dimension of science and embrace a concern with its institutions and social relations.

As a realist thesis, institutional realism acknowledges the importance of theorizing about the design of institutions that house science in order to understand them better and improve them. In their most general form, theories are expressions of possibility structures (Hooker, 1987). By theorizing better designs of the institutions of science in terms of possibility structures, we obtain an opportunity to appreciate how they might facilitate improvements in scientific practice.

It seems clear that society needs to regularly reshape its institutions to permit good science to flourish. A realist conception of science as a continual process of open and critical inquiry, directed towards human problem solving, cannot effectively work off the exploitative values of individualism, material acquisition and centralized state control that shape many contemporary societies. For example, it is plausible to suggest that, in order to flourish, our scientific institutions need prudential research policies, epistemically collective learning strategies, egalitarian, deprofessionalized structures and problem-oriented interdisciplinary foci.

In short, the emancipatory potential of institutional realism requires us to seriously theorize both actual and possible social arrangements for the better conduct of science (and life), and these must form a central part of both our scientific and science education endeavours.

NATURALISTIC REALISM

Most contemporary philosophers of science are committed to a doctrine of naturalism, understood as the view that there is no *a priori* knowledge obtainable from a privileged source, only *a posteriori* knowledge given to us by the methods of science. One particularly important feature of the account of realism presented here is its thorough-going commitment to naturalism. For this reason, it can be called *naturalistic realism*. An attractive form of this philosophy is presented by Hooker (1987). According to naturalistic realism, scientific reasoning, including theorizing, is a natural phenomenon that occurs in the world along with other natural phenomena. The doctrine maintains that philosophy and science comprise a mutually interacting and interconnected whole. As a philosophy of science, naturalistic

realism has no privileged status and is subject to revision in the light of new scientific knowledge. At the same time, naturalistic realism foresees that its philosophical conclusions, tempered by scientific knowledge, can force changes in science itself.

The interdependence of philosophy and science is the hallmark of naturalism. This interdependence is expressed in a relation of mutual containment (Quine, 1969), though the containment is different for each. Philosophy is contained by science, being located within science as an abstract, critical endeavour that is informed by science. Science is contained by philosophy because the latter, among other things, provides a normative framework for the guidance of science.

As a philosophy of science, naturalistic realism is regarded as that part of science concerned with the critical in-depth examination of science in respect of its aims, methods, theories and institutions. Philosophy of science naturalized employs the methods of science to study science. It is in a sense, science applied to itself. Having the status of a theory of science, it is, where appropriate, constrained by the findings of science. As such, naturalized philosophy of science is at once descriptive, explanatory, advisory, integrative and reflective of science. Positioned within science, naturalistic philosophy is able to study science, learn from science and instruct science.

Although naturalism and realism are allies, not all naturalists are realists and not all realists are naturalists. This raises the question, 'Why it is advantageous to combine scientific realism and naturalism in a single philosophy?' One reason is that naturalism is the best methodology we have available to us. It gives us our best methods for conducting inquiry, and it encourages us to theorize in a manner constrained by reliable scientific knowledge. A further attraction is that naturalism's explicit commitments to both anti-anthropocentrism and fallibilism enable philosophers to offer a tenable defence of realism, one that is true to our makeup as cognizers and realistic in its aspirations. Finally, by embracing naturalism, realism, although incomplete, is positioned to give us the most coherent explanatory theory of the cognitive dynamics of science (Hooker, 1987).

GLOBAL AND LOCAL REALISM

Most formulations of realism are global in nature (e.g., Boyd, 1989; Kitcher, 1993; Psillos, 1999); they are presented as overarching general philosophies of science that are presumably intended to apply to all sciences at all times. Largely focusing on the achievement of the natural sciences, particularly physics, these formulations of realism speak best to mature sciences that are in a state of advanced theoretical development.

An important consequence of this focus is that global realism is of limited value as a philosophy for the social sciences, which generally have been less successful than the natural sciences in their theoretical achievements. As a result, there is a growing tension between formulating realist theses in global terms applicable to all the sciences, and local terms applicable to particular sciences or parts thereof. Although global accounts of realism have dominated historically, local realism is increasingly being seen as an attractive way for realists to formulate their philosophy.

In order to take advantage of the understanding of science that realism is capable of providing, the social sciences need local, fine-grained formulations of realism that are appropriate to their particular natures and achievements (Kincaid, 2000). One productive way to proceed would be to modify the core theses of global realism along the lines suggested by Uskali Mäki (2005). Two of these modifications are briefly mentioned here (see Haig, 2014, for more detail). First, the thesis of metaphysical realism customarily insists on the mind-independence of the world. However, mental and social objects such as beliefs and money are mind-dependent in the sense that they are partly constituted by our representations of them (Searle, 1995). The objectivity required in studying such entities is safeguarded by insisting that they are *inquiry*-independent, even though they are mind-dependent. Second, the thesis of epistemological realism maintains that our best theories entitle us to believe in the existence of the hidden entities they postulate. However, when a scientist postulates a new entity, it is more appropriate to hold that the entity might exist, rather than maintain that it does exist, and that we give ourselves sufficient time to show that it does exist. This more realistic epistemic attitude should hold for the physical as well as the social sciences (Burian & Trout, 1995).

REALIST METHODOLOGY

Although not always seen as an essential doctrine of realism, an appropriate conception of scientific methodology is an important part of realist philosophy. Indeed, given the centrality of method to science, and a commitment to a method-centred conception of epistemology, methodological realism should be accepted as a core commitment of realism.

Scientific methodology is responsible for the evolution and understanding of scientific methods, a fact that makes this interdisciplinary sphere of learning of major practical and educational importance. In what follows, the broad contours of a modern conception of scientific realist methodology are sketched. This conception is in broad agreement with Tom Nickles's (1987a; 1987b) insightful treatment of the topic (see also Haig, 2014).

The following chapters are underwritten by this conception of methodology, along with a host of more specific methodological ideas.

The Tasks of Methodology

In its study of methods, methodology is at once descriptive, critical and advisory (Nickles, 1987a; Reichenbach, 1938). It discharges these major tasks by describing relevant methods and explaining how they help researchers achieve their goals; it critically evaluates methods against their rivals; and it recommends what methods we should adopt to pursue our chosen goals. Thus, a good methodology will offer researchers an informed description of methods, a judicious evaluation of them in relation to their rivals, and instructive advice on how to choose and use those methods. Methodology is important because the three major tasks it addresses are essential to the conduct of high quality scientific research, and to the improvement of the methods used in carrying out such research.

Being a practical endeavour, methodology is concerned with the mutual adjustment of means and ends. As such, it judges whether methods are sufficiently effective for reaching chosen goals. But methodology is also critically aim-oriented, and considers what research goals the research process should pursue. How, for example, are we to understand the related goals of truth, understanding and control? If truth is taken as a major goal of science, and if it is construed as correspondence with reality (see Haig & Borsboom, 2012), then philosophical semantics becomes a part of methodology. If understanding has an important psychological dimension, as it undoubtedly does, then psychology becomes a part of methodology. And, if the exercise of control over science is regulated to an appreciable extent by institutions, then policy science enters into methodology. From a genuine concern with questions such as these, it follows that methodology must be constantly attentive to possibilities of fashioning and deploying methods in the face of varied and changing goal demands. In doing so, it becomes the management science of research (Nickles, 1997; Simon, 1969). The role of methodology as a management science is to help set epistemic ambitions for inquiry for a particular class of problems. It does this by setting important but attainable goals, arranging the best match between methods relevant to those goals, and by assessing the effectiveness of the selected methods.

Problem-oriented Methodology

The realist conception of methodology emphasizes the importance of research problems for inquiry. In particular, it employs the *constraint-inclusion* view

of research problems (Haig, 1987; Nickles, 1981). The constraint-inclusion theory depicts a research problem as comprising all the constraints on the solution to that problem, along with the demand that the solution be found. With the constraint-inclusion theory, the constraints do not lie outside the problem but are constitutive of the problem itself; they actually serve to characterize the problem and give it structure. The explicit demand that the solution be found is prompted by a consideration of the goals of the research programme, the pursuit of which is intended to fill the outstanding gaps in the problem's structure. The goals themselves are part of the problem. Problems can only be solved by achieving research goals, and a change in goals will typically eliminate, or at least alter, those problems (Nickles, 1988).

The constraints that make up research problems are of various sorts. Importantly, many of them are heuristics, but some are rules, and a limited number have the status of principles. These constraints differ in their nature; some are metaphysical, others methodological, and many are drawn from relevant substantive scientific knowledge. Problems and their constraints also vary in their specificity. Some are rather general and have widespread application. Others are context specific.

Note that all relevant constraints are included in a problem's formulation. This is because each constraint contributes to a characterization of the problem by helping to rule out some solutions as inadmissible. However, at any one time, only a manageable subset of the problem's constraints will be relevant to the specific research task at hand. Also, by including all the constraints in the problem's articulation, the problem enables the researcher to direct inquiry effectively by pointing the way to its own solution. The constraint-inclusion account of problems enables the researcher to understand readily the force of the adage that stating the problem is half the solution.

Importantly, the constraint-inclusion account of problems stresses the fact that in good scientific research problems typically evolve from an ill-structured state and eventually attain a degree of well-formedness, such that their solution becomes possible. From the constraint-inclusion perspective, a problem will be ill-structured to the extent that it lacks the constraints required for its solution. Because the most important research problems will be decidedly ill-structured, we can say of scientific inquiry that its basic purpose is to better structure our research problems by building in the various required constraints as our research proceeds. It is by virtue of such progressive enrichment that problems can continue to direct inquiry.

The constraint-inclusion theory of research problems is part of the realist depiction of grounded theory method presented in Chapter 4.

Two Important Methodological Contrasts

Two important methodological contrasts are part of the deep structure of realist methodology. These contrasts are generative and consequentialist methodology, and reliabilist and coherentist justification (Nickles, 1987b). Consequentialist strategies justify knowledge claims by focusing on their consequences. By contrast, generative strategies justify knowledge claims in terms of the processes that produce them. Although consequentialist strategies are used and promoted more widely than generative strategies in contemporary science, both types of strategy are required in an adequate conception of research methodology. The conception of grounded theory method presented in Chapter 4 promotes both generative and consequentialist research strategies.

Consequentialist reasoning receives a heavy emphasis in the use of hypothetico-deductive method. Consequentialist methods reason from the knowledge claims in question to their testable consequences. As such, they confer a retrospective justification on the theories they seek to confirm. In contrast to consequentialist methods, generative methods reason from warranted premises to an acceptance of the knowledge claims in question. Exploratory factor analysis, the subject of Chapter 5, is a good example of a method of generative justification. It affords researchers generative justifications by helping them reason from established correlational data patterns to the rudimentary explanatory theories that the method generates. It is judgments of initial plausibility that constitute the generative justifications afforded by exploratory factor analysis. Generative justifications are forward looking because they are concerned with heuristic appraisals of the prospective worth of theories.

In addition to embracing both generative and consequentialist methodologies, realism makes use of two distinct theories of justification. One of these, reliabilism, asserts that a belief is justified to the extent that it is acquired by reliable processes or methods. Reliability judgments furnish the appropriate type of justification for claims about empirical phenomena.

By contrast with reliabilism, coherentism maintains that a belief is justified in virtue of its coherence with other accepted beliefs. The depiction of grounded theory method in Chapter 4 makes use of coherentist justification, where its approach to theory appraisal is governed by considerations of explanatory coherence.

It should be emphasized that, although reliabilism and coherentism are different, and are often presented as competitors, they can be viewed as complementary theories of justification (Haig, 2014). As is noted in Chapter 4, reliabilism underwrites the justification of claims about empirical phenomena, whereas coherentism provides justifications for explanatory theories.

Methodology with a Knowing Subject

Underwriting the conception of methodology sketched here is the anti-Popperian view that epistemology must take 'the knowing subject' seriously. Applied to methodology more specifically, this attitude leads to a rejection of the fanciful idea that the researcher is a 'computationally omnipotent algorithmizer' in favour of a more realistic conception that is in accord with our actual epistemic makeup. Herbert Simon's (1977) view of the researcher as a 'satisficer' is an influential part of this more realistic conception of ourselves as knowers. According to this view, our rationality is bounded by temporal, computational, memorial and other constraints, and thus proceeds in good part by the employment of heuristic procedures.

William Wimsatt (2007) helpfully characterizes heuristic procedures as having at least the following four properties: first, the proper employment of heuristics does not ensure that a solution will be found, much less that a solution will be the correct one; second, heuristics are cost-effective procedures in that they make considerably less demands on time, effort and computational complexity than their algorithmic counterparts; third, the errors that result from using heuristic procedures are biased in systematic ways, so that we can often predict the conditions under which they will fail and make appropriate adjustments; and fourth, applying heuristics to a problem may produce a transformation of the problem into one of related and more useful form. The notion of heuristic procedures is central to the liberalized conception of methodology being glossed here, and encourages us to treat the domain of pragmatic reasoning as a crucially important part of the research endeavour.

It should be pointed out that this overview of the nature of methodology is incomplete in two respects; it ignores the social dimension of research, including institutional and economic considerations, and it does not dwell on the fact that research is often a non-linear, bootstrapping, multi-pass enterprise (Nickles, 1987a).

THE CENTRALITY OF METHOD

According to naturalistic realism, science is most illuminatingly characterized as method, although as previously noted, there is much more to science than method. Everything we know we have acquired by way of evolving theories of method. The warrant for regarding conjectural theory as knowledge is provided by our best theories of method. Our best theories of method will be those which are most explanatorily and normatively adequate.

Three Major Theories of Scientific Method

Despite their importance to science, theories of scientific method do not feature prominently in social science methodology and practice. Therefore, attention is drawn to three quite different theories of method: inductive method, hypothetico-deductive method and inference to the best explanation. Comments about their proper roles in research are made. As will be suggested later, all three theories have a clear role to play in carrying out research that is realist in character.

Inductive Method

The idea that scientific method involves inductive reasoning takes various forms. For example, it is to be found in the fashioning of statistical generalizations, in a form of reasoning by analogy, in the Bayesian assignment of probabilities to hypotheses, in the strategy of successively eliminating implausible hypotheses, and in the reasoning involved in moving from confirmed predictions to test hypotheses in the standard formulation of the hypothetico-deductive method.

In the most popular inductive approach to scientific method, science begins by securing observed facts. These facts provide a firm base from which the scientist reasons 'upwards' to hypotheses, laws or theories. The reasoning involved takes the form of enumerative induction and proceeds in accordance with some governing principle of inductive reasoning. As its name suggests, enumerative induction is a form of argument in which the premises report counts of a number of observed cases from which a conclusion is drawn, typically in the form of an empirical generalization.

In the behavioural sciences, the radical behaviourism of B.F. Skinner (1984) is a prominent example of a research tradition that employs an inductive conception of scientific method. Murray Sidman's underappreciated *Tactics of scientific research* (1960) is an instructive radical behaviourist account of inductive method that speaks to the detection of empirical generalizations.

Hypothetico-deductive Method

Undoubtedly, the most popular account of scientific method is the hypothetico-deductive method. This method has assumed hegemonic status in the behavioural sciences, which often place a heavy emphasis on testing hypotheses in terms of their predictive success. In psychology, for example, the use of both traditional statistical significance test procedures and structural equation modelling methods are routinely embedded in a hypothetico-deductive structure.

According to the standard account of the hypothetico-deductive method, the scientist takes a hypothesis or a theory and tests it indirectly by deriving from it one or more observational predictions, which are amenable to direct empirical test. If the predictions are borne out by the data, then that result is taken as a confirming instance of the theory in question. If the predictions fail to square with the data, then that fact counts as a disconfirming instance of the theory.

Even though the hypothetico-deductive method is used by many scientists, and has been endorsed by prominent philosophers of science, it has received considerable criticism. The major criticism of the method is that it is confirmationally lax. This laxity arises from the fact that any positive confirming instance of a hypothesis obtained by its use can confirm any hypothesis that is conjoined with the test hypothesis, irrespective of the plausibility of that conjunct. At the level of theories, this means that hypothetico-deductive confirmation applies to all components of a theory, not just the deserving part(s). Another criticism of the hypothetico-deductive method is that it standardly submits a single hypothesis to critical evaluation without regard for its performance in relation to plausible competing hypotheses.

Criticisms such as these have led a few methodologists to recommend that the hypothetico-deductive method should be abandoned (e.g., Rozeboom, 1997). Although this is a reasonable reaction to the method as it is standardly conceived, it is possible to correct its deficiencies and use the method to good effect in hypothesis-testing research. For example, one might overcome the confirmational defects of the orthodox hypothetico-deductive method by employing a Bayesian approach to confirmation within the hypothetico-deductive framework. Further, with or without a commitment to the Bayesian approach, one could use the hypothetico-deductive method to deliberately test two or more competing hypotheses in relation to the evidence, rather than a single hypothesis in relation to the relevant evidence. Further still, in testing two or more hypotheses, one might supplement the appeal to empirical adequacy by invoking criteria to do with explanatory goodness.

Inference to the Best Explanation

Inference to the best explanation is a form of abductive, or explanatory, reasoning. It is founded on the belief that a good deal of what we know about the world is based on considerations of explanatory worth. Because a primary function of many theories in science is to explain, inference to the best explanation evaluates theories in terms of their explanatory merits. Theories that offer good explanations are deemed to be more likely to be correct than those that offer poor explanations.

Inference to the best explanation is quite different from the two preceding accounts of scientific method, and is virtually unknown in the social sciences. Unlike inductive method, which generalizes in a descriptive manner to more of the same kind, inference to the best explanation embodies a theoretical form of inference about explanations of facts that appeal to entities or processes that are different from those facts. And, in contrast to the hypothetico-deductive method, inference to the best explanation takes the relation between theory and evidence to be one of explanation, not logical entailment.

A major challenge for proponents of inference to the best explanation has been to furnish an informative account of the criteria that should be used to determine explanatory power. The cognitive scientist Paul Thagard presented a historically informed, systematic account of three major criteria that have been successfully used in assessments of the worth of scientific explanations: explanatory breadth, simplicity and analogy. These criteria were subsequently incorporated into a fully-fledged method of inference to the best explanation known as the *theory of explanatory coherence* (Thagard, 1992). This method should appeal to those social scientists who want to learn about the comparative explanatory worth of their theories and use judgments about such worth as grounds for accepting or rejecting them.

Local Theories of Method

The three theories just considered are commonly regarded by philosophers of science as the major theories of scientific method. Although each of the theories has sometimes been proposed as the premier account of scientific method, they are all better thought of as restrictive accounts of method that can be used to meet specific research goals, not broad accounts of method that capture what is essential to all scientific inquiry. Each of these methods covers only a part of the methodological activity of science. To take any one of them as *the* account of scientific method would be to unduly restrict the scope of scientific inquiry. This would be the case even if all three methods were somehow combined in one super method.

As a local method, inductive method is appropriate for phenomena detection, but not for theory construction. Similarly, inference to the best explanation should not be regarded as an all-purpose form of inference, but should instead be thought of as a method particularly suited for evaluating the worth of competing explanatory theories. For its part, the hypothetico-deductive method, appropriately modified, can usefully be used to test for the empirical adequacy of local hypotheses. All of these domain-specific methodological endeavours are of vital importance to realist science.

REALISM IN THE SOCIAL SCIENCES

Among the many contemporary versions of realism we find Cliff Hooker's naturalistic realism, Roy Bhaskar's critical realism, Richard Boyd's abductive realism, Ian Hacking's entity realism, John Worrall's structural realism, Ron Giere's perspectival realism, J.D. Trout's measured realism, and Uskali Mäki's local realism, to mention just some of the prominent alternatives.

In this penultimate section of the chapter, attention is briefly drawn to three of these different accounts of realism that were formulated with the social sciences in mind. This is done not so much to expound on and evaluate these philosophies, but to provide readers with a taste of the wide range of realist thought that they might usefully explore in their own time.

Bhaskar's Critical Realism

Critical realism is the name given to Roy Bhaskar's realist philosophies of the natural and social sciences. His earlier formulation of realism for the natural sciences, he called *transcendental realism* (Bhaskar, 1975), and his later philosophy of the social sciences, *critical naturalism* (Bhaskar, 1979, 1989). Critical naturalism addressed the question of whether society and human nature could be studied scientifically in the same way as the subject matter of natural science. Bhaskar's critical realism has had limited influence on realist philosophizing about the natural sciences. However, his social science variant of realism is an influential philosophy and movement, being developed and promoted by other philosophers, and widely employed in various social sciences, especially sociology and economics.

Although Bhaskar's critical realism ignores many concerns of mainstream realism, it nevertheless takes a stance on a number of important philosophical topics. These include commitments to a stratified ontology, an essentialist powers conception of causation, a distinctive rationale for experiments and qualitative research methods, and a transformational model of the nature of society. I will comment on three of these features.

First, Bhaskar (1975), along with Harré and Madden (1975), was among the first of the modern philosophers to argue that a powers conception of causation should replace the Humean idea that causation is nothing more than the regularity of events. To ascribe a power to something or being is to say that it will do something under the appropriate conditions, in virtue of its nature. Thus, critical realism is a form of *dispositional realism*, in the sense that dispositional properties are said to exist in the world. It should be noted, however, that for Bhaskar, it is powers themselves, not the things that have powers, that are the most fundamental entities in the world.

Second, Bhaskar adopts a transformational model of social activity, which means that agents constantly behave in a world of structured constraints that they themselves did not produce. That is to say, social structure is always present and is the reproduced outcome of intentional agents, who both reproduce and transform society. Critical realism pursues, at some ontological depth, the multiple causal structures and generative mechanisms that explain human social endeavours.

Third, from a methodological point of view, critical realism favours the use of intensive research designs and qualitative research methods. Although there are no uniquely critical realist methods, critical realist social inquiry places maximum value on the close study of individual social agents over time, and the use of qualitative methods such as ethnography, case study methods, and grounded theory method to obtain richly informative understanding of their social endeavours. Quantitative modelling methods are often criticized by critical realists for their positivist origins, and for being thought incapable of providing genuine insights about social phenomena.

Although Bhaskar's critical realism for the social sciences contains valuable insights, and has been attractive to many social scientists, it will be faulted by some for ignoring many important issues in the mainstream of realist thought. For example, Bhaskar's unyielding commitment to a particular metaphysics of causation precludes adoption of other conceptions of causation that rightly figure in science. A similar criticism can be made of his commitment to a single metaphysics of society. Critical realism is a singular philosophy of social science, whose proper use depends on the investigator's commitment to a powers ontology and a transformational model of society. Adoption by critical realists of a thinner conception of their core realist tenets would lead to a more flexible application of the philosophy (Mäki & Oinas, 2004).

Trout's Measured Realism

As noted earlier in this chapter, most formulations of realism have been based on consideration of the success stories of the natural sciences. By comparison, formulations of realism based on an examination of the character of the social sciences are rare. Given the marked difference in the theoretical success of the two types of science, it is not surprising that the validity of generalizing from one to the other is limited.

J.D. Trout's novel brand of realism, measured realism, breaks with this generalizing practice. Expressing doubts about the relevance of robust versions of (natural science) realism to behavioural and social science,

Trout (1998) subscribes to a more modest brand of realism for those sciences, which is based on examination of cases of their successful scientific practice. Realists have often sought to explain the success stories in the natural sciences in terms of the approximate truth of theories. Trout maintains that tracts of social science, such as cognitive and perceptual psychology, have made significant progress, and that they therefore deserve a good measure of intellectual respectability as genuine sciences. For this reason, Trout is prepared to adopt the strategy of explaining their successes by appeal to their approximate truth.

However, Trout maintains that disciplines such as psychology have been unable to produce deeply informative theories like those in the natural sciences. Instead, their successes are seen to involve the effective use of strategies of statistical testing of empirical law-like generalizations. Unlike the theoretical achievements of the natural sciences, Trout maintains that the social and behavioural sciences mostly comprise the systematization of law-like generalizations. Where substantial theories exist, their 'fatty tissue' can be disposed of, leaving bit-sized theoretical commitments that are more readily evaluated. It should be understood that Trout's efforts to justify the success of research in the social and behavioural sciences is directed at fashioning the best explanation for the reliability of their statistical methodology.

Trout dubs his brand of realism *measured realism* on account of the fact that the use of statistical methods to test hypotheses in the behavioural sciences often constitutes a form of measurement. He argues that with an emphasis on producing piecemeal law-like generalizations that are not tied to overarching theories, their successful testing by diverse methods in diverse settings are grounds for taking them to be approximately true.

Trout's measured realism is instructive in many ways, not least because it is built on a genuine examination of the substantive achievements and methodological practices of the social sciences. However, his philosophy is yet to receive considered attention in social science philosophy and research practice. Social scientists and methodologists would benefit from comparing their own metascientific commitments with Trout's brand of modest realism. Two cautions that they might well heed in doing so are the following: measured realism seems to adopt a view of measurement that is at variance with the core idea of measurement as the numerical assessment of quantitative structure. Surprisingly, it also finds methodological merit in psychology's widespread use, and understanding of, tests of statistical significance – a practice that has been strongly criticized by many statisticians and methodologists (e.g., Gigerenzer, 1993; Meehl, 1997).

Mäki's Local Realism

Over an extended period of time, Uskali Mäki (e.g., 2005; Mireles-Flores & Mäki, 2008) has developed a distinctive form of realism tailored to the special characteristics of economics. This account of realism contrasts with the more narrowly focused critical realism of Bhaskar, and is a different form of local realism from that of Trout. Although developed piecemeal, Mäki's realism is wide-ranging and systematic. Here just three of its distinctive features are considered.

First, in depicting realism in local terms, Mäki adopts a strategy that enhances its resourcefulness. He proposes a minimal characterization of realism that will have global application. This is done with reference to the ideas of possible existence, science-independence and possible truth noted earlier in the formulation of the three core theses of realism. Mäki's minimal characterization of realism also asserts that there are no requirements about having to study unobservable entities, or achieve technological success. Mäki also insists that formulations of realism will be discipline- or domain-specific, resulting in a number of local realisms. Importantly, all local realisms should meet the requirements of minimal global realism just mentioned, as well as heeding the peculiar characteristics of the discipline or field under study.

A second feature of Mäki's local realism is its articulation of the role of modelling in economics. Mäki depicts models as imagined small worlds that are represented by different means (e.g., mathematically, visually and verbally). They constitute surrogate systems that stand in for real world systems, the direct study of which enables the economist to learn indirectly about the real world system itself. Importantly for Mäki, these models can be thought of as true, despite the fact that they isolate relevant aspects of the system under study and are built on simplifying and false assumptions.

Finally, an interesting feature of Mäki's realist philosophy is that he argues for the importance of truth in understanding economic science, while at the same time acknowledging the legitimate role of rhetoric in the justificatory practices of science. It is unusual for a realist to argue explicitly for both. Although it is commonly understood that realism implies a commitment to truth, some realists want to sever the tie between realism and truth. Others reject correspondence truth, replacing it with an epistemic, and typically minimalist, account of truth. However, by embracing both correspondence truth and the existence and importance of rhetoric, Maki's local realism is afforded the increased understanding of science that each commitment brings with it. Mäki finds a place for rhetoric, or persuasion, in his realist theory because it is part of the institutional, or social, conditions of scientific

inquiry. He argues that, given favourable institutional conditions, rhetoric can and, in fact, does aid the formulation, acceptance and communication of truths about the world. However, the commitment to correspondence truth underwrites objectivity, thus allowing Mäki to distinguish between true claims, and the claims that are taken by an audience to be truths based on persuasion.

To conclude this section, it is important to understand that Mäki's realist philosophy is both more eclectic, and more local than Bhaskar and Trout's realisms. It draws widely, though discerningly, from many different philosophical sources, and develops new conceptual appreciations of economics that acknowledge some of its unusual features. The local nature of Mäki's realism comprises many factual claims about the reality of economics as a science that are not to be found in other realist philosophies, whether or not those realisms are directed at economics. Lehtinen and colleagues (2013) provide an informative appraisal of the primary dimensions of Mäki's realist philosophy of economics.

CONCLUSION

This chapter rejected the standard view that realism about science is appropriately characterized in terms of one, or a few, key theses. This is because there are several primary dimensions of science, namely aims, methods, theories and institutions, which need to be taken into account when trying to properly understand the scientific endeavour. Hence, in addition to the three core theses, a number of optional theses were included in the present formulation of realism. The cost of adopting a narrow realism is a limited understanding of science.

Although the link between realism and method is not direct, what is said in this book about method is better understood against a backdrop of realism, than, say, anti-realist options such as empiricism and strong forms of social constructivism. Clearly, there is no one set of methods entailed by realism; what methods one uses in a given situation involves means-ends reasoning that depends on a multitude of determining factors.

Learning about realism raises two major challenges for the reader: (1) to position oneself in the realism/anti-realism debate, which is complex, multi-dimensional and ongoing; (2) to select from the innumerable brands of realism the one, or ones, that seems best for particular purposes. This is also an enormously difficult challenge, particularly given that an expression of local realism will be an attractive option for many reflective researchers. It is hoped that the three versions of realism presented with the social sciences in mind will be of some help in that regard.

Although the subject of considerable debate, and opposed by many anti-realists, realism is the dominant philosophy of science today. This fact, combined with an increasing willingness to focus on the nature of scientific practice, makes realism an appropriate philosophy for science. Given that realism in some of its many forms approximates the working scientist's natural methodological attitude, this book was written with the conviction that realist thinking about science can be of considerable benefit to social science methodology. Accordingly, readers are invited to begin formulating their own realist philosophy using, where appropriate, the contents of this book, the additional reference it provides, and their own additional reading.

FURTHER READING

Jarrett Leplin's edited book, *Scientific realism* (University of California Press, 1984), is an important collection of papers that both support and criticize scientific realism. All of the papers' authors have been prominent in the realism/anti-realism debate.

Stathis Psillos's *Scientific realism: How science tracks the truth* (Routledge, 1999), is a detailed and comprehensive examination of the long-running, and varied, debates on the merits of realism.

Cliff Hooker's *A realistic theory of science* (State University of New York Press, 1983), presents an important philosophy of *evolutionary naturalistic realism*. It is one of the most suggestive, wide-ranging and systematic theories of realism available.

Mario Bunge, in *Chasing reality: Strife over realism* (University of Toronto Press, 2006), presents his own version of realism, which he calls *hylorealism*. His book defends realism and critiques various forms of anti-realism. There are some similarities between Bunge's hylorealism and Bhaskar's critical realism.

Ian Hacking's book, *Representing and intervening* (Cambridge University Press, 1983), is novel for its philosophical focus on experimental practice in science. It is best known for its endorsement of *entity realism,* a view which justifies the belief in theoretical entities if they can be successfully manipulated in the laboratory.

Marthe Chandler's article, 'Attitudes, leprechauns and neutrinos: The ontology of behavioral sciences' (*Philosophical Studies,* 1990, *60,* 5–17), argues for the surprising conclusion that successful experimental manipulation is sufficient to justify the claim that the attitudes of behavioural science are real entities.

In *Realism and truth* (Blackwell, 1991), Michael Devitt argues for a naturalistic conception of realism that gives priority to metaphysical considerations. He argues that questions to do with realism should be separated from questions to do with truth.

Peter Godfrey-Smith's philosophy of science text, *Theory and reality* (University of Chicago Press, 2003), contains a chapter on scientific realism, which differs in interesting ways from orthodox accounts of scientific realism. It contains Deweyan lessons for rethinking realism, as does his article, 'Dewey on naturalism, realism, and science', *Philosophy of Science,* 2002, *69*, S25–S35.

In addition to his realist philosophy of natural science, Rom Harré formulates a novel brand of anti-naturalist *conversational realism* that he considers appropriate for social psychology (Harré & Gillett, *The discursive mind,* SAGE, 1994). The ontology of his social world comprises 'arrays of people', who engage in speech acts following discursive rules.

Finally, John Greenwood's *Explanation and experiment in social psychological science* (Springer-Verlag, 1989), influenced by the philosophies of Rom Harré and Roy Bhaskar, presents a realist philosophy appropriate for a causal, experimental and explanatory science of human action.

Key references for each of the three forms of social science realism sketched above are:

Margaret Archer et al., *Critical realism: Essential readings* (Routledge, 1999); J.D. Trout, *Investigating the intentional world* (Oxford University Press, 1999); and A. Lehtinen, J. Kuorikoski & P. Ylikoski (Eds), *Economics for real: Uskali Mäki and the place of truth in economics* (Taylor and Francis, 2013).

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