# Viewpoint: Exploring the Role of Geography

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The starting point for any discussion of the role of geography must be the recognition that the practice of geography varies substantially from country to country, and even within countries (as the chapters in Johnston and Claval, 1984, indicate). This indicates that there is no general agreement on a working definition for geography—its scopes and its goals. The reasons for this lack of consensus are many, and reflect both the local context within which geography has been nurtured and the projects of the individual geographers who have steered the development of their discipline. (For an exposition of such differences, see Asheim, 1987.) Different people in different places define geography differently, according to their socialization and, their evaluation of contemporary conditions, and they promote the interests of the discipline accordingly.

Given this introductory set of remarks, it ill behooves a visitor to suggest to geographers in another place what they should be doing, and to what ends; to attempt that would be an arrogant form of cultural imperialism. Nor does it seem very profitable to present in any detail a survey of geography in the visitor's home country, since the local context that it reflects may have little relevance to the situation being addressed. As a consequence, what I want to do here is adopt a much wider brief, addressing the general issues of the goals and roles of science and setting geography within that context. From this, it should be possible to identify issues of local relevance, which allow discussion of the role of geography in its local, time- and place-specific, context.

## THREE VARIETIES OF SCIENCE

Science is frequently defined, in vernacular usage at least, as a particular means of obtaining and structuring knowledge. It is associated with experimentation and the development of laws, universal statements that apply to clearly defined categories of phenomena in just-as-clearly-defined situations. The goal of science is thus to identify laws, and the role of science in society is to promote the use of such laws for improving the quality of human life. I am going to contend here, however, that there are several definitions of science, with different sets of goals and roles. For

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geographers, then, there is the necessity to choose. Some claim that there is no such necessity, that it is possible to combine elements of the three types of science that I will define here. My conclusion is that although elements of all three types can be brought together, there are fundamental differences between the sciences which preclude the integration that some call for.

## EMPIRICIST/POSITIVIST SCIENCE AND ENGINEERING

This first type of science conforms to the popular stereotype sketched above: its goal is the classification and description of observable reality, and its wider social role involves using its knowledge to manipulate that reality. It is termed empiricist because of its total reliance on observational data. (This is usually, though not necessarily, visually observed data; the other senses can also provide valid material for scientific analysis, although the classification of observations is frequently more difficult than with visual sources.) It is positivist because it uses those data in a particular way, manipulating them to test hypotheses out of which emerge putative laws, statements of regularities that can be used as predictive devices. The goal is to provide an *explanation* for anything that is observed—a pattern, an event, a relationship, perhaps—not as something singular but rather as one outcome of a predictable causal sequence, as an example of a general law.

The terms singular, general, and unique as they relate to such explanations call for brief discussion here. A singular event is one that bears no relationship to any other, and so cannot be explained by reference to general laws; any account of it must be *sui generis*. A unique event, on the other hand, may also have no peer, but it is explainable by reference to one or more general laws. The model of science that I am outlining here can deal with unique events (patterns, etc.) but not with singular events. An example of the important difference between the two is provided by the fields of meteorology/climatology. Some of the events with which they deal would appear, to the casual observer in particular, to be singular—inexplicable, individual happenings. But scientists believe that they are unique, and that their apparent singularity reflects a very rare combination of general laws producing a particular effect. Those laws are the laws of physics, which are interacting in a very complex manner. The number of possible interactions, in particular places and in the context of recent preceding events, is extremely (if not infinitely) large, which is why predicting forthcoming events is sometimes difficult—the scientists have neither experience nor knowledge of similar situations and the particular outcome of an interaction. (Developments in mathematical modelling in the social sciences alone, as with the use of catastrophe and bifurcation theory—Wilson and Clarke, 1985—illustrate the complexity, and possible unpredictability, of many interactions.) Leslie Curry (1962) once argued that climatic change could be treated as a random series, but he did not conclude that the processes producing climatic change were random. He offered two options: climatic change as an aggregate of determinate cyclic processes; and climatic change as an indeterminate process working through the heat storage of the oceans. Both could be modelled as outcomes of chance effects, thereby focusing on the important questions to be asked that could lead to an explanation.

Empiricist/positivist science, then, seeks for the general laws that either individually (in very simple, usually laboratory-controlled, conditions) or severally (in most "real world" situations) account for observational data and experiences. Its explanations treat individual events as unique, and thus predictable if the combination of operative laws can be identified; the goal is to achieve such identification. Such scientific work involves two, interacting, steps. The first involves the identification of what can be termed the *membership laws*. Clearly, generality requires classification, since any scientific statements are to apply to classes of phenomena. Without agreement on class membership, it is impossible to move to the second stage, which is the identification of *functional laws*, the general statements that explain behavior. To some extent, the two identification processes interact, since phenomena can be classified in terms of the functional laws that apply to them—water is a substance that boils when heated at sea level to a temperature of $100^0$C. But recognition of their separate nature is necessary for the application of scientific findings, which invariably refer to categories of phenomena.

Once general laws have been identified via empiricist/positivist science, they can be applied through engineering. Engineering involves the use of scientific laws to modify the environment and to produce commodities (in the widest sense of that term) for human use. It is, as it is often termed, applied science. Not all knowledge produced by empiricist/positivist science is directly applicable, and indeed not all scientific endeavor is directed at producing applicable knowledge. But the overall goal is to produce knowledge that may be applied, and the role that societies frequently assign to scientists involves a focus on applicable findings—indeed in some cases the applications are defined and the scientists are asked to provide the scientific knowledge to underpin them.

Empiricist/positivist science has been developed as the philosophy of what are usually known as the natural sciences, both those dealing with matter other than human (the physical and life sciences) and those that deal with the biological aspects of human beings (the human sciences). It is assumed that all are able to produce both membership and functional laws. For some practitioners, the same philosophy can also be used for the social sciences, which deal with human behavior (as opposed to the behavior of the human organism). It is assumed that people obey functional laws, either as a species *in toto* or in clearly defined categories within it, so that behavior can be explained and predicted. This, then, provides the foundation for social engineering, for applying the laws of social science to modify and, ultimately, control human behavior.

## HUMANISTIC SCIENCE AND AWARENESS

This second type of science is to many not science, since it does not conform to their conception of what a science should be (i.e. it does not fit into the empiricist/positivist mold). However, if one accepts that science is rigorously obtained knowledge, then that conception can be shown to be myopic. Although the subject matter of humanistic science is largely, though not entirely, subjective (i.e., belonging to a perceiving individual rather than having some external reality) this does not

mean that knowledge cannot be obtained and reported objectively, by an unbiased neutral observer.

Humanistic science is concerned with the contents of the human mind, arguing that for humans reality is an individual mental construction which comprises phenomena classified and given meanings by the person concerned. The goal of humanistic science is to appreciate that mental construction, and to transmit the appreciation. The key tool is language, itself a human creation; it is the dominant medium through which the contents of the human mind are transmitted to a scientist (either directly, and hence orally, or indirectly, by being written) and through which the scientist's understanding is transmitted to others (again, either verbally—as in much teaching—or written). Understanding language and its use is thus a key methodology for humanistic sciences, therefore, not only the mechanics of its construction but also the nuances of meaning attaching to words and phrases, nuances which are often only fully appreciated in an oral encounter. It is not the only methodology, however, for language is not the sole textual source through which meanings are expressed. The various art forms—music, drama, painting, sculpture etc.—all express meanings, as does the landscape; people organize the landscape to reflect meanings and goals. Thus reading texts in the widest sense is the methodology of humanistic work, ranging from interpreting the arrangement of the built environment to understanding the contents of a psychoanalytic encounter. There are no readily-stated methodological protocols, as in the statistical testing of empiricist/positivist science; rather, procedures are adopted that allow the scientist access to the meanings and the behavior that follows from them, without influencing meanings and behavior by the very act of observing them.

Humanistic science is avowedly antiempiricist and antipositivist. It is anti-empiricist because it denies the existence of a real world external to the world of intentionality and meanings, which is a mental construction. It is antipositivist because it denies the existence of general laws that govern how people behave. People create and live in their personal worlds, and as they live in them so they recreate and refashion them. This is is not to claim that every person is singular, in the sense that elements of personal worlds are not shared; clearly this cannot be so, because meanings are transmitted through language and language-use is a skill that is learned in a societal context (although it may be, as some structuralists claim, that genetically we are provided with the ability to use language, though how we use that ability depends on our context—and hence the language that we learn). If language is a shared resource, then meanings are shared too. To this extent, language provides an equivalent to the membership laws of empiricist/positivist science. There is one basic difference, however: empiricist/positivist science assumes unchanging, externally fixed membership laws (a spider is a spider is a spider) whereas humanistic science accepts that the meaning of words can be altered by those who use them (a spider is a pet is a pest). Nor does humanistic science claim that all individuals are equally influential in the creation of texts: some are more powerful than others in defining and propagating the use of words, for example, whereas a small number are clearly extremely powerful in most societies in creating the landscape.

The goal of humanistic science, as already indicated, is appreciation; it seeks to understand what people believe (or have believed) and how this has stimulated them to

act in particular ways. It does not claim an ability to explain either beliefs or behavior, and therefore to be able to predict; indeed, the whole notion of prediction is anathema to the conception of the human as an autonomous agent, living in a social context, that is central to humanistic science. Its task is to appreciate and to convey that appreciation, and its methods are those of interpretation, or hermeneutics. A double hermeneutic is involved in that there are (at least) two interpretations; by the scientist interpreting the text and by the audience interpreting what is being conveyed by the scientist.

The role of humanistic science is to improve awareness, through revealing the contents of texts. That awareness may be self awareness, as in psychoanalysis and personal counselling where the scientist seeks to uncover the meanings that individuals are using in order to improve their understanding of themselves and how they behave. It may, on the other hand, be mutual awareness, as for example in marriage guidance counselling and conciliation in industrial relations, with the scientist seeking to make people aware of how others think and act. Whichever is the purpose of any particular piece of humanistic work, the goal is clearly to increase understanding, so that the role of humanistic science in society is to improve the general quality of knowledge: the better we understand ourselves and others, the better we can react to circumstances.

Humanistic science clearly differs from the empiricist/positivist sciences in a number of crucial ways, which makes the two incommensurable; it is impossible to say which is better since they are pursuing different goals, although one can say that one goal is better than another and one can deny the foundations on which either or both is built! One important difference is that humanistic science treats human subjects as of an entirely different nature from all others, whereas that distinction is, to say the least, blurred in empiricist/positivist science. The latter suggests a common methodology for both the natural and the social sciences; the former is a social science. This is not to deny the relevance of humanistic science to some aspects of the natural sciences; indeed, the origins of phenomenology lie in a concern with the nature of those sciences (Pickles, 1985). Empiricist/positivist scientists conduct their activities on the basis of shared and individual meanings, interpretations of the world that they express in their own languages. How they obtain and develop those meanings, and thus how they conduct their science, is clearly a topic of interest for humanistic science, the outcome of which would improve our appreciation of that type of scientific enterprise. (Pickles (1985) makes this clear with regard to phenomenology.) It should be stressed that, as he and others interpret it, phenomenology is not simply the study of meanings. It is the search for the essences of those meanings as they reside in pure consciousness, and is thus the search for general mechanisms that underpin individual and group interpretations. According to this reading of phenomenology, therefore, it is much more than an exploration of the subjective contents of individual minds.

## REALIST SCIENCE AND EMANCIPATION

Realist science denies the basic assumptions of both empiricist/positivist science and humanistic science. Its critique of the former contends that observation alone is insufficient to account for the mechanisms that drive the world studied by the natural sciences, and claims that the positivist laws of both natural and social science assume a particular context which is sensible for the latter but not the former. With regard to humanistic science, it contends that concentration on mental constructs alone tears them out of the (hidden) context within which they are formed. Realist science contends that the mechanisms (the causal processes) cannot be observed. All that can be apprehended are the outcomes of those mechanisms, whose existence can be theorized but never examined.

A simple example of this case taken from the physical sciences is the well-known law of gravity as expressed in the classical Newtonian formula (and adopted to the social sciences). That law is based on repeated empirical observations, in both laboratory and "natural" conditions: its status as a law reflects the fact that, in the absence of contaminating factors, the data collected always conforms to the predictions. But the law tells us nothing about how the mechanisms that produce it work, let alone why they are present at all. For that, we have to construct theories, theories that are consistent with observations of consequences of the law's existence. We cannot observe the law in operation, only its outcome; the mechanisms cannot be apprehended, only theorized. The theory provides us with a predictive formula, providing we assume that the theory always applies.

The whole edifice of empiricist/positivist science is built upon that assumption of a stable set of mechanisms; it allows us to explain in the positivist sense, but doesn't tell us what the mechanisms really are, or how they came to be there (for that we need an explanation of creation). An empiricist/positivist social science would have to be built on similar foundations but, according to realists, it cannot be; one might reasonably assume stable mechanisms in the natural sciences but not in the social sciences. The reason for this is that whereas the mechanisms studied in the physical sciences exist whether or not human society does, those studied by the social sciences do not: they are human creations. Furthermore, it is in the nature of human creations that they are not unchanging. People learn, and as they do so their behavior changes, thereby altering the mechanisms. Hence, whereas physical scientists can assume what Sayer (1984) calls constant conjunctions (the same situations repeating themselves *ad infinitum*) social scientists cannot. Thus the latter cannot create either membership laws (because people can change the categories that they belong to—or most of them) or functional laws (if people change, so will their responses to stimuli and the stimuli that they provide). The philosophy and methodology of empiricist/positivist science can therefore not be applied to the study of knowing subjects, unless one can assume that their knowledge is fixed.

The realist critique of the humanistic sciences is that these ignore the mechanisms entirely. They focus on the contents of human minds without exploring the relevance of those contents to either the needs of living in a particular society or the ways in which society operates to manipulate how people derive meanings and construct the

personal worlds in which they live. Human existence is necessarily social existence, it is claimed: most of the characteristic features of humanness, notably the ability to store and transmit knowledge through language, only operate in societal contexts, so that the isolated individual is not, strictly, a human being. By tearing individuals out of their social contexts and studying them as individuals, therefore, humanistic science runs the risk of eliminating a basic feature of human nature. To survive, people create societies which, among other things, are repositories of knowledge. Only by studying how and why societies have been created, how they are recreated, and how their imperatives impact on individual members can one really appreciate what people are.

The goal of realist science, therefore, is to promote that appreciation, by linking empirical appearances (what individuals observed in the world) to actual events (how what constitutes those appearances was created) *and* to real mechanisms. For example, I may observe—directly or indirectly—an armed attack in Northern Ireland. What I see, or read about, or am told about, I may define as murder, thereby allocating a meaning to the observation. But the individual who perpetrated the attack may interpret it very differently, as a necessary act of war. Both of us are reacting to that event in the contexts of our personal models of society in general, of Northern Irish society in particular, and of events involving the loss of life. Neither of us is seeking to penetrate the empirical and the actual, however, in order to explain why it is that such events come about and why they can be given such very different interpretations. In other words, we are not taking a realist approach, nor seeking to account for events in terms of their ultimate origins as against their proximate causes.

The goal of realist science is to identify those ultimate origins, to produce a theoretical structure that offers an account of why some people may see the necessity for the act of war used in this example and why others will interpret what they do differently. This involves producing working models of societies, as wholes that have imperatives which channel, but do not control, the beliefs and actions or the individual human agents who are members of those societies. Many such models have been proposed. That outlined by Marx and developed by a legion of disciples is undoubtedly the most popular. It has a materialist core: societies are created in order to organize the processes of individual reproduction. There are very many different societies, but each conforms in general to one of a few basic ideal types—primitive communist, feudal, capitalist, and communist (socialist is a transition stage between capitalist and communist). Most attention is paid to capitalism, if for no other reason than that nearly all realist social scientists live in capitalist societies. The goal is to uncover the driving force of capitalism (the necessity of accumulation), to appreciate how that is organized (through the relations of production), to indicate why a societal superstructure is necessary to sustain that driving force and the relations of production, and to explore the freedom of the human agent to interpret, act in, and refashion those components. Together, all of this provides an explanation of particular events, not in the empiricist/positivist sense of an example of general laws, but rather as an account of why people interpreted their situation the way that they did and how the underlying structure led them to that interpretation.

Following from this goal of realist explanation, the role of such a science within society is emancipation. By uncovering the hidden mechanisms of society to people,

they are freed from the constraints of ignorance, particularly the constraints imposed upon them by others whose interests are not best served by such emancipation. (Hence it is argued that a role of the state is to promote an ideology—a particular world-view—that promotes the relations of production, and the exploitation inherent to them as the "natural" way of organizing the means of reproduction. Instead of revealing the mechanisms, the state glorifies them.) With the knowledge that comes from emancipation, people are better able collectively to control their own destinies, to decide for themselves how they wish their lives to be organized.

To some, realist science stops there; its role is to emancipate people and give them freedom to determine the contours of their existence. To others, this is insufficient, and a critical science is required which leads people to exercise that freedom in a particular way. This, of course, is the Marxist program, for Marxism is more than a way of studying society. It is also a manifesto for a different form of society. People must not only be made aware of how their society operates, and how unjust it is, but must be encouraged to replace it with a particular alternative.

## GEOGRAPHICAL SCIENCE

So far, I have presented the three types of science in very general terms, with few specific references to geography. I turn now to their usage within that discipline, remembering my comment at the outset that the definition of geography—its goal and its role—varies significantly from place to place.

Geography has traditionally been an empiricist science, relying on the senses for observational data which are then transmitted to an audience as "facts." It also has a substantial tradition as a positivist science. Some of its early forays into this were weak and rapidly discredited (though not always as rapidly discarded)—as with Davis' concept of cycles of erosion and the thesis of environmental determinism (which Davis termed ontography). More recently there has been a return to this, through what became widely known as the quantitative and theoretical revolutions. In physical geography this involved a switch away from models of landform evolution based on inferred processes to investigations of climatic, biotic and physical processes that produce the complexity of the physical environment. This work is clearly set in the empiricist/positivist framework (though see Haines Young and Petch, 1986, on how it has been applied). In human geography, a similar philosophy was advocated, first, for the derivation of normative laws of spatial behavior and organization and, later, for the exploration of data relating to such behavior in order to produce inductive (or positive) laws. Among both human and physical geographers there were calls to use the knowledge so gained to improve the management of both the natural land the built environment and to increase the quality of life for all.

The humanistic and realist critiques of this conception of geography focused almost entirely on human geography and the assumptions regarding human agency and structural constraints on which it was based. In physical geography, it was the conduct of the empiricist/positivist science that attracted attention; its relevance was virtually never queried. For human geographers committed to the same approach, the humanistic affiliates condemned the derogation of human identity that its assumptions

involved, whereas those promoting a realist approach denied the existence of constant conjunctions (the *ceteris paribus* caveat of so much research reporting) and hence the ability of human geographers to produce positivist explanations with predictive power. The response to each took much the same form. Although individuals do have freedom of action and decision making, nevertheless in many circumstances it can reasonably be assumed that, in aggregate, they will conform to the observed laws with a high degree of probability, and although both humans themselves and their circumstances are always changing, nevertheless most change is very slight and gradual so that for the short-term: one can reasonably assume a *status quo*. It is thus viable to engineer society (land use/transport plans, for example) using the generalizations produced by empiricist/positivist human geography, because those generalizations are unlikely to be ephemeral. The realist response is that this is in part a self-fulfilling prophecy, since if planning is based on those generalizations then the past is being imposed on the future.

During the 1970s and early 1980s the role of geographers as applied empiricist/positivist scientists was increasingly promoted, in part as a reaction to a growing economic crisis in many countries. Physical geographers, especially geomorphologists, were encouraged to become involved in using their understanding for the exploration of environmental potentials and the solution of environmental problems (see Brunsden, 1985), a program which led others to respond that this required a much more professional training, divorced from human geography (Worsley, 1985). Human geographers, too, were urged to put their understanding of behavior to use and to apply their skills in a wide range of contexts. Increasingly it was the skills that were focused on, notably those concerned with what are now called geographical information systems—the collection, collation, manipulation, portrayal, and analysis of large, spatially organized data sets. Remote sensing and computer graphics are the saleable skills of the empiricist/positivists at present.

The role of empiricist/positivist geographers, therefore, is increasingly seen as a combination of pure science—uncovering the process laws of both human and physical geography, involving improvements in data acquisition and handling in order to tackle major topics—and applied science—putting that knowledge to use. In this, research and teaching are clearly linked, with the latter increasingly portrayed as providing a *training* (the provision of skills needed for tackling a certain class of problems) rather than an *education* (a drawing out, or development, of the individual).

The humanistic critique of this portrayal of the role of geography focuses on its emphasis on discipline; it produces narrowly-trained rather than rounded individuals, and seeks to standardize people according to particular models. The great diversity of human cultures is largely overlooked, so that awareness, in general as well as in detail, of the complexity of the world is ignored. And yet the absence or such awareness is potentially very dangerous; as much work in various types of counselling shows, many inter-personal and inter-group problems arise because of a lack of appreciation of the other's point of view. On a world scale, such lack of appreciation can be fatal, increasingly so with the expansion of the ability to destroy both the entire human race and the source of its livelihood. To survive in an increasingly interdependent and dangerous world requires the sort of knowledge that humanistic study provides; a

heightened awareness of both others and self, out of which accommodations that are mutually satisfactory can be forged.

The role of humanistic geography, then, is to increase understanding of the cultural mosaic that is the contemporary world, a task which stresses the dignity of individuals and the uniqueness of cultures, rather than imposes a standard "model of man" on all. For geographers more than for other social scientists, however, there is a further aspect to this role. As well as increasing awareness of people, cultures and societies, and replacing irrelevant models on which behavior is based, it can also increase awareness of the nature of the physical environment, how it really works and what happens to it when it is used in different ways. Much research has shown that behavior is frequently based on false conceptions of the nature of the environment; geographers can counter those, promoting better understanding of the physical context of life. In that way, people can live in greater harmony with their environment as well as with other people. Thus geography can be presented as a major vehicle for promotion of awareness of that which might otherwise never be experienced directly and thus reacted to on the basis of stereotypes.

Empiricist/positivist geography takes the world and seeks to explain and manipulate it; humanistic geography seeks to enhance people's appreciation of its complexity. Neither seeks to promote, or even set the stage for, major changes. Realist geography does the latter, and some practitioners wish to do the former, too (Harvey, 1984). The goal is not simply to describe the empirical appearances of society in increasingly sophisticated ways, nor is it just to increase awareness of others, though both are necessary. Rather, the aim is to get beneath the empirical world, to show people what drives societies, and to increase their appreciation of how their understanding of societies is structured to sustain the driving forces. Empiricist/positivist applied science cannot achieve fundamental change in the nature of society because it does not investigate it; it accepts both the structure of social relations and the use of the physical environment and seeks to ameliorate some of their outcomes rather than to ensure that such problems never reappear. Nor can humanistic science achieve fundamental change, since it too does not explore the reasons for the constitution of societies, it merely seeks to enhance mutual appreciation and harmony within those societies as constituted. If, however, the empirical appearances and representations were shown to be outcomes of mechanisms, for which those appearances and representations (in general form but not in detailed representation) were necessary, then people may become dissatisfied with both empiricist/positivist and humanistic science; they would want to create new mechanisms, new ways of constituting societies which did not rely on inequality (in all its manifestations) and environmental abuse for human survival.

The role of realist science, then, is to uncover the mechanisms, to provide viable theories of society which people can use to account for their empirical situations and, from that, to reassess the nature of the society that they want, collectively, to live in. Such a science is not concerned with manipulations to solve short-term problems, since that does not contribute to the consideration of long-term fundamental change. Nor does it concern itself simply with portraying how societies differ; without appreciating how those differences are constituted as well, the information that it

provides is also of little use in promoting "real" change. To some, this is a political program that lacks any explicit geographical content, except insofar as it provides an explanation for environmental attitudes. But increasingly social scientists are recognizing the key role of geography (in the vernacular if not the academic use of that term; Johnston, 1986) in the creation of societies. People learn in milieux, which are place-bound; they create social systems which are spatially bounded (some more rigidly than others); these social systems are the milieux in which further learning occurs. Thus geography matters, as Doreen Massey (1984) expresses it: the constitution of society is necessarily geographical in its operation and requires geographical study (as in the essays in Gregory and Urry, 1985).

## DRAWING OUT SOME THREADS

Three very different roles for geography, corresponding with three very different conceptions of science (especially social science) have been outlined here. From that outline, the purpose of the present section is to draw out certain issues and themes for further scrutiny.

The first point is to suggest that each science has a clear applied role; it is not the case that one (empiricist/positivist) can be applied, whereas the others are simply academic exercises. Each has utility for society, though in very different ways. We almost always associate applied geography with the first type of science only, but this clearly is not so. Thus when we are urged to do more applied work, to become more relevant, we have to ask, as David Harvey (1974) did more than a decade ago—relevant for whom, and to what? The humanistic geographer whose work is aimed at improving social awareness in the hope of reducing tensions between states and thus removing the potential for armed conflict can justly claim to be every bit as much an applied geographer as someone who is designing a new pattern of shopping centers or set of coastal defences.

Second, we need to evaluate the role of the three different types of science in the educational programs that we provide. Should we choose to emphasize one over all others; should we try to cover two, if not all three; do we perceive markets for each, or should we be dictated to by external evaluations of demand? Similarly with our research: should we promote research which involves the support of outside sponsors (most of whom undoubtedly will want empiricist/positivist science) or should we retain a freedom to do other types of research even though outside bodies show little desire for it? How we answer those questions will reflect our particular situation, such as the structuring of the research system within which we work and our own interpretations of contemporary needs. (And perhaps we need to be emancipated too!) Perhaps most importantly in all of this: should we let our role (and thus the type of science that we practice) be determined for us, or should we defend both our freedom to choose and the relevance of other roles?

Third, should we have to choose collectively while accepting that individuals will have to choose for themselves? Is there not a need for all three types of science? Empiricist/positivist science tackles pressing problems which require immediate solutions if people, perhaps in large numbers, are not to suffer; to eliminate it is not

possible, because society demands it, so to refuse to participate in it (collectively as a discipline) is merely to contribute to our own demise. Humanistic science rarely tackles pressing problems; its purpose is to sensitize society to promote its long term health. When there are many pressing problems, it may well be discarded so that we should protect and sustain it, as a necessary part of a civilized society. Realist science is clearly not addressed to the solution of contemporary problems in their current context, and as such is not only irrelevant to many it is also potentially, if not actually, subversive. Should we sustain it, and if so how? Must we promote it as not necessarily subversive, but crucial to a just society: if those in power seek to orient the educational system so that it does not reveal to people just how and why their lives are organized, are they not being denied the freedoms that are so vigorously promoted in other contexts and hence the potential to contribute to debates over how societies can be restructured so that the problems that seem to be inherent at the present time need never recur. What we have to choose, then, is whether we defend and sustain education in its broadest definition while contributing to training.

Finally, and perhaps most importantly to many, do we have to choose between the three sciences? Cannot we create a science which is an amalgam of the three, which uses the empiricist/positivist procedures to explain regularities, which uses humanistic procedures to elucidate what they mean to individuals, and which sets both in a realist framework that puts them in the context of the driving mechanisms?

The answer is both no and yes, but more no than yes. It is not only possible but desirable that empirical procedures be used, where relevant, as descriptive devices, but the procedures are not wedded to that conception of science alone. Quantification, for example, is not a set of techniques used only in empiricist/positivist science, and good empirical description does not have to be equated with the empiricist philosophy. But positivist assumptions are not compatible with those of realism; one freezes society while the other emphasizes its continual change. Positivism is deterministic, not in the simplistic sense of saving that every event has a definable cause but in saying that there are general laws which individuals conform to. Realism is not; it recognizes the importance of human agency in deciding courses of action, and of learning from conducting such action. Similarly, some aspects of humanistic methodology are necessary for the interpretation of texts; again, good empirical work is required. But humanistic philosophies are essentially voluntaristic, ascribing complete freedom to individuals and ignoring structural constraints.

The philosophies of realism, humanistic social science, and empiricism/positivism are incompatible, therefore; they make different assumptions about what we can know, and how we can know it. Thus an integration of the three (or two of the three) is not possible. Many believe that it is because they confuse philosophy (and its associated epistemology and ontology) with methodology. As I have just argued, neither quantification nor textual interpretation is allied to a single philosophy, and as ways of exploring data they have wide usage. But a science is defined by its goals, by its definition of knowledge and the uses associated with it, not by its procedures. So we must choose between the sciences, and then select the relevant procedures for the work which we undertake in that context.

## CONCLUSION—OR IS IT FOREWORD?

There is no single definition of geography. There are three, according to the case I have outlined here, and the choice between them must be based on an evaluation of the role that geographers are to play in society. Where that choice is made, and how, will depend on the particular society, which may direct all of its geographers in one direction or may allow a plurality of approaches to prevail. Clearly my role here has not been to prescribe the choice, but to sensitize people to its importance, for choice (however implicit) there must be.

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