Why critical realism fails to justify critical social research


© 2009 The Author

Version: Version of Record

Link(s) to article on publisher’s website:
http://www.methodologicalinnovations.org

Copyright and Moral Rights for the articles on this site are retained by the individual authors and/or other copyright owners. For more information on Open Research Online’s data policy on reuse of materials please consult the policies page.
Why Critical Realism Fails to Justify Critical Social Research

Martyn Hammersley*

*Centre for Childhood Development and Learning, The Open University

Abstract

Many social scientists have argued that research should be designed to perform a ‘critical’ function, in the sense of challenging the socio-political status quo. However, very often, the relationship between the political value judgements underpinning this commitment and the values intrinsic to inquiry, as a distinct form of activity has been left obscure. Furthermore, the validity of those judgements has usually been treated either as obvious or as a matter of personal commitment. But there is an influential tradition of work that claims to derive evaluative and prescriptive conclusions about current society directly from factual investigation of its history and character. In the nineteenth century, Hegel and Marx were distinctive in treating the force of ethical and political ideals as stemming from the process of social development itself, rather than as coming from a separate realm, in the manner of Kant. Of course, the weaknesses of teleological meta-narratives of this kind soon came to be widely recognised, and ‘critical’ researchers rarely appeal to them explicitly today. It is therefore of some significance that, under the banner of critical realism, Bhaskar and others have put forward arguments that are designed to serve a similar function, while avoiding the problems associated with teleological justification. The claim is that it is possible to derive negative evaluations of actions and institutions, along with prescriptions for change, solely from the premise that these promote false ideas, or that they frustrate the meeting of needs. In this article I assess these arguments, but conclude that they fail to provide effective support for a ‘critical’ sociology.

Key words: Critical realism, critical social science, explanatory critique, deriving ought from is

Introduction

My discussion of critical realism here focuses entirely on the justification for its being 'critical', I have no disagreement with the idea that social research ought to adopt a realist position (Hammersley, 1992:ch3). Moreover, there is, of course, a sense in which all research should be critical: it should subject knowledge claims to scrutiny. However, the phrase ‘critical realism’, and the notion of ‘critical social science’ generally, goes beyond this. It requires that the phenomena being studied, and the societies in which they are found, are subjected to criticism.
One of the features that is distinctive to critical realism, against the background of other recent versions of critical social science, is the explicit rationale it provides for research being ‘critical’, in the sense of aimed at diagnosing defects in society; according to which, how value conclusions can be derived from descriptive and explanatory evidence alone. Very often, critical researchers today fail to explicate the basis for their critical orientation: features of the operation of social institutions are presented as if their undesirability, and the need to change them in particular ways, were immediately obvious. Yet, while these value judgements may often seem uncontentious, to both ‘critical’ researchers and their main audiences, value assumptions are necessarily involved; and, unless judged from a perspective that already assumes their validity, there is no reason to accept them at face value. Justification is required.

Of course, there has long been, within the ‘critical’ tradition, an influential rationale for the drawing of value conclusions from factual evidence: that offered by Marx. Versions of Marxism influenced by Hegel relied upon a teleological account of the development of the world from which value conclusions could be drawn directly. In this respect both Hegel and Marx were opposed to ethics in the more usual Kantian sense. For them, any conclusions about what is good or bad, or what ought to be done, should be derived from an understanding of the nature of the world, not from some separate, abstract realm of values. However, generally speaking, critical researchers today do not place explicit reliance upon the sort of teleological meta-narrative promoted by Hegel and the early Marx. Indeed, this has long been subjected to severe criticism even within the Marxist tradition, with neo-Kantianism, pragmatism, structuralism, and post-structuralism providing the resources at various times. Furthermore, the denial that value judgements – or, in some quarters, any kind of knowledge – can be rationally justified has become much more influential within a contemporary intellectual climate that Smith and Deemer (2000) label ‘the era of relativism’. This encourages subjectivist positions according to which value judgements are matters of non-rational commitment; in other words, as involving undecidable or incommensurable judgements.

Against this background, critical realism is of great importance because it offers an objective but non-teleological rationale for a ‘critical’ orientation, in the form of the notion of explanatory critique: the idea that criticism of social phenomena can be derived directly from sound explanatory models of them. And just as Marx and Hegel had opposed Kantianism, so too some critical realists have challenged the sort of anti-naturalistic ethics which became influential in twentieth century Anglo-Saxon philosophy, according to which value judgements are portrayed as subjective, and perhaps irrational, expressions of emotion or personal feeling. Indeed, quite falsely it seems to me, they often portray this view of ethics and politics as the only alternative available to the ethical naturalism and moralism adopted by critical realism.

We can identify at least two arguments to be found within critical realism for warranting the notion of explanatory critique, in other words for justifying the drawing of value conclusions from factual evidence alone. The first has the following components:

a) If we establish some fact about the world, we are simultaneously implying that other people ought to believe it. This provides a model for deriving an ‘ought’ from an ‘is’.

b) If we can show that beliefs incompatible with this fact are systematically generated by a particular social institution, then criticism of that institution automatically follows, other things being equal.
On this basis it is claimed that evaluative and prescriptive conclusions can be logically derived solely from factual evidence established by social science. This first argument is sometimes described as cognitive, because it relates to belief.

The second argument is non-cognitive, in the sense that it concerns other aspects of human life. It runs as follows:

a) If we establish that someone suffers from an unmet need, such as the absence of food, then it follows automatically, other things being equal, that action should be taken to meet this need.

b) In addition, if it can be shown that the frustration of a need is not only generated by some institution but is necessary for the reproduction of that institution, then the conclusion follows (other things being equal) that the institution should be changed.

Again, this is presented as an example of deriving a conclusion about what is wrong, and perhaps also about what ought to be done, solely from a statement about what is the case.

I will evaluate each of these arguments in turn.

**The Cognitive Argument**

At the start it should be made clear that this argument does not succeed as a strict logical deduction of a value conclusion solely from factual premises (even aside from the inclusion of a *ceteris paribus* clause). In the first component, the conclusion (that any statement of fact ought to be believed) only follows if we assume a value principle to the effect that we ought to believe what is true. It can, of course, be argued that this value principle is deeply entrenched within, or even constitutive of, human social life, so that the assumption of this principle is trivial. I certainly agree that this value is constitutive for the goal of any kind of inquiry; and it may apply more widely than this; though there are arguments which question whether it applies across the board. At the very least, these arguments imply that this principle should not be assumed to apply at all times and in all circumstances; and they certainly indicate that other considerations may legitimately shape what we believe, in many circumstances, besides our assessments of whether or not it is true (Hammersley, 2009).

There is another, and more significant, problem with the first component of the cognitive argument. This is that, as fallibilists, we should distinguish between a factual knowledge claim being true and our belief that it is true. It may - in practical, even if not in strictly logical, terms - follow automatically from the fact that some factual claim is true that people ought to believe it. However, it does not follow automatically from the fact that I have come to the conclusion that statement X is true that others ought to believe it. It could equally follow that they ought to conclude that I am mad for believing such a thing. The only way to bridge this gap is to assume that we can know with absolute certainty that a statement is true, so that the conclusion can be derived from this that everyone ought to believe it. For example, it might be argued, along these lines, that there is a scientific method whose use guarantees true conclusions. However, once we recognise that we can never have absolute knowledge of this kind, as fallibilism insists, the argument falls. And, given that Bhaskar’s epistemological position is a fallibilist one, this first component of the cognitive argument generates an internal contradiction.
More particularly, it does not follow from the fact that social scientists claim to have established the validity of some knowledge claim that other people ought to believe it. Indeed, as rationalists we might expect, and hope, that people would exercise their own critical faculties rather than simply deferring to the authority of social science, especially since much of what is currently put forward as social scientific knowledge is open to serious dispute. Yet, for the cognitive argument to hold we must assume that social science is capable of producing knowledge whose validity is beyond all possible doubt, so that it should be accepted 'on authority'.

There are also problems with the other component of the cognitive argument: about the role of institutions. A first one concerns the idea that if an institution is generating beliefs that are incompatible with what has been 'established' by social science, then it must be treated as operating in an irrational manner and is therefore open to legitimate critique in these terms. In this way, the sort of explanatory critique advocated by critical realists under the heading of the cognitive argument shares with some concepts of ideology the assumption that beliefs which are false are caused in a different way from, or at least by different types of factor to, beliefs that are true. The simplest formulation of this is that true beliefs are caused by reality whereas false beliefs are generated in other ways. However, I suggest that, if we wish to speak in this confusing manner, all beliefs are caused by reality, and there is no strong relationship between how they are caused and whether or not they are true. This is a difficult issue, but in my view whatever one thinks of the subsequent development of the social studies of science movement, its original insight - the principle of symmetry - was correct (See Barnes, 1974 and Bloor, 1976). This principle held that we should not assume that true knowledge claims are generated in any fundamentally different way from those in which false knowledge claims are produced.

One argument that might be presented against the symmetry principle is that it undercuts social science itself, on the grounds that it denies that there are ways of pursuing inquiry that are more likely than others to generate sound knowledge. However, this conclusion does not follow. What is denied is that there is any strong, systematic causal relationship between how inquiry is pursued and whether or not the conclusions reached are true; there is no method or starting point that can guarantee truth. And much the same applies at the meta-level of determining whether any set of conclusions is true or false. This leaves it open for us to recognise that some methods - for example, those labelled by Peirce (1877) as the methods of tenacity, authority, and a priori argument - are much less likely to produce true conclusions, while those of science are more likely to do so. Nevertheless, people adopting the first three methods may, of course, reach true conclusions, while much rational inquiry has produced false findings. Furthermore, while we can argue that inquiry following a certain institutionalised pattern is desirable in minimising the chances of error, compared to following some other method, what is involved here is not the adoption of some utterly distinctive form of behaviour but rather a specialised refinement of behaviour of a kind that is to be found in other contexts too. In addition, all manner of motivations may operate on the decision to engage in research in a scientific way, of the same kinds that motivate other, very different, kinds of action.

In summary, I think there are particular practices that, other things being equal, will be likely to increase the chances of our coming to sound conclusions, compared to others; or perhaps it would be better to say 'reduce the chances of our reaching false conclusions'. These would be those practices that are usually labelled scientific, compared for instance with those which seek to draw conclusions about the nature of the physical universe by explicating what is in some religious book. There are also structural processes that tend to generate outcomes that may involve certain sorts of bias. But just as scientific method does not guarantee the validity of our conclusions nor do these structural processes always produce error. The most fundamental point of all is that systematic causal relations may well tend to generate particular sorts of belief in particular sorts of circumstance, but truth/falsity is an evaluative categorisation that does not have any intrinsic or internal relation to causality.
Another problem with the second component of the cognitive argument concerns the assumption that institutions either generate false beliefs or they generate true beliefs. Yet, even if we assume that institutions generate, or are constituted in terms of, specific sets of beliefs in some reasonably straightforward fashion, and I am not sure this is true, we can expect that most institutions will generate both true and false beliefs. Given this, no evaluation or prescription would follow in the automatic manner that critical realists wish it to do from the fact that an institution generates some false beliefs, unless we were to assume that we should try to change all institutions until they only generate entirely true beliefs. Moreover, apart from anything else, this latter position seems to involve a form of intellectualism: the idea that other social activities should be evaluated in exactly the same manner as scholarly inquiry. In my view, different sorts of activity require different kinds of rationality, depending upon their goals.

So, contrary to the claims made for it, the first argument does not succeed in deriving value conclusions solely from factual evidence, either in strictly logical terms or in some other way. As a result, it does not provide a secure basis for arguing that realism, or social science, can and should be ‘critical’.

The non-cognitive argument

The second argument that critical realists have put forward to legitimate their ‘critical’ orientation appeals to the concept of need. This also fails as a purported logical derivation of value conclusions solely from factual evidence, because ‘need’ is a quasi-evaluative term: it concerns an actual or potential gap between what is and what ought to be. Any practical evaluation of this kind can and should be sharply distinguished from a factual statement to the effect that there is a difference between what exists and what would be desirable or necessary in terms of some evaluative standard that is simply identified rather than asserted. For instance, we must draw a line between the factual statement that some person does not have food and is likely to die as a result, and the evaluation that this is an undesirable situation. The implicit value assumption involved is: ‘no human being should starve to death’. Of course, as with the first critical realist argument, it could be countered that even though, strictly speaking, there is a logical gap between factual evidence and value conclusion here, the implicit principle on which reliance is being placed is built into the very fabric of human life: that someone should not be allowed to starve to death is a fundamental ethical principle (see Sayer, 2008; Elder-Vass, 2008). This may be so, though what I will say below at least qualifies it. However, the fundamental point remains that at least one value assumption is required to reach a value conclusion, in this case as in others.

My second point is that, even in the case of basic needs, there are situations where human beings do not apply this value principle, may well be prepared to justify this, and where we might reasonably agree with them. For example, one of the strategies used in wars is to cut off supplies to the opposing army, and we might feel few qualms about this if the people whom we were effectively condemning to starvation were responsible for the most terrible atrocities and/or this were the only way of defending ourselves from them. Elder-Vass (2008:16) argues that ‘it is a rather minimal implication of valuing humans that we should support their staying alive’, but then adds ‘assuming that they rationally wish to do so’, a qualification that points to another situation where leaving someone to starve could be the right thing to do.

Bhaskar’s inclusion of an ‘other things being equal’ clause in this second argument, as in the first, indicates that he recognises that there are circumstances where even basic needs ought not to be met. However, Collier (1994), Sayer (1997:481 and 2007), and Elder-Vass (2008) have pointed to problems with appeals to ceteris paribus in this context. The questions for me are: who should decide when relevant considerations are and are not ‘equal’, and on what grounds? More particularly, is the social scientist in a position to do this with any
distinctive intellectual authority? In other words, can it be done entirely on the basis of factual evidence derived from research? My answer to the last of these questions is ‘no’, and this implies that social scientists have no distinctive expertise in making decisions about whether ‘other things are equal’ in any particular case. This undercuts any direct inference from factual evidence alone to value conclusions, even allowing for ceteris paribus conditions.\(^\text{12}\)

To clarify, let me sketch what seems to be involved in the drawing of value conclusions:

We start with a description of a situation, perhaps along with some explanation of how it came about, and perhaps also some prediction about what will result. Taking the range of value principles that are available, some of them (usually more than one) will be found relevant to this situation. Each of these values sets up a line of potential evaluative and/or prescriptive argument. Given this, in evaluating the situation we must decide on the priority that ought to operate amongst these value principles, or how they should be combined, and we must determine what the implications of this are for how we evaluate the situation as good or bad, right or wrong; and/or decide what should or should not be done. Note that the value judgement that results here is unlikely to be the outcome of a fixed ranking of these value principles. Instead, what relative priority we give them on this occasion will depend upon our purposes, what we see as our responsibilities, our relation to the people involved, how well they seem to apply to this situation, and so on.\(^\text{13}\)

If this is a fair characterisation of the nature of the task, then formulating what is involved as the application of a single value principle whose relevance derives from the facts of the case, and which must be applied ‘other things being equal’, is not helpful. The process is far more complex than this and leaves room for reasonable disagreement. At the very least, my account here makes clear that no conclusion about what is good or bad about the situation, and what should or should not be done, can be logically derived solely from social science evidence about the matter. Rather, we must adjudicate among and combine relevant value principles in ways we judge to be appropriate in the circumstances. Moreover, neither the social scientist nor the philosopher has any superior expertise or authority in doing this, and very often there will be scope for disagreement about what the evaluation and the prescription should be.

The third point I want to make is that many needs are more problematic than hunger. Indeed, often, basic needs merge into more complex and controversial ones. For example, it could plausibly be argued that literacy and numeracy are basic needs in contemporary society. But how exactly are we to define ‘literacy’ and ‘numeraacy’ here? For instance, should we limit ourselves to elementary functional concerns or ought we to be introducing students to the worlds of literature and pure mathematics? In this case, and others, there is clearly considerable room for reasonable disagreement about what does and does not count as a need, as well as about whether or not a need should be met in any particular circumstance and what would count as meeting it. And these problems cannot be resolved entirely in terms of descriptive and explanatory evidence. Any resolution would require value argument, using appeals to: rights and/or obligations; the principle of universalisability; precedents; other cases that are similar or different in key respects; examples generated by counterfactual hypotheses; and so on. This is why there are likely to be multiple reasonable views in most instances; an outcome that partly reflects the fact that, while in the case of disagreement about well-formulated factual questions there is a single underlying correct answer, this is not the case with value questions (see Larmore, 1987; Gray, 1995:ch2; Habermas, 2003; Hammersley, 2005).

So, once again, there is no direct or immediate route from factual research evidence to value conclusions. Rather, any such inference necessarily depends upon value assumptions, both about any particular need and about whether there are other overriding values. Moreover, value pluralism, the fact that there are always multiple values that could be seen as relevant, and will often be felt to be relevant, means that there are
frequently grounds for reasonable disagreement. Given this, there is no justification for claiming that social scientists can conclusively determine what counts as a need that should be met on any particular occasion. For them to claim this capacity would amount to a form of scientism: they would be exceeding the authority of scientific research, over-extending the domain of legitimate claims to research expertise.

Of course, it might be argued that while social science cannot legitimately claim to produce value judgements about particular situations, it can tell us what value principles ought to be taken into account in human social life in general terms (see Bhaskar, 1986; Sayer, 2008). Two points need to be made about this. First, this does not provide sufficient basis for the argument that social research should be ‘critical’ in the required sense, since the latter involves social scientists ‘taking a stand’, as regards what is wrong and what ought to be done about some particular issue in some particular socio-historical situation. Second, while biological and social science can show why particular value principles have tended to emerge within human communities at particular times, this does not in itself establish that, as humans or even as members of a particular community, we should adopt those principles; even though the evidence provided would be relevant to such a decision.  

It should be clear, then, that the first component of the non-cognitive argument is not defensible; and since the second depends upon it, that fails too. Moreover, there are further problems with this second component. We can expect that any institution is likely to meet some needs but frustrate others (on various interpretations), and so any assessment of it will have to take account of both aspects. And, since this is a matter for practical value judgement, here too social science cannot claim any distinctive authority.

Conclusion

I have argued that, in the context of critical social science today, critical realism is distinctive in putting forward a clear rationale for how evaluative conclusions can be derived directly from research evidence, such that social scientists can present evaluative and prescriptive conclusions as validated by their work. In other words, critical realism offers a rationale for being ‘critical’. However, I have shown that neither of the two arguments making up this rationale is convincing. Of course, establishing this does not automatically undercut the project of critical social science, but it weakens it considerably, as against the alternative prospect of a social science committed solely to producing factual conclusions. Moreover, there are other reasons why we should reject the ‘critical’ project. One of the most important is that the simultaneous attempt both to produce knowledge and to bring about social change of some kind (or, for that matter, to preserve the status quo) is liable considerably to increase the danger of bias (Foster et al., 1996; Hammersley, 2000).

Note that my commitment to the principle that researchers should strive to be value neutral or objective does not imply that value argument is unimportant, or that it is irrational. Indeed, I believe such argument is essential to governance and to everyday life, though it seems to me that much current public discussion is of poor quality. My point is simply that social scientists, whether realists or non-realists, have no distinctive expertise to determine what is good or bad about the situations they seek to describe and explain; or what, if anything, should be done about them. This is because even where value judgements rely on research evidence they also necessarily depend upon other factual assumptions and upon value principles that are plural and often in conflict. In other words, because they are not able to validate any teleological meta-narrative or to derive value conclusions directly from factual evidence, their authority does not extend to drawing value conclusions: to producing evaluations and prescriptions as if these could be validated primarily through the research process or on the basis of their expertise. While social scientists, like others, can engage in value argument, to which both factual evidence and value principles will be relevant, they must not suggest or imply
that any value conclusions they reach can be validated through their work, given that there is almost always room for reasonable disagreement about which value principles are relevant, and about the appropriate priority amongst them on any particular occasion. What is required to reach value conclusions is practical, situated argument: neither philosophy nor science can tell us, on its own, whether a situation is good or bad, who is to blame, or what we should do about it. And they should not pretend to have this capacity.

This is not to deny that academic social science has an important and distinctive role in relation to many forms of political practice. Its role is to establish relevant facts about social actions, events, and institutions; while that of philosophy, at least in part, is to clarify the concepts involved in factual and value arguments. These contributions are very important, especially in a political culture such as that in which we now live, where spurious debates based on taken-for-granted assumptions of doubtful validity (both factual and evaluative) are common. But it is also important that the appropriate limits to what social research can offer are recognised by both researchers and their audiences. The claim made by critical realism that social science can move beyond those limits is not only false but encourages bias and amounts to scientism.

References


---

1 Earlier versions of this paper were presented at a Colloquium on Critical Realism in Education, Institute of Education, University of London, May 2008, and at a British Sociological Association Realist Study Group meeting, Kings College, London in June 2008. My thanks go to the participants at these events for their comments, and especially to Dave Elder-Vass for a thoughtful response to the paper.

2 There is another important ambiguity in the meaning of ‘critical’ and ‘criticism’ here. In some contexts, for example that of literary criticism, being ‘critical’ means ‘subjecting something to assessment’, an assessment that can result in favourable as well as negative judgements. Yet, it seems to be built into the notion of critical realism, and of critical social research more widely, that the aim is to diagnose what is wrong with some institution or society, and sometimes also to identify the remedy. This negativity surely requires justification. Adorno has provided a rationale for it (see Thomson, 2006), but it is far from convincing; and it is not clear whether it would be accepted by critical realists.

3 For critical assessments of ‘critical’ research from this point of view, see Hammersley 1992:ch6, 1995:ch2, and 2000.

Accounts of this aspect of critical realism are to be found in a variety of places: Archer et al. 1997:pp233-57 and Part III; Bhaskar 1979:pp56-103; Bhaskar 1986 and 1991:Appendix 1; Collier 1994:ch6. For assessments, see: Lacey 1997 and 2007 and Sayer 1997 and 2007. For an earlier attempt on my part to grapple with this issue, see Hammersley 2002. For useful brief summary of the arguments on each side, see Elder-Vass 2008a, and in a more extended discussion (Elder-Vass, 2008b) he has examined Bhaskar’s arguments about this issue in some detail, including his later appeal to meta-reality. I have excluded the latter from consideration here, partly on the grounds that this aspect of his later work, the ‘spiritual turn’ is not accepted even by many critical realists, and the extent to which it is compatible with realism is debatable.

The question of whether or not such inferences are possible, whether there is a distinction between factual and value statements and if so what its character is, and so on, have of course long been a matter of dispute among philosophers, and continue to be debated. See Taylor 1967, Hudson 1969, Anderson 2002; Putnam 2002; Angelides 2004.

For a genealogy along these lines, see Williams 2002.

These include those put forward by William James about what it is good to believe, in his critique of W. K. Clifford’s insistence that we should only believe those propositions for which we have strong evidence (James, 1909; Hollinger, 1997).

There is variation in the meaning of the word ‘fact’ in everyday usage that can cause misconceptions in this area. It can mean ‘matters of fact as against matters of value’, ‘well-established knowledge rather than speculation’, or ‘what is true as against what is false’. Clearly, these distinctions are not isomorphic. Here I am using the term in the first sense.

Whether the validity of a factual claim is a matter of fact is an interesting philosophical issue that I will leave on one side.

Putnam 2002 refers to concepts like this as having a ‘thick ethical’ character, in that descriptive and value components are closely entangled in such a way that they cannot be separated. This analysis is correct, but he fails to distinguish between the situation where a system of values serves as a framework for picking out relevant facts and its serving as a basis for drawing practical conclusions, evaluations or prescriptions. He discusses Sen’s critique of conventional welfare economics, but fails to address Max Weber’s much earlier assessment of the failings of normative economics: see Bruun 2007.

It should be noted that there is an important distinction between attaching ceteris paribus clauses to theories, which will relate to the conditions under which the causal relations the theory identifies operate, and attaching such clauses to value conclusions where they relate to the conditions under which those conclusions should be adopted. In the first case there must be some reasonable hope that such a set of conditions can be specified, at least in principle, whereas in the second case there is no prospect of this because of value plurality and the scope for reasonable disagreement, as I will argue in the remainder of the article.

It should be noted that if we take the view, as I think we should, that descriptions and explanations are always framed in terms of value assumptions that establish their relevance, this does not alter the argument that plural values are likely to be available for constructing evaluations. Furthermore, the value relevance framework itself may be open to challenge and revision.

Elder-Vass (2008:18) argues that in situations approximating to Habermas’s ideal speech situation ethical discussion could resolve conflicts of interest, and presumably also conflicts in priority given to different values. While this will sometimes be possible, I suspect that most of the time it would not be (Hammersley, 2005). Furthermore, there is no distinctive role here for social scientists. For example, they do not have superior expertise in judging whether people are
conducting ethical discussion honestly and sincerely, whether all who should participate are doing so, or whether the discussion is being distorted by power differences. Here, too, value judgements are involved.

Social scientists do of course have the authority to claim expertise in relation to factual matters; but even here they do not have sole or absolute authority.