

POSITIVISM AND STATISTICS IN SOCIAL SCIENCE*

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1. Introduction

Debates about ‘positivism’ in the social sciences have become fairly frequent in the last ten years or so (Giddens 1974; Adey and Frisby 1976), but the term itself gets used in many rather different senses. There is some danger of its becoming a vague and over-general term of epistemological and political abuse; or, alternatively, of too much discussion taking place about its ‘correct’ definition, what it ‘really’ means. What matters most are the merits, defects, and consequences of the actual claims and practices that get called ‘positivist’, since these raise issues that are central to the possibility of a science of the social, and to what kind of science it could be.

The ‘positivist’ position in the social sciences, in the sense of the term I will be using, has two main elements. First, there is the belief that in their basic features the social sciences can and should be modelled upon the natural sciences, especially physics and chemistry. This is the ‘thesis of methodological naturalism’—a demand for the use of similar methods and approaches in the social and natural sciences, with the latter providing the model for the former. Second, there is a specific conception of science itself, of the kind of knowledge it provides, and the ways in which claims to this knowledge are justified.

It is this positivist conception of science that was accepted in the late eighteenth and nineteenth centuries by the advocates of a science of society, such as Saint-Simon, Comte and Mill (see Kolakowski 1972; Keat and Urry 1975, Ch. 4; Benton 1977, Ch. 2). And, as will be seen, it assigns an important, and specific, role in science to statistical data. Further, much of the statistical work done in the social sciences has been based upon this positivist view of science. Any evaluation of the possible uses of statistics must therefore take account of the more general issues involved in the debates about positivism and social science. My aim in what follows is to provide an informative, critical guide to these issues.

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2. The positivist view of science

I will describe the positivist view of science—which, together with the thesis of methodological naturalism, constitutes ‘positivist social science’—by outlining its view of the nature of scientific explanation and theories, of the function and character of empirical observation, and of the relations between scientific knowledge and political or moral values (see Lessnoff 1974, Ch. 1; Keat and Urry 1975, Ch. 1; Benton 1977, Chs. 3 and 4).

Within a positivist approach, to explain something is to show that it conforms to well-established scientific laws, such as those relating the pressure, volume and temperature of gases (e.g. $PV=kT$ where k represents a constant), or the Newtonian laws of motion (e.g. that a body with no external forces operating on it continues either at rest or in rectilinear motion). Statements expressing these laws are descriptions of regular relationships that are taken to hold at all times and places, past, present and future; they are ‘strictly universal’¹. We can explain something by showing that the statement describing it follows as the conclusion of an argument whose premisses include statements of such laws. Thus, ‘the volume of this gas increased’ could be deduced from a set of premisses, which would include both the law, $PV=kT$, and a number of particular facts (often called ‘initial conditions’): e.g. that its pressure had remained the same, and its temperature had increased.

In the social sciences, this view of explanation has been explicitly endorsed, for example, by George Homans—who makes use of what he sees as the basic laws discovered by behavioural psychologists—to explain a wide range of social and historical phenomena. Examples of such ‘laws’ are: ‘when a response is followed by a reward, the frequency or probability of its recurrence increases’, and ‘the higher the value a person sets on the reward, the more likely he is to take the action or repeat it’ (Homans 1964).

This account of explanation reflects the significance assigned by positivists to the use of scientific knowledge for prediction and control (Fay, 1975, chapter 2). For the information used to explain something is such that, had it been known in advance, the phenomenon could have been successfully predicted. Indeed, many positivists have argued that explanation and prediction are essentially the same in their structure and content, differing only in whether they are performed retrospectively or prospectively (Hempel 1965).

In addition to explaining particular phenomena, science also explains laws, by deriving them from higher-level ones. Ideally, positivists suggest we will discover a hierarchy of laws, so that at the top there is a small number of laws with a very wide range of application from which other, less general, laws can be deduced. It is this kind of hierarchical system that constitutes a scientific theory, and its higher-level components will typically make use of what are called ‘theoretical’ terms, i.e. terms

which do not refer to any observable phenomena. 'Magnetic field', 'electron', or 'kinetic energy' are examples; as are 'class', 'social integration', or 'the unconscious', in the social sciences.

But the use of these theoretical terms poses a serious problem for positivists. They have always been centrally concerned with distinguishing genuine, scientific knowledge from various non-scientific or pre-scientific approaches, especially 'metaphysical' or 'religious' ones. And they have attempted to achieve this by tying down science to the realm of the observable.

This has been done by ascribing two forms of primacy to what can be observed. First, an ontological primacy: the only kinds of items that can properly be said to exist are those that are accessible to the senses. For positivists, it is typical of non-scientific approaches to populate the world with all sorts of mysterious, unobservable entities (e.g. God, vital spirits, Hegel's *Geist*, etc.) and to explain phenomena by reference to their activities. This practice is ruled out by the ontological restriction to the observable. But how, then, are the theoretical terms of a genuine science to be understood? The main positivist answer has been: by giving them (often highly complex) definitions in statements that make use of observational terms: these are often called 'operational definitions'. For instance, the theoretical term 'magnetic' might be partly defined by the statement 'something is magnetic if, whenever a small piece of iron is placed near it, the iron moves towards it'. Or, in the social sciences, the concept of social class may be defined in terms of apparently more readily observable data about income, wealth, and education.

The second form of primacy is epistemological. Positivists have insisted that the only relevant test for the acceptance or rejection of scientific claims is whether or not they are consistent with the empirical data, with the body of facts that is established via the senses. But what precisely are to count as 'data': how is 'observation' to be defined? There have been several, slightly different answers given by positivists, but in most, two characteristics of empirical data have been emphasised. First, data must be 'theory-neutral', in the sense of being described in an observation language which is devoid of theoretical assumptions or presuppositions. Second, they must be 'objective', in the sense that all competent, honest observers, whose senses operate in a normal, non-defective manner, can agree upon them. This requirement of what might be termed more precisely 'intersubjective agreement'² is taken to be met most effectively by data produced in quantitative form. Further, with this kind of data, it becomes possible to calculate the degree of support given to various, competing theories by the available evidence, and to make choices between them on this basis.

So the positivist conception of empirical data provides an important rationale for the role of statistics in positivist social science. Indeed, given the way positivists have invoked the primacy of the observable to distinguish science from non-science, it is easy to see how the use of statistical data and

techniques in the social sciences could come to be seen as actually demonstrating their scientificity.

The use of statistics may also appear to show that another important requirement of scientificity for a positivist social science has been met, namely value-freedom. One element of this doctrine is basically a consequence of the epistemological primacy ascribed to observation: the political and moral values of scientists are seen as totally irrelevant to the truth or falsity of scientific theories. For scientists to allow their commitments to such values to influence their assessment of rival scientific theories—i.e. of the extent to which they are supported or undermined by the data—would be to allow bias or prejudice to distort objectively decidable issues. And there is a further element in this concept of value-freedom. No moral or political judgements can be established by purely scientific argument and evidence. Science can discover what is the case, and explain it, but it cannot show what should, or ought to, happen. (Weber 1949; Lessnoff 1974, chapter 6).

Since much of our everyday, qualitative language seems to have significant politically and morally evaluative connotations, there is a strong tendency for positivist social scientists to try to eliminate these, to avoid the dangers of not meeting the requirement of value-freedom. For instance, the use of the concept of exploitation in Marxism has often been taken by positivists to show its lack of scientificity. So what is needed is a value-free, purely factual ‘language’—such as that of statistics—to replace the ‘unscientific’ language of politics and morality.

3. Positivist social science: an example

To see how this account of science applies to the social sciences in more detail, consider the way positivists could (and indeed, often do) interpret, and make use of Durkheim’s theory of suicide (Durkheim 1952).³ Suppose one wants to explain why the rate of suicide in Denmark is higher than that in Spain. This can be done by deducing the statement of this fact from the following premisses: the suicide rate of Protestants is generally higher than that of Catholics; the population of Denmark is predominantly Protestant; and the population of Spain is predominantly Catholic. The first of these premisses (which expresses a lower-level law) can itself be explained by deducing it from a higher-level, theoretical law, that suicide rates vary inversely with the degree of social integration, together with the additional premiss that Catholics display a greater degree of social integration than Protestants. The same theoretical law can also be used to explain other lower-level regularities, such as the higher rate of suicide amongst the unmarried, as compared with the married.

Further, all these claims can be tested by reference to empirical data, such as the differences in rates of suicide between different countries, religious groups and so on. For instance, between 1960 and 1964, the suicide rates in Denmark and Spain averaged 18.8 and 5.1 per 100,000 population respectively (Giddens 1971, p. 421). Durkheim, working in the 1890s (when suicide data do not

appear to have been available for Spain), selected as part of his evidence for the general relations between suicide rates and religious affiliation, the figures in Table 1 for Switzerland because ‘as French and German populations exist there, the influence of the confession is observable separately in each case’. (Durkheim, 1952, p. 154).

Table 1: Suicide rates (1876) for Swiss Cantons
Classified according to religion and race

<i>Per million inhabitants</i>		
	<i>French Cantons</i>	<i>German Cantons</i>
Catholics	83	87
Protestants	453	293

A problem for empirical testing might seem to arise for the claims about ‘social integration’, since this is clearly a theoretical, rather than an observational, concept. However, this difficulty is dealt with by defining and measuring social integration in terms of various empirical indicators such as: the number of individuals interacted with in a given time, the frequency of these interactions, the number of different types of social relations, and their degrees of intimacy—particularly in the area of familial relations (see Douglas 1967, p. 39). These indicators are held to be ‘objective’ or reliable in the sense that all competent observers would report the same ‘observations’.

Finally, in this positivist interpretation of Durkheim’s theory, moral or political attitudes towards suicide and religion are to be seen as completely irrelevant in assessing the merits of the theory. Nor does anything follow from it about the rights or wrongs of suicide itself, though the theory could possibly be used to predict changes in suicide rates, and as a basis for social policies aimed to reduce these. Indeed, for positivists the study of suicide can be seen as an exemplary case of a phenomenon that, having for centuries been the subject of philosophical anti religious debate, often involving moral evaluations of the victim’s motives, eventually became, by the early nineteenth century, an object of properly scientific investigation, especially in the work of the ‘moral statisticians’, such as Quetelet (see Giddens 1965; and Atkins and Jarrett, this volume). The value-neutrality of the scientific analysis is reflected in the way Durkheim carefully excluded any reference to the victims’ motives from his definition of suicide, following his general methodological rule that ‘science, to be objective, ought to borrow the material for its initial definitions directly from perceptual data’ (Durkheim 1964 p. 43).

4. Alternatives to positivist science

Before considering some criticisms of positivist social science, I want to emphasize that the positivist conception of science has been widely attacked as an account of the natural sciences. For instance, the idea of ‘theory-neutral data’ involved in its view of the relations between theory and observation has been rejected by many philosophers of science (see Hindess 1973, Appendix; Benton 1977, chapter 4; and Krige, this volume). Further, a number of alternative, non-positivist, conceptions of the natural sciences have been developed, both in the past, and more recently. I will briefly outline one of these, usually called ‘realism’. It can best be introduced via its argument that the positivist account of explanation fails to distinguish between predictive and explanatory knowledge.

The objection goes like this. By presenting explanation simply as an argument from statements of laws and conditions, positivists confuse providing information that would enable us to predict something, with describing how and why it came about. What is missing is any reference to the actual connections between phenomena, to the underlying structures and mechanisms that generate the regularities expressed in statements of scientific laws. To describe these connections, it is often necessary to postulate the existence of unobservable entities such as molecules, viruses, or magnetic fields.

For the realist, then, theories are primarily seen as attempts to characterise the nature and mode of operation of such entities. The chief virtue of theoretical laws is not, as it is for the positivists, that lower-level laws can be derived from them—thereby achieving economy and rigour in a deductive system. Rather, it is that they describe the fundamental processes that actually sustain the observable regularities represented in those lower-level laws. Thus, for example, Marx’s account of modes of production, and Freud’s of the unconscious, might be treated in this sense, as theories, by the realist⁴.

Nonetheless, despite their rejection of the ontological primacy of the observable, realists retain the view that some form of empirical testing is an essential element in the assessment of scientific theories. In this respect, realism differs significantly from certain other non-positivist conceptions of science, especially those influenced by the rationalist tradition in the history of science and philosophy. According to this, scientific knowledge is basically established by *a priori* forms of argument and analysis, and empirical data are seen primarily as illustrations of theories, rather than crucial tests of their truth or falsity.⁵

Since there are these alternatives to the positivist view of science, it is worth keeping the following question in mind, when considering criticisms of positivist social science. Do these criticisms result in all forms of methodological naturalism being rejected, or only that involving a specific, positivist

conception of science? In other words, to what extent would the criticisms be met by a methodological naturalism based on a non-positivist view of science? These questions are relevant to issues raised in the next section.

5. Experience and meaning

A number of important objections can be made to positivist social science, and the suicide example can illustrate them. First, there is the claim that positivism systematically excludes any account of the experiences, perceptions, feelings and other ‘subjective states’ of the participants in social relationships. But without any grasp of these, it is impossible even to describe the so-called ‘data’, let alone explain anything. A strict positivism in the social sciences—especially psychology—results in behaviourism, in the attempt to describe social action in terms of observable behaviour. However, what counts as a particular action cannot be defined purely in terms of its overt, observable features. Indeed, the very same pattern of behaviour can constitute quite different actions, depending upon the intentions and rules involved (Lessnoff 1974, chapter 2).

Thus, suicide statistics cannot be regarded merely as ‘observational data’. A suicide is not simply a dead body. Although Durkheim tried to define suicide without reference to the person’s intention to end his or her life, this not only departs from the ordinary meaning of the term, but from the meaning given to it by those upon whose decisions the official statistics of suicide are normally based, e.g. coroners. For to describe death as a ‘suicide’ is not simply a matter of observation, but also requires the attribution of intentions (Atkinson 1968). And to explain why people kill themselves requires a grasp of the way they perceive their situation; references to religious affiliation, marital status, or the degree of social integration, mean little unless they can be spelled out in terms of the agent’s viewpoint, experiences, etc. (Douglas 1967). Yet positivism’s doctrine of the ontological primacy of the observable rules this out.

One response to such objections would be to suggest that, although they are powerful arguments against positivism, they do not necessarily have force against a *realist* naturalism, i.e. a methodological naturalism based on a realist conception of science. For, with its rejection of the positivist restriction to observables, a realist social science might be able to incorporate ‘subjective states’ and meanings on the model of unobservable items in the natural sciences (Keat and Urry 1975, chapter 7). But even if this could be done, there is a second objection to positivist social science that is more fundamental, and would seem to apply also to realism, since it is aimed at something their epistemologies share.

The basic claim of the objection is that whereas in the natural sciences the data consist of empirical observations, the ‘data’ in the social sciences consist of social meanings; and the interpretation and

understanding of meanings cannot be assimilated or reduced to the discovery and validation of observational data. This can be brought out most directly by considering the process of reading a literary text. Although this clearly involves the visual perception of physical marks, to understand the text is not to observe or causally explain those marks: it is to grasp the sense or meaning that they are used to express, through various conventions and rules. Similarly, in listening to someone talking, one is trying to understand what is said, not to describe or explain the acoustic phenomena. In the social sciences, we are studying a subject-matter one of whose distinctive characteristics is its use of language, and, at a variety of different levels, the understanding of social action requires the understanding of language and related forms of meaning (Taylor 1971; Apel, 1972; Connerton 1976, Part II).

For instance, an important source of evidence for the study of suicide is suicide-notes. What sort of ‘understanding’ is involved in using these? Apart from grasping their literal meaning—which may sometimes be quite difficult, and is anyway a quite different process from scientific observation—we need to decide which of various possible overall meanings, such as ‘revenge’, ‘repentance’, or ‘escape’, is being expressed in a particular note (Douglas 1966). Furthermore, we may want to show how these form parts of more general systems of shared meanings in a particular group or form of society, and to discover what are sometimes called the ‘basic notions’ presupposed by these systems: specific conceptions of human agency, authority, work, nature, masculinity and femininity, and so on (Fay 1975, chapter 4).

This idea of ‘interpreting meanings’ has been a significant element in the rather vague and diffuse concept of *verstehen* that has been central to much of the opposition to positivist social science (Outhwaite 1975). It has often been connected with doctrines of empathy, intuitive insight, or imaginative re-enactment, especially by its positivist critics (e.g. Nagel 1961, ch. 13), but I think this is misleading, since the processes are quite different (Leat 1972). And it is often presented, even by its proponents, as showing that the social sciences are essentially subjective, lacking in objective criteria of validity. But against this it can be argued that, whilst the criteria of validity for interpretive knowledge may be different from those for (empirical) scientific knowledge, this does not mean that they are inferior, much less non-existent. Further, it is important to see that this kind of interpretive understanding is necessarily involved in the production of knowledge in the natural sciences. For this is a social process, of which communicative interactions between scientists are an essential feature (Apel 1972; Giddens 1976).

6. Criticisms of value-freedom

The remaining two objections to be considered concern the claims of positivist social science to value-freedom. The first is this. The basic concepts of any theoretical framework in the social sciences

can always be shown to express specific evaluative attitudes towards human existence, the organisation of society, the relationships between individuals or groups, and soon. To adopt one such framework rather than another is, amongst other things, to accept that evaluative position, to commit oneself to the political and moral values it reflects (Taylor 1967; Israel 1972). For instance, the concept of social integration, and the related concept of normative integration, which are involved in Durkheim's accounts of egoistic and anomie suicide, are bound up with a specific view of what are to be seen as normal, and pathological, conditions of society. Thus the concept of 'anomie' is essentially evaluative, just as that of 'alienation' is in Marx's earlier writings (Ollman 1971), but the values are by no means identical (Lukes, 1967), and part of what is involved in choosing between Durkheimian and Marxist theories is the commitment to one set of values rather than another.

The second objection is this. The positivist conception of the natural sciences presupposes a view of the physical world as a possible object of prediction and human technological control. It is for this reason that a central role is given to the discovery of laws, and that prediction and explanation are so closely connected. But if this conception of science is used as the model for the social sciences, what will be produced is a technology of social control, which treats humans as objects to be manipulated, and the design and organization of societies as an engineering problem, to be solved by scientific expertise—and, of course, political power (Marcuse 1964; Fay 1975). Thus positivists are mistaken in claiming, as they often do, that the social sciences only provide information about the likely results of various actions and processes, without in any way determining for what political ends this information is used. For to see politics in terms of using the most 'effective' means to given ends is in itself to adopt a distinctive political position, a technocratic and elitist one.

These two objections operate at significantly different levels, and are largely independent of each other. The former is concerned with the different values presupposed by the specific contents of different theoretical frameworks, whereas the latter is aimed at the more general values presupposed by any such framework constructed from a positivist standpoint. And each objection can be used as a basis for quite different, and mutually incompatible, responses to positivism. For instance, the first can lead to a total scepticism about the possibility of producing scientific knowledge about social reality and withdrawal from any such attempt: or instead to the call for politically committed, explicitly 'partisan' social science, which makes its evaluative assumptions clear, and, while striving for technical competence does not try to fulfil the expectations of people who do not share them. The second can lead to the attempt to construct a conception of social science that does not involve positivism's technocratic values, such as the Frankfurt School's idea of 'critical theory' (Jay 1973; Connerton 1976); or to a total rejection of any kind of science of society, and the adoption instead of some form of romantic anti-scientism.

Notes

1. For simplicity, I have excluded the use of statistical laws here, which involve a slightly different form of explanatory argument; see Lessnoff (1974 Chs. 1 and 3) and Benton (1977, Ch. 3).

2. This requirement is closely related to the concept of reliability in measurement, introduced in most social science methods tests; for a brief critical discussion, see Sjoberg and Nett (1968, pp. 298-302).

3. The account that follows is in the spirit of the kind of positivist interpretation adopted by many American sociologists; e.g. Homans (1964) and Merton (1968, chapter 4). Recently, several writers have challenged this positivist 'appropriation' of Durkheim; see Hirst (1975) and Benton (1977, chapter 5). I discuss only one of Durkheim's three types of suicide, egoistic, and in outlining anti-positivist criticisms of the theory, in Section 5 below, I ignore the problem of relating explanations of individual suicides to explanations of rates of suicide: see Giddens (1965) on this.

4. Freudian theory could be considered as an attempt to explain human activity by means of a description of the instinctual sources of various desires and wishes, and the operation of unconscious mental processes to generate characteristic patterns of behaviour and experience. For a realist discussion of Marx, see for example, Keat and Urry (1975, chapter 5). In addition, Bhaskar (1975) and Benton (1977) are attempts to develop a generally realist view of the social sciences, and criticisms of the positivist conception of science. Whether realism is consistent with some versions of the attacks on theory-neutrality seems to me an unresolved issue.

5. The rationalist element in the 17th century 'Scientific Revolution' is emphasised in e.g. Koyré (1968). Losee (1972) provides useful information on some rationalist philosophers of science. Some critics consider that there are rationalist elements in Althusser's view of science, which is discussed, for example, in Benton (1977, chapter 9).

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