

Chapter 2: Philosophical Foundations: Critical Realism

2.1 Introduction and Context

Over the last four hundred years science has been incredibly successful in generating knowledge about the world and producing the vast array of technology that now shapes every minute of our lives. It is not surprising therefore that (natural) scientific knowledge came to be seen as the only valid form of knowledge. Modern-day science began in the days of the Enlightenment with the then novel idea that we could gain knowledge and understanding not from tradition or religious dogma or subjective contemplation but by observing and experimenting with the natural world itself. The origin of knowledge was to be *empirical* rather than metaphysical leading ultimately to the philosophies of empiricism and positivism that reached their apogee in the early twentieth century.

For empiricism the source of all knowledge must be empirical—i.e., open to the senses and able to be observed by others. That which cannot be observed, directly or indirectly through instruments, ultimately cannot exist. The logical positivists insisted that observations should be quantifiable and expressible mathematically, and that discussion of anything else was actually meaningless. Social science also wanted to emulate natural science with the work of Comte and Durkheim in sociology and Skinner's behaviourism in psychology.

Management science (including operational research (OR) and information systems (IS)) and systems thinking had their roots in this era. OR began in the Second World War when scientific methods were used to analyse military operations such as the size of convoys, the use of radar and depth charging (Trefethen 1995). These methods emphasised the collection and analysis of data, and building mathematical and simulation models to test out hypotheses. After the war OR groups were established in large organisations and in government with the intention of scientifically improving societal processes. The systems approach also began in the 1930s with the biologist von Bertalanffy (1971) developing the idea of general systems theory applying across all disciplines, and Weiner (1948) and Ashby (1956) recognising the importance of feedback and communications processes which they termed cybernetics (Heims 1993).

However, empiricism and especially positivism were then subjected to major critiques by philosophers (e.g., Popper (1972)), psychologists and sociologists and virtually all their major tenets were discredited to some degree. Within natural science a degree of support was established around what was known as the hypothetico-deductive model but social science became strongly split into what were seen as mutually incompatible paradigms (Kuhn 1970; Burrell and Morgan 1979). The main rupture was between functionalists who followed a broadly positivist approach and interpretivists who claimed that the meaning-based nature of the social world made it inherently unavailable to external observation and measurement.

These developments were paralleled within management science and systems with the emergence of “soft” systems and OR, and second-order cybernetics (Checkland 1985; Eden 1993; Hayles 1999).

The pendulum swung fully away from positivism with the emergence of extreme anti-realist and anti-rationalist positions such as postmodernism (Rosenau 1992) and constructivism (Von Glasersfeld 1984). These, in various ways, denied the taken-for-granted assumptions of modernism: that there was an external world about which we could discover knowledge; that there were general standards of rationality such as true/false, good/bad or right/wrong; or that, especially in the social world, there was an underlying order or theory to be discovered rather than simply superficial surface happenings. Again, these positions were echoed, albeit somewhat mutedly, within the practically-oriented disciplines of management science (Hassard and Parker 1993; Taket and White 1993; Coyne 1995; Robinson, Hall et al. 1998).

It is against this background that we can examine the development and contribution of critical realism as a significant philosophy of science able to underpin the management science disciplines.

2.2 Philosophical Problems within Management Science

As management science developed it was dominated by an empiricist philosophy that led it to see quantitative modelling and statistical analysis as the main legitimate type of research method. Within other fields of management (and indeed management science outside the United States) interpretive or constructivist philosophies also became legitimised, employing a range of non-quantitative methods. In some cases, e.g., information systems or operational research, this has led to divisive debates over “hard” and “soft.”

This chapter argues for a reorientation of the fundamentals of management science in terms of both underlying philosophy and related methodology. In particular, it suggests that critical realism provides an underpinning that resolves many issues as well as fitting in with management science’s distinctive approach. It will also be argued in Chapters 9 and 10 that *multimethodology* (the combination of a plurality of intervention or research methods) is an appropriate and complementary methodology. These arguments illustrate the intimate connection between theory, especially philosophy, and research methods. Current approaches such as positivism and interpretivism embody particular theories and assumptions about the nature of the natural and social worlds and this conditions the type of research methods and methodology that they utilize. So too does critical realism but in a way that enables it to build on important insights from differing paradigms whilst bringing forward its own distinctive tenets.

Management science, taken broadly, has been based in a strongly positivist, quantitative paradigm although more recently softer, interpretive methodologies have been gaining credibility. For example, surveys of the information systems literature

(Orlikowski and Baroudi 1991; Cheon, Grover et al. 1993; Walsham 1995; Nandhakumar and Jones 1997) agree that the majority of information systems research that is published, especially in N. American oriented journals, is generally of a positivist nature and, more specifically, relies on some form of statistical analysis and modelling. Mingers' (2003b) survey concluded that nearly 50% of empirical research published in the top IS journals employed observation, experiments, surveys or simulations and would thus involved some sort of statistical analysis. When positivistic case study research was included this proportion rose to 75% (over 90% in the case of the top journal *Information Systems Research*).

Despite this positivistic hegemony, alternative research approaches have been proposed and to some extent employed (Nissen, Klein et al. 1991; Galliers 1992; Goles and Hirschheim 2000; Mingers and Willcocks 2004). These generally come from an interpretive or subjectivist perspective (Myers 1994; Avison and Myers 1995; Harvey and Myers 1995) although there is also work within the critical tradition (Ngwenyama and Lee 1997; Klein and Huynh 2004). Interpretive researchers tend to be very critical of positivism, and statistical analysis in particular, on the grounds that the social world is inherently different to the material world and is in essence a human social construction not able to be quantified and captured in statistical models. However, this often leads to a strongly anti-realist position that tends to deny the existence of any forms of external social structures.

Similarly, the history of operational research can be seen (Mingers 1992; Mingers 2000a) to embody a range of alternative philosophical viewpoints. There is the traditional positivist or empiricist viewpoint with various flavours—inductivist, deductivist, falsificationist (Dery, Landry et al. 1993); a wider view of science as craft, developed by Ravetz (1971) and debated by Miser (1991; 1996), Keys (1991), and Ormerod (1996a; 1996c); various types of constructivist, interpretive or post-modern stances that to a greater or lesser extent deny the possibility of an observer-independent reality (Bryant 1993; White 1994; Brocklesby and Cummings 1996; Tsoukas and Papoulias 1996; White and Taket 1996; Brocklesby 1997); or the social studies of science argument that successful science is actually the result of a political and social process (Keys 1997; Keys 1998).

There has been a range of reactions to this plurality of philosophical approaches. Imperialists argue for the dominance of one particular paradigm (usually positivism), either on epistemological grounds (that it is the correct way to generate knowledge) or in the belief that it is necessary to create a strong discipline (Pfeffer 1993; Benbasat and Weber 1996). Isolationists tend to accept the arguments of Burrell and Morgan (1979) that there are distinctively different paradigms within a discipline and that these are generally incommensurable—i.e., they cannot be directly compared with each other because they are based on radically different assumptions. From this perspective, research should develop separately within each paradigm (Parker and McHugh 1991; Deetz 1996). Finally pluralists accept, and indeed welcome, a diversity of paradigms and research methods. Within this group we can distinguish between those who welcome diversity for its own sake (Van Maanen 1995; Van Maanen 1995); those who see different methods as being more or less appropriate for

particular research questions or situations (Landry and Banville 1992; Robey 1996); and those who argue that research should strive to be trans-paradigmatic, routinely combining philosophically distinct research methods (Jackson 1999; Goles and Hirschheim 2000; Midgley 2000; Mingers 2001a). Management science is not unique in respect of this diversity—most social sciences, for example, organisation theory, sociology, or geography, are equally split.

However, what is often not recognized is that there are significant problems within the underlying philosophies, of science and social science, themselves. Positivism has been extensively critiqued and the resulting consensus around a weak empiricist position (known as hypothetico-deductivism) leads to an impoverished view of (realist) ontology and causality. Within the social sciences extreme constructivist and post modern positions have undermined even the most basic tenets of science and rationality.

This chapter considers a particular philosophy of science—*critical realism*—as a way of resolving or dissolving most of these issues, and providing a consistent and coherent underpinning philosophy for management science. The next section discusses the problems with the philosophy of science, particularly as they inhibit a realist (although not “naïve” realist) approach. Later sections develop critical realism and shows how it addresses these problems.

2.3 Problems in the Philosophy of Natural Science

In general, a *realist* understanding of science takes the view that certain types of entities—be they objects, forces, social structures, or ideas—exist in the world, largely independent of human beings; and that we can gain reliable, although not perfect, knowledge of them. However, from as long ago as the eighteenth century Hume (1967) and Berkeley (1995) undermined such a view by denying fundamental tenets like the existence of a physical world, causal necessity, or unobservable entities. Berkeley argued that we only actually know objects through our ideas and perceptions of them and that, therefore, is all we can actually take to exist. Thus, to be is to be perceived. Hume was highly sceptical of several basic notions such as causality, unobservable entities, and induction. With regard to causality, he says we often see one event regularly followed by another and we believe that event A (e.g., swing a bat) causes event B (a ball moving). However, all we can actually observe is the constant conjunction of the two events. Our belief that A *causes* B is simply that—a psychological belief. There is nothing more to causality than a regular succession of events. Hume is similarly sceptical about induction—the idea that witnessing an event occur many times (e.g., the sun rising) warrants us claiming it will always happen. These views, particularly that of Humean causality, underlie empiricism and have serious anti-realist implications.

During the twentieth century, “naïve realism” continued to be under constant attack from empiricism (which restricts science to mathematical formulations of empirical regularities) on the one hand and the many different forms of conventionalism or

constructivism (that deny the existence of a world independent of human thought and perception) on the other.

Empiricism

In very broad terms, empiricism refers to those philosophies that see science as explaining events that can be empirically observed. That which is not manifest and capable of observation must be non-scientific or even, in the extreme case of the Vienna Circle philosophers, literally meaningless. Events are expected to display regularities or patterns that can be explained as being particular instances of universal laws of the form “given certain conditions, whenever event X occurs then event Y will occur.” Science is seen as the systematic observation of event regularities, the description of these regularities in the form of universal laws, and the prediction of particular outcomes from the laws.

Logical empiricism was developed during the 1920s by a group known as the Vienna Circle (e.g., Schlick (1979), Neurath (1987)) who aimed to specify a truly scientific conception of knowledge and the world. Their main tenets were:

- Scientific knowledge must rest ultimately on that which is empirically open to the senses. This meant that any scientific propositions must be able to be empirically verified, and that anything unable to be directly or indirectly observed must be non-scientific or even meaningless.
- Empirical observations must then be reformulated into some strict mathematical or logical language (following the work of Frege (1952) and Russell (Whitehead and Russell 1925)), generally expressed in terms of universal laws.
- There must be a unity of method across all sciences, thus social science and history must also be formulated in such a way.

These propositions rested on particular fundamental assumptions: i) the idea that observation and perception were unproblematic—simply providing a mirror on nature; ii) the Humean (1967) principle that the observation of one event following another (e.g., one ball hitting another) did not enable us to prove some underlying causal mechanism—all that we can claim are “constant conjunctions of events”; iii) the principle of induction—that *universal* laws could be derived from a set of *particular* observations accompanied by the deduction of predictions from the laws.

This view of science was extensively critiqued. The idea of pure, objective perception and observation was exploded by psychologists (Piaget; Gregory 1972), sociologists (Cicourel 1973) and philosophers (Hansen 1958; Merleau-Ponty 1962; Popper 1972). They showed, theoretically and experimentally, that the brain was not simply a blank slate on which the external world imposed itself, but rather perception and conceptualisation was an active construction of the nervous system. Hesse (1974), Popper (1972), Wittgenstein (1958), and Kuhn (1970) showed that

observational terms, i.e., the language we use to describe our observations, were not an atomistic picturing of reality but part of a pre-given linguistic structure—in short that all observation was theory-dependent. And Popper (1959; 1969), based on Hume, rejected the possibility of induction and verification replacing it with deduction and falsification.

In response to these criticisms there developed the “deductive-nomological (D-N)” or “hypothetico-deductive” method centred around the work of Hempel (1965) and Popper. Science was still seen to be based fundamentally on empirical observations, although recognising their theory-dependence. From such observations theories were generated and expressed in terms of universal (nomological) laws (“covering laws”). Explanation, or prediction, then consisted of the logical deduction of particular events given some antecedent conditions and a set of laws. It was accepted that the laws might only be expressed in terms of statistical probabilities, and that they could not be *proved* to be true inductively. Some people maintained a confirmationist view that empirical evidence could provide support for a theory while Popper developed the falsificationist approach that negative observations could definitely refute a theory. On this view, science should constantly aim to reject poor theories rather support or confirm good theories. Hume’s view of causation was still largely accepted. There was still general scepticism about the ontological status of theoretical concepts that could not be observed fairly directly leading to debates about the legitimacy of “theoretical entities.” Perceptibility was the criterion for existence.

The D-N approach also suffers from a range of problems, some of which will be explained in the next section on conventionalist alternatives. But, to highlight a few:

- Falsificationism, certainly in simple form, does not stand up—does a failed experiment falsify an underlying theory, or simply the experiment itself and its supplementary theories? Theories often need to be developed despite initial failures, not just abandoned. Does not falsificationism implicitly rely on induction—i.e., moving from particular instances (of failure) to the general statement that it will always fail?
- The covering law model and especially Humean causality was very impoverished simply providing a description of *what* happened in highly constrained experimental conditions, with no explanation of *why* it happened, or sometimes did not; and with no mechanism for the generation of new theories or putatively real entities. This is particularly problematic from a realist point of view as it restricts “reality” to the domain of empirically observable events and prohibits underlying generative mechanisms.
- It did not correspond, in many ways, with the actual practices of scientists and could not therefore satisfactorily explain the *de facto* success of science.
- The proposal that the social world was in essence no different from the natural world simply could not be sustained.

Conventionalism

Problems with the empiricist view of science centre on the impossibility of pure, unmediated observation of empirical “facts.” So, the term conventionalism covers a wide range of philosophies that all emphasise the inevitable dependence of scientific theories on human perception, conceptualization and judgement.

The first position, *pragmatism*, derives from philosophers such as Dewey (1938) and Peirce (1878) and has been developed most radically (and perhaps somewhat illegitimately) by Rorty (1980; 1989). At a general level pragmatism is a view about the purpose of science—that it is essentially a practical activity aimed at producing useful knowledge rather than understanding the true nature of the world. Thus, Peirce developed a pragmatist theory of meaning such that the meaning of a concept was specified purely in terms of the actual practical effects that it would have; and a consensus theory of truth as that which would come to be believed by a community of scientists in the long term, rather than as correspondence to reality (Habermas 1978). Dewey saw knowledge and truth as the outcome of processes that successfully resolved problematic situations.

The second position on the nature of science comes from those who study the actual practices of scientists and find that they do not correspond to the standard philosophical theories. This becomes more than mere description when it is used to critique the possibility of particular philosophical prescriptions. Kuhn’s (1970; 1977) identification of major paradigms of thought throughout science is so well known as to need little exposition. The general idea is a development of the theory-dependence of observation—at any one time there is a broad, underlying theoretical conceptualization (e.g., Einsteinian physics) that is unquestioned within “normal” scientific activity. This paradigm informs all actual experimentation which is simply puzzle-solving within the paradigm. The failure of particular experiments does not refute, or even question, the basic paradigm. Only in periods of “revolutionary” science, when there are many anomalies, do paradigms actually become questioned or compete.

This view leads to a much greater recognition of the social and psychological nature of scientific activity. A paradigm develops through consensus within a social community of scientists through many practical mechanisms such as learned societies, journals, or funding bodies. Individual scientists come to accept the underlying assumptions concerning research practice, theoretical validity, and core values as they become members of the community. Theoretical innovations that challenge the paradigm are generally rejected without serious consideration.

The basic idea of paradigms replacing each other over time has developed, particularly within social science, to the idea of there being competing paradigms existent at the same time (e.g., positivist, interpretive and critical). This is often combined with the claim that paradigms are incommensurable (although Kuhn himself did not agree with this (Kuhn 1977)). That is, each paradigm is so all-inclusive in defining its ontological and epistemological presuppositions that it is

literally not possible to actually compare them—each defines its own “reality.” Clearly, the Kuhnian view has major relativistic implications for empiricism since it points out the constructed, conventional nature of scientific theorizing, and makes truth not correspondence to some external reality but that which is accepted by a scientific community at a particular point in time. The incommensurability thesis is even more undermining since it makes it impossible to judge between paradigms or even assert that a later paradigm is actually superior to an earlier one.

The third viewpoint, the sociology of scientific knowledge (SSK), can be seen as an intensification of Kuhn’s study of the actual practice of science. It investigates the way in which scientific and technological knowledge comes to be constructed and accepted within a scientific community (Bloor 1976; Barnes 1977 ; Knorr-Cetina and Mulkay 1983; Collins 1985; Bijker, Hughes et al. 1987; Latour 1987; Woolgar 1988). The most radical theories from this perspective (e.g., Bloor) argues that in fact science is no different to other forms of purposeful social activity and actually has no greater claim to truth.

The Relationship between Natural and Social Science

So far, the discussion has centred around the nature of natural science on the assumption that this was most relevant to management science, but in recent years there has been persuasive arguments that since IS is conducted within social organisations, social science is also of relevance (Boland 1991; Orlikowski and Baroudi 1991; Galliers 1992; Myers 1994; Avison and Myers 1995). This then brings into the picture major philosophical debates concerning the nature of social science in relation to natural science that can only be sketched here (for overviews see Giddens (1976), Burrell and Morgan (1979), Keat and Urry (1981), Outhwaite (1987).

Broadly, there are three possible positions:

- The *naturalist* view that there is one general approach to science that applies to all domains. Within this category, positivists hold that for anything to be scientific it must follow the canons of positivism/empiricism and thus be based on universal generalizations from empirical observations (Giddens 1974). This was in fact accepted by early sociologists such as Comte and, despite much criticism, continues in areas such as empirical and functionalist sociology and much IS research. Critical realists, on the other hand, maintain a modified naturalism that is non-positivist and that accepts there are some differences between the natural and social worlds.
- The antithesis is the view that the social world is intrinsically different to the natural world, being constituted through language and meaning, and thus involves entirely different hermeneutic (Bleicher 1980), phenomenological (Schutz 1972), or social constructivist (Gergen 1999) approaches. The argument here would be the idealist one that ontologically social objects do not exist in the way physical ones do (i.e., as subject independent), and that

epistemologically there is no possibility of facts or observations that are independent of actors, cultures or social practices. Both Habermas (1978) and Giddens (1976) fall in this category.

- The most radical position denies the possibility of objective or scientific knowledge at all, in either domain. Arguments here come from the strong sociology of knowledge program discussed above; post-structuralists such as Foucault (1980) who point out the extent to which even our most basic categories such as male/female are socially constructed, and the inevitable intertwining of knowledge and power; and more generally post modernists (Best and Kellner 1991) who attempt to undermine even the most basic categories of modernist rationality such as distinctions between truth and falsity, better or worse, or the existence of external reality.

2.4 *An Introduction to Critical Realism*

Critical realism has been developing for some years (Bhaskar 1978; Bhaskar 1979; Keat and Urry 1981; Bhaskar 1986; Bhaskar 1993) in response to the fundamental difficulty of maintaining a realist position in the face of the criticisms, outlined above, of an empirical and naturalist view of science. Its original aims (which this chapter will concentrate on) were:

- To re-establish a realist view of *being* in the ontological domain whilst accepting the relativism of knowledge as socially and historically conditioned in the epistemological domain (Bhaskar 1978). In other words, to establish that there is an independently existing world of objectives and structures that are causally active, giving rise to the actual events that do and do not occur. But at the same time, to accept the criticisms of naive realism and to recognise that our observations and knowledge can never be pure and unmediated, but are relative to our time period and culture.
- To argue for a critical naturalism in social science (Bhaskar 1979). That is, to maintain that the same general process of science is applicable in both the natural and social domains but to accept that the particular characteristics of the social world place inevitable limits on that process.

Originally Bhaskar referred to his work as either “transcendental realism” or “critical naturalism,” reflecting these two aims, but these became contracted to “critical realism.” In later work (Bhaskar 1993; Bhaskar 1994) the use of the qualifier “critical” related also to critical social theory (Habermas 1974; Habermas 1978), and he put forward the argument that no social theory can be purely descriptive, it must be evaluative, and thus there can be no split between facts and values. And, following from this, the view that social theory is inevitably transformative, providing an explanatory critique that logically entails action (Archer, Bhaskar et al. 1998, Part III).

Critical realism is becoming influential in a range of disciplines—geography (Pratt 1995; Yeung 1997), economics (Lawson 1997; Fleetwood 1999), organisation theory (Marsden 1993; Reed 1997; Tsang and Kwan 1999; Ackroyd and Fleetwood 2000; Reed 2001), sociology (Layder 1994; Archer 1995; New 1995; Sayer 1997), international relations (Wright 1999), Marxism (Brown, Fleetwood et al. 2002) and research methods in general (Sayer 1992; Layder 1993).

2.4.1 Arguments Establishing an Independent Ontological Domain

The first step is to put forward arguments that establish the existence of an ontological domain separate from the activities and cognitions of human beings.

Bhaskar's (Archer, Bhaskar et al. 1998, p. 23) starting point is to argue, specifically against empiricism and positivism, that science is not just a matter of recording constant conjunctions of observable events but is about objects, entities and structures that exist (even though perhaps unobservable) and generate or give rise to the events that we do observe. The form of the argument is a *transcendental* (this follows a broadly Kantian interpretation of "transcendental") one. That is, it begins with some accepted happening or occurrence and asks what must the world be like for this to occur or to be intelligible? In this case, what is accepted by both empiricism and many forms of idealism is that we do have perceptual experience of the world, and that science is carried out through experimental activity in which scientists bring about particular outcomes.

The argument is that neither empiricism nor idealism can successfully explain these occurrences, and that they necessitate some form of realist ontology. With regard to perception, we can note that as human beings we have to learn (as babies) to perceive things and events; that our perceptions can change or be mistaken (e.g., visual illusions); and that scientists, for example, have to be trained to make observations correctly. These all imply that there must be a domain of events that are independent of our perceptions of them—what Bhaskar calls an *intransitive* domain. And, indeed, that these events would exist whether or not they were observed or whether or not there were even observers. Thus, there is a domain of actual events only a (small) subset of which are perceived and become empirical experiences. That which is not experienced is not known but that does not mean to say that it does not exist. In other words, there is an infinity of events that do actually occur but are never empirically observed.

Moving on to experimental activity, this shows several things. We can note that the experimenter causes (i.e., brings about) the experimental conditions but does not cause the results, these depend upon the underlying causal laws or mechanisms that are operative at the time. The regularities that are expected may or may not occur and this depends partly on how well the experiment is carried out rather than on whether the presumed laws are or are not working. In fact, the occurrence of empirical regularities (i.e., constant conjunctions of events) in general is fairly rare—that is why the experiment is necessary to try to bring them about in the first place. The world is not full of constant conjunctions. But despite this, experimental results

do in fact hold outside the experiment as is attested by the enormous success of our technology.

The implications of this are that causal laws (more precisely from a critical realist perspective causal *mechanisms*) must be different from and independent of the patterns of events they generate; and that the experimenter aims to produce a constant conjunction of events by *closing* what would otherwise be an open system. Thus the intelligibility and success of experimental activity demonstrates the existence of an intransitive domain of causal mechanisms separate from the events they generate. And the corrigibility of perception demonstrates the separation of events from particular experiences of them. This leads to a conceptual separation between a domain of causally operative structures or systems; the events that they generate; and those events that are empirically observed. Thus empiricism is doubly wrong in identifying causal laws with empirical regularities. It reduces underlying laws or mechanisms to actual events, and then events in general to experiences.

The argument can be expressed in terms of the mistake that both empiricism and strong forms of idealism or conventionalism make—that is, the *epistemic fallacy*. The essential mistake is in reducing the ontological domain of existence to the epistemological domain of knowledge—statements about being (i.e., what exists) are translated into ones about *our (human) knowledge* or experience of being. For the empiricist, that which cannot be experienced cannot be. For the conventionalist, limitations of our *knowledge* of being are taken to be limitations on being itself. In contrast, the realist asserts the primacy of ontology—the world would exist whether or not humans did.

The argument so far establishes that, given the successful occurrence of science there must be an intransitive world of events and causal laws, but what exactly are causal laws? Or, rather, what is it that causes or generates events given both the regularities that can be established in experiments, and the common absence of regularity outside? Equally, how can we assure ourselves that event regularities are based on necessary connections rather than simply coincidence? The answer is that there must be enduring entities, physical (e.g., atoms or organisms), social (e.g., the market or the family) or conceptual (e.g., categories or ideas) (Bhaskar 1997), observable or not, that have *powers* or *tendencies* to act in particular ways. The continual operation and interaction of these entities generates (i.e., causes), but is independent of, the flux of events.

Entities are structures, consisting of particular components that have certain properties or powers as a result of their structure. Thus gunpowder has the power to cause an explosion, a plane has the power to fly, a person has the power to compose music, a market has the power to generate wealth, and an inequitable distribution system the power to cause poverty. Entities may have powers without exercising them at a particular time (it may need an experiment or particular stimulus to trigger them), and powers may be exercised but not become manifest in events because of the countervailing operation of some other generative mechanism. The heart of this argument is that of a *causal* criterion for existence rather than a perceptual one. In

other words, for an empiricist only that which can be perceived can exist, whereas for a realist having a causal effect on the world implies existence, regardless of perceptibility.

2.4.2 Critical Realism and Natural Science

For Bhaskar, reality is both intransitive (existing independently of humans) and stratified—i.e., hierarchically ordered (Archer, Bhaskar et al. 1998, p. 41). The first form of stratification is between structures or mechanisms, the events that they generate, and the subset of events that are actually experienced. These are known as the domains of the *Real*, the *Actual*, and the *Empirical* (see Figure 2.1). The real contains mechanisms, events, and experiences—i.e., the whole of reality; the actual consists of events that do (or do not) occur and includes the empirical, those events that are observed or experienced. These distinctions arise from the transcendental arguments above—namely that we should not reduce all events to only those that are observed, and we should not reduce enduring causal mechanisms to events.

A second form of stratification is within the realm of objects themselves (Archer, Bhaskar et al. 1998, p. 66) where causal powers at one level (e.g., chemical reactions) can be seen as generated by those of a lower level (atomic valency). One strata is emergent from another (what Bhaskar terms “emergent powers materialism”). The picture of the real is thus one of a complex interaction between dynamic, open, stratified systems, both material and non-material, where particular structures give rise to certain causal powers, tendencies, or ways of acting often called by Bhaskar “generative mechanisms” (Bhaskar 1979, p. 170). Although the term “mechanism” sounds like a physical object, in fact Bhaskar uses the term to refer to the powers or properties of an object. For example, an airplane embodies the generative mechanism of the power to fly. The interaction of these generative mechanisms, where one often counterbalances another, causes the presence or absence of actual events.

Having established the intransitive *objects* of knowledge, we must recognize that the *production* of knowledge is very much the work of humans, and occurs in what we could call the *transitive* dimension (Bhaskar 1989 p. 18). Acknowledging the work of sociologists, the practice of science is a social process drawing on existing theories, results, anomalies and conjectures (the transitive objects of knowledge) to generate improved knowledge of science’s intransitive objects. This distinction allows us to admit the *epistemic* relativity of science, the fact that knowledge is always historically and socially located, without losing the ontological dimension. We should also note that such epistemic relativity does not imply a corresponding *judgmental* relativity, i.e., that all views are equally valid and that there are no rational grounds for choosing between them.

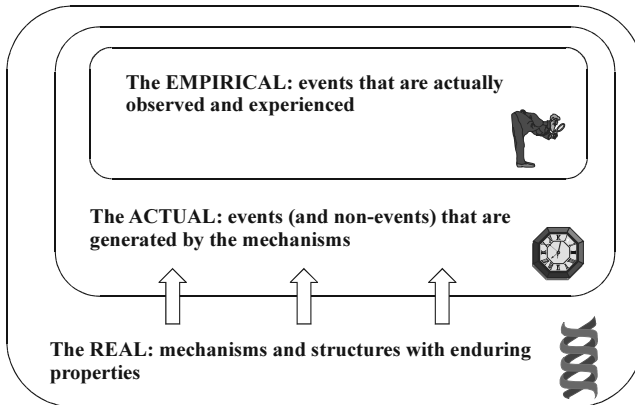


Figure 2.1. The Real, the Actual, the Empirical.

We can now characterise the realist method of science as one of *retroduction* (this is the same as “abduction” as developed by Peirce (Habermas 1978, p. 113) in contrast to induction and deduction) where we take some unexplained phenomenon and propose hypothetical mechanisms that, *if they existed*, would generate or cause that which is to be explained. So, we move from experiences in the empirical domain to possible structures in the real domain. This does not of itself prove that the mechanism exists, and we may have competing explanations, so the next step is to work towards eliminating some explanations and supporting others. Bhaskar summarises this as: Description, Retroduction, Elimination, and Identification (Bhaskar 1994, p. 24) (DREI). He also considers a variant for applied science that may be more relevant to OR/MS (RRREI):

Resolution of the event or phenomena to be explained into its component parts and their relations.

Redescription of the phenomena in a way that makes it theoretically significant, that is, that makes it relevant to the concepts or issues of some particular theory(ies).

Retroduction—the postulation of a hypothetical mechanism(s) or structure(s) that, *if they existed*, would generate the observed phenomenon. The structure could be physical, social or psychological, and may well not be directly observable except in terms of its effects (e.g., social structures).

Elimination of alternative explanations and attempts to demonstrate the existence of the mechanism by experimental activity or by the prediction of other phenomena or events.

Identification of the correct generative mechanism from those considered, and appropriate development to the theoretical base.

Of potentially even more relevance, although underdeveloped as yet, is a discussion (Bhaskar 1993, p. 260) of practical problem resolution (Diagnosis, Explanation, and Action to absent the problem), and attempting to change morals or norms (Description, Explanation, Transformation) that derive from and utilise RRREI. The key point is in going from surface observations (the empirical domain) to underlying explanatory structures (the real domain) and back again. See Section 9.2.2.

An obvious objection is how do we *know* that such hypothetical mechanisms actually do exist rather than being merely interesting ideas? At one level the answer is that we can never know for certain, since critical realism accepts that our knowledge is always ultimately fallible. More practically, however, the intransitivity of real structures means that they will always have the potential for effects that go beyond us, i.e., are out of our control, and the methodology means that we should aim to eliminate alternative explanations by testing in some way for their potential effects.

So, the main feature of a critical realist approach to science is a fundamental concern for *explanation* in terms of independent underlying causal or generative mechanisms which may in principle be unobservable. This is in contrast to the empiricist approach which limits itself to empirically measurable events and their abstraction into general laws; or the idealist approach that has difficulty accepting a causally efficacious ontological domain.

2.4.3 Critical Realism and Social Science

We now move to the second major argument of critical realism, that social science is essentially similar to natural science in its realist character albeit with modifications to reflect the particular nature of the social world. We can begin by asking what would rule out a realist approach to social science? The answer is that there are no intransitive objects for social science to investigate. Such an argument could come from the extreme constructivists (or superidealists as Bhaskar calls them) who would also apply it to the natural world; or from those, such as Checkland (1989), who would argue for the distinctive nature of social phenomena as being intrinsically meaningful and not existing independently of social actors. Space precludes a full discussion of this complex issue (see Bhaskar (1979); Outhwaite (1987); Bhaskar (1994); Archer (1995); New (1995); Bhaskar (1997); Archer; Bhaskar et al. (1998); Part III; King (1999a) but I will outline: i) the argument for intransitive social structures; ii) implications for the nature of societies; iii) the limits on naturalism that follow from i) and ii).

The primary argument (Bhaskar 1979 ch. 2) is against methodological individualists, such as Popper (1962) (and Margaret Thatcher who claimed that “society” does not exist!) who argue that all explanations can be couched in terms of an individual person’s beliefs and actions. The first refutation concerns emergent properties—there are attributes that can be applied to people that concern physical features such as height, weight; there are attributes that we share with other animals such as pain or hunger; but there are many attributes, essentially human ones, that are unavoidably social, for example “bachelor,” “banker,” or “nun.” These are only intelligible within

the context of a social institution or practice (Searle 1996). The second argument is that many activities we undertake, most obviously perhaps language, must already exist and be available for people to learn and then use. As Wittgenstein (1958) argued, there can be no such thing as a private language—every time anyone has a conversation, uses a credit card, or waits for a train they are assuming the existence of a structured, intransitive domain of resources, concepts, practices, and relationships. The successful occurrence of social activities warrants the existence of causally efficacious, although unobservable, social structures.

Bhaskar (1979) does accept, however, that social phenomena are inherently different from material phenomena and that this does put limits on the nature of social science:

Ontological

- Social structures do not exist independently of the activities they govern, or, put another way, they exist only in their effects or occurrences. Social structures enable social activities and through that activity are themselves reproduced or transformed. Thus, they are themselves the result of social activity. In contrast, the laws of the natural world are not affected by their own operation.
- Social structures do not exist independently of the agents' conceptions of what they are doing. Thus agency always requires some degree of interpretation and understanding of the meaning of the actions undertaken, although this does not imply that agents cannot be mistaken, and it does not require that they be fully aware of the consequences of their activity. In contrast, natural phenomena are independent of our conceptions of them.
- Social structures are localised in both space and time, unlike natural laws or tendencies that are generally universal. They only hold in particular cultures or sub-cultures for finite periods of time.

Epistemological

- Social systems are inherently interactive and open. Whilst the same is true for natural systems, it is the case that they can be artificially closed or controlled in the laboratory, and this indeed is the principal reason for experiments. This however is not (generally) possible in social systems. The main effect is that it is difficult to test theories since predicted effects may or may not occur depending on a multitude of factors. It focuses attention on a theory's explanatory rather than predictive power.
- The possibilities of measurement are very limited since intrinsically the phenomena are meaningful, and meanings cannot properly be measured and compared, only understood and described.

Relational

- Social science is itself a social practice and is, therefore, inherently self-referential. This means both that social science knowledge can itself affect the social world, and perhaps change it (e.g., the self-fulfilling prophesy); and that it is itself a social product and therefore will be shaped by the social conditions of its production. This does not make social science totally transitive—once an event has occurred, or some theory been produced, it becomes intransitive relative to possible explanations of it.
- I would draw a second conclusion from this, that social theories must be self-consistent in not contradicting their own premises since they are part of their own domain.
- All of the above place limits or constraints on the practice of social science, but do not make it different in principle from natural science. It is still driven by the existence of an intransitive domain of generative mechanisms; recognition of the epistemic (but not judgmental) relativity of knowledge; and a retroductive methodology that explains events by hypothesising underlying causal mechanisms.

2.5 Criticisms of Critical Realism

It is interesting that little has been written as a direct critique of critical realism especially within the philosophical literature. We may speculate that this is partly due to Bhaskar's disengagement from the philosophical establishment—he has never had a significant academic position always remaining independent; he writes books but rarely papers and so is not well established in the mainstream journals; and does not really engage in philosophical conferences and debates. His work has mainly been picked up in other disciplines, especially the social sciences, where the reception has usually been positive rather than critical. Indeed, even some of the critics discussed below (e.g., Chalmers and Callinicos) end up saying that despite their concern with particular arguments, they basically think CR is true!

The first point is the status of one of the main planks of CR—the transcendental argument for an independent, stratified ontological domain. This form of argument is the reverse of the traditional syllogism—it goes from the agreed occurrence of some phenomena (in this case scientific experimental activity) backward to an inference about what, therefore, the world must necessarily be like (independent stratified ontology):

“The intelligibility of experimental activity presupposes then the intransitivity and structured character of the objects of scientific knowledge, at least in so far as these are causal laws. And this presupposes in turn the possibility of a non-human world ... and in particular of a non-empirical world” (Archer, Bhaskar et al. 1998, p. 26).

Doubt can be cast about the strength of this argument in several ways. It seems to rest very much on what is meant by “intelligible.” If it simply means understandable or explainable then this seems quite a weak argument. Does it really imply the existence of an external world, or does it just imply that scientists have that belief, whether or not it is actually true? We could similarly argue that the intelligibility of religious activity implies the existence of God but presumably we would only wish to argue that it implies a *belief* in God on the part of religious people. In fact, does not the argument rest on the *success* of science rather than its intelligibility (Chalmers 1988)? In other words, it is not so much what scientists believe about what they are doing, but the fact that knowledge generated through experimental activity is found to hold outside the experimental situation as testified by the enormous developments of successful technology.

We might also question whether the premises about experimental activity are actually shared by competing positions or, indeed, an indubitable description of science anyway (Callinicos 1995). How do we know that there are not competing theories about scientific practice and that these offer different accounts that still make the activity intelligible? Here Bhaskar would probably argue that his is an *immanent critique*. That is, his arguments are always contextual and directed against particular positions, in this case empiricism and some forms of idealism, rather than being totally general. There may well be other views on the nature of experiments, e.g., from a postmodern perspective, but then the nature of the argument would be different.

Finally, we could object that even if we accept the premises, the nature of the conclusions depends very much on general scientific knowledge of the day. If a Greek or medieval philosopher attempted a similar argument they would come up with a very different picture of the nature of the world. I think this argument has to be accepted but is compatible with CR’s wider acceptance of fallibility. Bhaskar accepts that knowledge is temporally relative and will change, and even accepts that CR itself is only “the best explanation so far”—“the transcendental consideration is not deployed in a philosophical vacuum: it is designed to situate, or replace, an existing theory; and may of course come, in time, to suffer a similar fate.” (Bhaskar 1979, p. 6)

A second area of concern is the extent to which the theory of science is simply descriptive or actually normative, and the strength of its prescriptions. Many would agree that CR (Baert 1996), with its acceptance of unobservable entities, the role of metaphor and analogy, and the importance of explanation, is a much better description of the activities of actual (natural) scientists than empiricism or even Popperianism. To what extent, however, does it provide powerful normative procedures for natural science; and to what extent does it apply to the activities of social scientists?

Methodologically, the Description, Retrodution, Elimination and Identification formulation has several weaknesses. Given the acceptance of the subjectivity of the transitive domain and the theory dependence of observations, it seems unlikely that

one can begin with objective and agreed descriptions of particular phenomena. The description will already be imbued with underlying theoretical concepts and in the social sciences will also be highly value laden². This will clearly condition the forms of generative mechanisms that are postulated to explain the phenomenon and make any sort of comparison or contrast very difficult.

Retroduction itself is clearly an intuitive and creative process, rather than a logical one³, and this is a necessary part of scientific endeavour, but it can result in a proliferation of possible explanations, some of which may well be untestable, or at least unrefutable. This places a lot of weight on the latter stages of elimination and identification but here CR runs into problems because of its critique of traditional empirical testing, verification, and induction. How is the scientist, especially the social scientist, ever going to be able to undertake testing that unambiguously rules out or rules in particular hypothetical mechanisms, particularly when such mechanisms may be unobservable, and their powers may be unactualised?

This is related to a third problem, the nature of truth within critical realism. While the basic orientation is towards a correspondence theory of truth, i.e., that knowledge in the transitive domain in some sense corresponds to its objects in the intransitive domain, the acceptance of epistemic relativity means that we can never prove or be certain that this is the case. This potentially brings in elements of a consensus theory of truth. Bhaskar himself recognises four dimensions of truth (Bhaskar 1994): *normative-fiduciary*, truth as that which is believed by a trustworthy source; *adequating*, truth as based on evidence and justification rather than mere belief; *referential-expressive*, truth as corresponding to or at least being adequate to some intransitive object of knowledge; and *ontological/alethic*, the truth of things in themselves and their generative causes in the intransitive domain, i.e, no longer tied to language although expressible in language. The fourth aspect is clearly controversial (Groff 2000). We are thus left with a problem of precisely what criteria we can use to judge between competing explanations if not a clear view of truth.

A fourth area of criticism concerns that of naturalism—i.e., the extent to which an approach developed largely in relation to natural science can be applied to social science. Clearly Bhaskar recognises the fundamentally different nature of the social world and the limitations this places on science. But are not these limitations in fact so great that CR-type science is not possible? Giddens (1976) recognises that even natural science involves a transitive, hermeneutic domain but that social science involves a double hermeneutic in that the objects of knowledge are themselves intrinsically socially structured and human-dependent. If social “structures” are unobservable, and indeed only exist through people’s activity; if social systems are open and not amenable to experiment; and social activities always rely to some

² A point Bhaskar clearly accepts.

³ Indeed Peirce, who coined the term, called it basically guesswork.

extent on prior common sense or theoretical conceptualisation, then to what extent is it really possible to test competing explanations and identify “true” ones?

Coming from the opposite direction, King (1999b) argues against the realist notion of a causally effective social structure over and above the knowledgeable actions of individual agents. He suggests that Bhaskar’s concept of social structure involves two contradictions (or “antinomies”). The first is that society is both dependent on individuals and is also independent of individuals. From Bhaskar’s viewpoint this apparent contradiction is resolved through the idea of emergence. Society, as a separate ontological entity, emerges from but is separate to the activities of individuals. This allows for the development of a social theory with two separate types of entity—individuals and society—that interact with and mutually shape each other. King objects that such a view of society is a reification and that in fact

“The apparently structural and emergent aspects of society can be successfully accounted for by hermeneutic reference to individuals and their meaningful interactions with other individuals alone. ... Social reality is coextensive with the individuals involved and is neither more nor less than those individuals” (King 1999b, pp. 271–272).

The second antinomy is that social action is said to be always intentional, yet is also said to be non-intentional and materially caused. The point at issue is related to the previous one—to what extent should individual action be explained in terms of external social and material structures as opposed to simply the intentions of the individual? This is clearly a major debate within social theory and I can only refer the interested reader to the literature.⁴

The fifth area of debate I will discuss is the nature and extent of critical realism’s claim to be “critical” not so much in the epistemological sense but in the political sense of bringing about change in society. The idea is that social science is not value-neutral description but inevitably explanatory critique of the status quo⁵. Social science concepts must always be evaluative or moralised, never purely descriptive. For instance, it is more correct to say “Two children were murdered” than “Two young humans ceased functioning” since it is a more precise and accurate description requiring a more specific explanation. Social science will always reveal examples of false beliefs, unmet needs, and unnecessary suffering; and will often be able to identify their structural causes. Other things being equal, it is then possible to condemn the causes and propose action to remove or absent them. We thus move from fact to values and from values to actions in support of a transformation of society.

⁴ King (1999a), King (2000), Giddens (1984), and Archer (1995), Archer (2000).

⁵ This is in direct opposition to positivism’s insistence on a separation between fact and values.

Sayer (1997) accepts these arguments at a general level but points out the difficulty of enacting them in practice. In particular, it is not difficult to find many examples of false beliefs or suffering but doing something about them requires both a correct identification of their causes and specific changes that are both desirable and feasible, and do not generate new problems elsewhere. The world is now highly complex and incredibly inter-dependent. Particular events or problems will often have multiple interlocking structural causes which are very difficult to untangle, and possible changes will often have undesirable and unintended consequences, and have to contend with an increasing diversity of values and cultures.

Baert (1996) maintains that Bhaskar's social theory is actually much better at explaining why societies remain the same rather than why they are transformed. Certainly it is true that Bhaskar's transformational model of social action (TMSA) emphasises the way in which social actors necessarily draw on an already existing social structure and through their interactions reproduce it, and only potentially transform it⁶. Archer (1990; 1996; 1998) has addressed this point to some extent in her morphogenetic model which emphasises the independence of society from individual actors and therefore allows both reproduction and transformation through their mutual interaction. Baert also suggests that the TMSA model undervalues the extent to which social actors (not just social scientists) can develop their own discursive, theoretical knowledge of society and act on it to change rather than merely reproduce social structure.

Fine (2002) is particularly concerned with economics where there has been a significant attack on traditional theory, especially econometrics, from CR (Lawson 1996; Lawson 1997; Fleetwood 1999; Lawson 1999; Fleetwood 2001; Fleetwood 2002). Interestingly, rather than being a supporter of the status quo (in economics) Fine argues that CR is neither critical nor realist enough to have much effect. It is not critical enough because it has largely confined itself to critique at the level of methodology rather than substantive theory. Fine suggests that mainstream economists (and perhaps this can be extended to other disciplines) have no interest in methodology, or indeed realism or the real world. And, it is not realist enough in not having significant theoretical conceptions of core economic phenomena such as capital and capitalism. One could reply that Bhaskar has always maintained that the *philosophy* of CR is intended as a foundation for specific sciences, not as a replacement. So now perhaps is the time for critical realists within the disciplines to use it to generate more and better substantive theories and prove its worth in practice.

2.6 Conclusions

This chapter has made a case for the contribution of critical realism as an underlying philosophy for management science as a practical discipline. It has approached this

⁶ There are indeed many similarities with Giddens' theory of structuration which is also criticised as being overly regulative.

by showing that critical realism addresses the unresolved problems within the philosophy of science, whether it be natural or social. In particular: the impoverished view of explanatory theory within empiricism; the major critiques of observer- and theory-independence that empiricism assumes; the logical problems of induction and falsificationism; the dislocation between natural and social science; and the radical anti-realist positions adopted by constructivists and postmodernists.

The main points to be taken from this chapter are:

- Ontologically, the strongly held claim that there does exist a world independent, to differing degrees, of human beings and that the underlying mechanisms generate the events we observe and experience.
- Epistemologically, the fact that we do not have pure, unmediated access to this world but that our knowledge must always be locally and historically relative. But in accepting epistemic relativism we do not thereby accept judgemental relativism—there are grounds for choosing between competing views.
- Methodologically, the retroductive approach of hypothesising generative mechanisms that would explain our experiences and then trying to confirm or deny their existence. This underwrites a pluralist view of research and intervention methods which will be explored more fully in Chapters 9 and 10.



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