DICK TAVERNE

'Shines long overdue light on the dark corner where dodgy science and dodgy politics meet' Peter Preston

THE MARCH OF UNREASON

Science, Democracy, and the New Fundamentalism

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The Attack on Science

> Truth is what your contemporaries allow you to get away with.
>
> Richard Rorty, American philosopher

So far, the reactions against science and technology I have described have not been based on intellectual arguments, but mainly reflect a general instinctive malaise—that natural remedies and natural farming methods are best, that we are losing touch with nature, and that science is subjecting us to ever greater risks of harm. However, there has also been an intellectual assault on science in academe, a philosophical, political, and sociological critique whose impact on attitudes to science should not be underestimated. The assault has been launched under a number of banners, such as cultural relativism, deconstructionism (which has attacked science for 'reductionism'), and hermeneutics (literally, the art or science of interpretation), but I shall concentrate on ideas generally associated with relativism, or, in the particular case of the attack on science, postmodernism.

Postmodernism is not a theory or school of thought that is easy to define. Few philosophers today seem willing to describe themselves as postmodernists. Its main impact on the public has been as a movement in literature and the arts, but, although its authority has faded, its critique has been adopted by many teachers of sociology, mainly in the United States, and has left its mark on attitudes to science among generations of students, adding weight to the current mood of scepticism and suspicion. In particular, it has had an influence in turning against science those on the left of politics, who were traditionally supporters of the scientific

approach. In the words of Professor Alan Ryan, 'American departments of literature, history and sociology contain large numbers of self-described leftists who have confused radical doubts about objectivity with political radicalism and are in a mess'.[1] Its main inspiration came from a group of French intellectuals, among them Bruno Latour, Jean-Louis Lyotard (who has led the assault on science), the historian Michel Foucault, and the philosopher Jacques Derrida. Their ideas spread to Britain, Germany, and especially to the United States.

One of the postmodernists' main contentions is that science wrongly claims to describe the physical world that surrounds us objectively and truthfully. In this they echo the basic tenet of relativists that all points of view are equally valid. Scientific truth, it is asserted, is only one of many truths, or rather just 'one story among many'. The American philosopher Richard Rorty, a leading and even eloquent exponent of the view that there is no truth, but only truths, ridicules those who seek the truth as 'lovably old-fashioned prigs'.[2] He maintains, with a refreshing directness unusual among postmodernists (who rarely make simple and direct statements), that truth is what your contemporaries allow you to get way with. According to postmodernists, scientists have not 'discovered' laws of nature, but have 'constructed' them. (This does not stop postmodernists travelling to international conferences by aeroplanes, whose safety, one would have thought, might be regarded as highly uncertain if the laws of aerodynamics were mere social constructs.)

Postmodernists also argue that science is wrong in claiming that the results of research can be independent of local cultural constraints or of moral and ideological motivations. In this, again, they reflect the views of relativists that all knowledge and values are relative to some particular standpoint, such as the individual, their culture and era, and so on. The work scientists do, according to postmodernists, and the hypotheses they advance are determined by where they were born, their sex, the society and culture in which they were brought up, the class they belong to, and their political ideology. Their work has to be judged by their motives

and values. This view is echoed by many sociologists today and has almost become part of conventional wisdom. It was a basic assumption behind an influential House of Lords report on Science and Society and is much favoured by the think tank Demos, closely associated with New Labour.[3] It is perhaps the principal legacy of the postmodernist assault on science.

The attack on the objectivity of science is music to the ears of eco-fundamentalists. If postmodernists are right, then environmentalists do not have to worry about evidence, only about ethics. As long as they are trying to save the world, whatever they do is justified. What is more, since motive is what matters, GM technology can obviously be dismissed without regard for evidence, because it is promoted by multinational companies who, they argue, are only interested in profits.

Postmodernists also maintain, as Green fundamentalists do, that the Enlightenment, far from being 'one of the best and most hopeful episodes in the history of mankind', was in fact the precursor and generator of colonialism and oppression, and that it spread false ideas about the inevitability of progress. Furthermore, a number of modern sociologists, who propagate the view that science is not value-free, denounce it for being elitist and out of touch. It is argued that 'the public' should be more involved in almost every aspect of scientific activity to prevent its elitist bias, to allow the innate wisdom of the public to play a greater role than science has traditionally allowed and to ensure that science serves the public interest.

Science as 'the purveyor of certainties'

There were two good reasons for the rise of postmodernist influence. One was a rejection of 'Scientism', the excessive and false claims made that science deals in certainties. The other was the rejection of belief in the inevitability of progress. Isaiah Berlin, himself a champion of the Enlightenment, upbraided those

philosophes who believed that there are universal truths which apply to matters of conduct and that we should seek a Utopia, 'a goal for which no sacrifice should be too great'.[4] Some of the *philosophes* did indeed claim that they could develop a science of human nature and answer ethical and political questions with the same certainty as those of mathematics or astronomy.

Karl Marx followed in their footsteps. He argued that the scientific method could be applied to society as well as to the world about us. In fact, he saw himself as the Newton or Darwin of the social sciences, and claimed he had discovered the scientific laws that govern human societies. Just as Newton had discovered the natural laws that determine the motion of matter in space (as was generally supposed at the time), which enable us to predict the time of sunrise and sunset accurately, so he, Marx, thought he had discovered the laws of capitalist production that enabled him to predict with certainty how societies would develop. It is said that he offered to dedicate the second volume of *Das Kapital* to Darwin because 'he had a greater admiration for [him] than for any of his other contemporaries'.[5] (Darwin wisely declined, it is reported, explaining that unhappily he was ignorant of economic science.)

Marx was wrong. Firstly, I am convinced by Karl Popper's arguments that there are no laws of history or society, because history does not have a coherent pattern.[6] Secondly, Marx's main predictions have been contradicted by events and his theory invalidated. There was no 'immiseration', or ever-growing misery of the working class. Contrary to the laws of capitalist production that Marx claimed to have discovered, it was not capitalist societies but rural economies such as Russia and China that turned Communist. Far from taking over the world, Communism collapsed. These failures helped create scepticism about science, because a central part of Marxism's appeal was its claim to be scientific.[7] Marxists believed that they understood the laws of history, that history was on their side and, because they knew they were right, they suppressed dissent.

We should not underestimate the effect that the collapse of Communism and the failure of Marxism has had on attitudes to

science. Many people, including many on the left, failed to understand that its approach was anything but scientific. Communists never believed that hypotheses should be adapted in the light of criticism or experience. In the Soviet Union, anyone who challenged the theory of its leading agricultural scientist, Trofim Lysenko, that acquired characteristics could be inherited, was likely to be shot or sent to a Gulag. Yet no less an intellectual than Václav Havel, the former President of the Czech Republic, wrote in 1992: 'The fall of Communism can be regarded as a sign that modern thought—based on the premise that the world is objectively knowable, and that the knowledge so obtained can be absolutely generalized—has come to a final crisis'.[8] Fortunately, the premise that the world is objectively knowable was not a special discovery of Communism and survives its demise. Furthermore, there is no sign that disillusionment with science is today as prevalent in former communist countries as it is in many parts of the old capitalist West.

Relativism and the corruption of language

Apart from the false claims of scientism, there was also a reaction among anthropologists against colleagues who proclaimed the superiority of their own culture over the other cultures they studied. This commendable display of humility led less defensibly to the inference that facts are only true in relation to a particular culture, in other words that there is no such thing as objective truth, because no one culture is superior to another.

There are times when I have some difficulty in understanding what relativists, particularly the postmodernists, are trying to say—and this is neither a boast nor a confession—because they do not care about clarity of expression, which is regarded as a bourgeois vice and an instrument of oppression. To them, the Enlightenment is clearly the source of the ills of the world. When science was born, they argue, it provided the West with tools that enabled European nations to enslave the rest of the world—

although in fact it was during the Enlightenment that Western thinkers first proclaimed the equality of all men and their equal right to freedom and self-development. (Both John Locke and Adam Smith not only opposed slavery, but colonialism as well.) However, in the view of postmodernists, not only the applications of science and of the new technologies generated by the Enlightenment but reason itself and the language of reason aided the process of colonialization. If colonialists expressed themselves clearly, it was the duty, it seems, of anti-colonialists to express themselves obscurely. The philosopher Ernest Gellner has described the attitude of those anthropologists, for example, who swallowed the new doctrines hook, line, and sinker:

> As for style . . . why those colonialists wrote with limpid clarity, because they dominated the world, partly by using that wicked clarity to do so. Lucid prose and the domination went hand in hand. 'We'll show them through our style just how anti-colonialist (and pro-feminist, for that matter) we are!' And by God, they do.[9]

The style of postmodernists, as well as their rejection of the empirical approach, offered a complete antithesis to the Anglo-Saxon tradition of philosophy. As a student, I was nurtured on the philosophy of Locke and Hume, and of twentieth-century philosophers such as Bertrand Russell and Gilbert Ryle, the author of *The concept of mind*, whose writings were notable for the clarity of their prose. They are a pleasure to read. By contrast, while I admired Sartre's novels, I found *L'Être et le néant*, an existentialist forerunner of the postmodernists, almost incomprehensible. I tried to read Heidegger, often described as one of the earliest postmodernists, but the task defeated me. Mark Twain described his first editor as 'a felicitous skirmisher with a pen, and a man who could say happy things in a neat and crisp way.' No one could say that about Heidegger, even though some of my philosopher friends assure me he was a great philosopher.[10]

Heidegger's obscurity was no exception. The American philosopher John Searle relates of Derrida:

> Michel Foucault once characterized Derrida's prose style to me as '*obscurantisme terroriste*'. The text is written so obscurely that you can't figure out exactly what

the thesis is (hence *obscurantisme*) and then when one criticizes this, the author says, '*Vous m'avez mal compris. Vous êtes idiote.*' (Hence *terroriste*).[11]

It is tempting to draw the conclusion that the writings of postmodernists are incomprehensible because they have nothing intelligible to say.

The Sokal hoax

In fact, postmodernists sometimes cannot even understand each other. A professor of physics at New York University, Alan Sokal, was so exasperated by their confused thinking, misuse of scientific concepts and obscurity of language that he submitted a hoax account of scientific activity, phrased in suitable jargon, to a leading postmodernist journal, *Social Text*.[12] His paper, which was entitled 'Transgressing the Boundaries: Towards a transformative Hermeneutics of Quantum Gravity', was brimming with absurdities, full of elementary scientific howlers and non-sequiturs, but that did not prevent its acceptance for publication. This is not surprising, because its contents are indistinguishable from other postmodernist writing.

To quote from the article:

> . . . most recently, feminist and poststructuralists critiques have demystified the substantive content of mainstream Western scientific practice, revealing the ideology of domination concealed behind the façade of 'objectivity'. It has thus become increasingly apparent that physical 'reality', no less than social 'reality', is at bottom a social and linguistic construct; that scientific 'knowledge', far from being objective, reflects and encodes the dominant ideologies and power relations of the culture that produced it . . .

Again:

> Liberatory postmodern science . . . liberate(s) human beings from the tyranny of 'absolute truth' and 'objective reality' . . . postmodern science provides a powerful refutation of the authoritarianism and the elitism inherent in traditional science, as well as an empirical basis for a democratic approach to scientific work . . . how can a self-perpetuating secular priesthood of credentiated

'scientists' purport to maintain a monopoly on the production of scientific knowledge?

So it goes.

The objectivity of truth

The first contention of relativists, that there is no objective truth, is so contrary to common sense that it is hard to take it seriously. It is not, however, unknown for philosophers to reach conclusions that conflict with common sense. When Zeno of Elea (not to be confused with Zeno the Stoic) explained to his companion that it was logically impossible to walk, his friend's answer was to get up and walk (*Solvitur ambulando*). In Tom Stoppard's play *Jumpers*, the philosopher George Moore—namesake of the famous ethical philosopher—parodies similar arguments that it is impossible for an arrow ever to reach its target (another of Zeno's paradoxes). Indeed, he concludes that an arrow could not move at all and 'St Sebastian died of fright'.[13] When Bishop Berkeley's idealism, which claimed that we could not be certain of the independent existence of material objects, was explained to Dr Johnson, he got up and kicked a stone. I am tempted to follow Dr Johnson and declare myself a member of a common sense party and to say there is no point in such nonsense. (Being suspicious of such nonsense is not the same as being suspicious of science because its findings often contradict popular, 'common sense' beliefs.)

However, dependence on objectivity and truth is the inner citadel of science. If it were overthrown, science would be pointless. How would we distinguish science from ideology, fraud, and nonsense? Fortunately, the fallacy of this basic tenet of all relativists seems self-evident. They hold that there is no objective truth. Why should we take any notice of that proposition? Is the proposition itself objectively true or not? If true, then relativists admit that propositions *can* be objectively true and their thesis is false; if it is not true, because there is no such thing as objective truth, it is a meaningless statement of which we should take no more notice

than of statements that life is just a bowl of cherries or that the moon is made of green cheese. (The same objection can also be made to Marxism's claim to objectivity. If all theories are products of their class background, how can Marxism be objectively true?) Some have likened the relativist dilemma to the old paradox of Epimenides, who stated that all Cretans were liars, because he had been told this by a poet who was himself a Cretan. The comparison is inappropriate—the poet's statement was not worthless, because liars do not tell lies all the time and this may have been one time when a Cretan was telling the truth. The statement was therefore verifiable and not meaningless. Epimenides was more logical than the relativists.

The values of scientists

Perhaps the contention that should be taken most seriously is the view that science is influenced by the values and prejudices of scientists themselves, since this is a view that has become widely accepted outside the ranks of relativists and postmodernists. For example, Mary Douglas and Aaron Wildavsky argue that it is impossible to expect scientists or experts to provide an objective assessment of risk: 'Everyone, expert and layman alike is biased. No one has a social theory above the battle . . . judgments of risk and safety must be selected as much on the basis of what is valued as on the basis of what is known'.[14] They too seem to accept that science can never be value-free. Likewise, the House of Lords Select Committee set up to consider the problems of Science and Society in 2000 concluded that:

> Science is conducted and applied by individuals; as individuals and as a collection of professions, scientists must have morality and values, and must be allowed and indeed expected to apply them to their work and its applications. By declaring openly the values that underpin their work, and by engaging with the values and attitudes of the public, they are far more likely to command public support.[15]

The same message, that what matters most are 'the values, visions and vested interests that motivate scientific endeavour', is

propagated by the New Labour think tank, Demos, in a paper that reflects the fashionable drive to make science more socially accountable.[16]

But this is plainly wrong. Both the House of Lords Committee and Demos are guilty of the fallacy that denies the objectivity of science. Of course scientists have moral and social values, but science does not, so that ultimately the motives of researchers are unimportant. Scientists may embark on a particular research project because they hope it will help mankind, or make them famous, or will confirm their prejudices, or they may select it because they can get it funded. If they work for a company, no doubt they hope it will help the company make higher profits. Whatever their motives or their values, in the end the results of their research will be subjected to objective scrutiny. Do the findings stand up to the critical analysis of peer review? Are they reproducible? Can they be verified or falsified? If the results are obviously biased by the researcher's prejudices or vested interests, they will be worthless and his or her reputation will suffer. Scientists thus have a strong incentive not to let their prejudices interfere with their work. Their reputation depends on getting things right. All scientists care about accuracy because, whatever their values, it is vital to their work. Indeed, one irrefutable answer to the supposed relevance of a scientist's background, values, and motivation is to ask the question put by Professor Robin Fox of Rutgers University, USA: What did it matter whether Gregor Mendel was a male, white, European, monk? His findings about the heritable characteristics of peas would have been no less valid if he had been a black, handicapped, Spanish-speaking, Lesbian atheist.[17]

Science is concerned with objective truth in a way that other intellectual activities are not. If a hypothesis is substantiated, it is valid at any time, anywhere, whoever thought of it, at least until a better one is found. Scientific truth is the clearest example of the philosopher Bernard Williams' description of the concept of truth: 'The concept of truth itself, that is to say, the quite basic role that truth plays in relation to language, meaning and belief—is not

culturally various, but always everywhere the same.'[18] Scientific truth does not resemble the textual interpretation of a poem or of a novel, which must remain a matter of subjective opinion, about which different critics will take different views that depend among other things on their values and the age and culture in which they live. Scientific truths do not resemble political beliefs, which are inevitably influenced by our culture. Of course, there are fashions of thought, and of course, we are creatures of the age in which we were born. If I had been born in Medina in the centre of Islamic civilization in the ninth century, it is inconceivable that I would look at the world in the way I do now as a contemporary, European, liberal democrat. But if I had been an astronomer at that time in that place and had discovered a new planet, or a new law about the way the planets moved, my discoveries would have been true (or later proved false) irrespective of time and place.

Newton's work provides a good example of the irrelevance of prejudice or values or of cultural background to a scientist's work. He believed in mysticism and alchemy, devoting much of his time to the latter and, living when he did, it is not surprising that he did so. These beliefs made no difference to the validity of his scientific discoveries. I do not deny that the attitudes of scientists towards issues of scientific controversy or the direction of their work may be influenced by contemporary or personal values. When a hypothesis is still uncertain, attitudes may well reflect prejudices. When it was first suggested that smoking causes cancer, those who smoked themselves may well have been more sceptical about the findings than those who hated smoking. In time, however, the hypothesis was confirmed and today it is no longer disputed by any reputable scientist, whether they smoke or not.

Should scientists 'openly declare the values which underpin their work' in order to win public confidence, as a House of Lords Committee suggested?[19] It is not clear how this would help. Should scientists who announce a finding that the impact of pollen from *Bt* corn on Monarch butterflies in the field is negligible, declare that they have been lifelong Republicans, or Seventh Day Adventists, or disapprove of sex outside marriage? Would the public really

trust scientists more if it knew what they felt about truth and beauty, or that they hate capitalism, or are Arsenal supporters? Would Newton have achieved greater public understanding of his work if he had declared his interest in mysticism and alchemy?

What seems to lie behind the suggestion is the fashionable view, part of the legacy of postmodernism, that science is not truly objective but is as much influenced by political and social values (or commercial motives) as are politicians and social scientists. Of course, decisions on the *use* of scientific discoveries and their applications may raise moral issues, for scientists as much as for anyone else. That is why Robert Oppenheimer, one of the inventors of the atomic bomb, refused to do more work on the weapon. But it is important to distinguish the results of the research itself, which is value neutral and should be judged on its merits, irrespective of the social background or motivation of those who do it, from the use to which it is put, which may raise moral problems. Almost any discovery can be abused.

The impact of postmodernism

It is easy to underestimate the subversive influence of postmodernist views on academic integrity. Some of its absurdities are more extreme than any cited in Sokal's brilliant hoax. For example, one prominent postmodernist, David Bloor, argued that Boyle's law was influenced by his conservative political beliefs and his desire to maintain the status quo in order to protect his vast Irish land holdings.[20] Feminists have called for feminist science and a feminist epistemiology, to replace 'phallocentric knowledges' (whatever these may be).[21] To prove Rorty's claim that truth is anything your contemporaries let you get away with, Afrocentric historians have argued that Greek culture was stolen from Africa. One book widely used in Afro-Caribbean studies claimed that Aristotle stole his philosophy from the library at Alexandria and studied the Egyptian mystery system with Egyptian priests.[22] Therefore our culture, supposedly derived from the ancient

Greeks, originated with black Africans. Those who have tried to point out that (a) Aristotle did not visit Egypt; (b) the library was not built until long after his death; (c) Egyptian mythology and religion were quite different from that of the Greeks; and (d), apart from anything else, the Egyptians did not regard themselves as black, have been dismissed as white racists or Euro-centrists, clearly motivated by a desire to discredit the achievements of African civilization. Some American universities also teach that Socrates, because of his snub nose, was clearly black.[23]

Another absurdity is the assault mounted by some members of the constructivist-relativist school on 'the standard model of science' for being far too restrictive in its view of what is scientific. They have called for 'a reappraisal of the scientific method' to include astrology, parapsychology, psychoanalysis and other 'extraordinary sciences'.[24] After all, if science is merely one of many 'narratives', or as another leading light of postmodernism, Paul Feyerabend, called it, only one 'particular superstition', why prefer astronomy to astrology? Far more people pay attention to astrology. The astrologer on the *Daily Mail* newspaper is one of the most highly paid journalists in Britain. Another illustration of the influence of postmodernist, anti-science views on high intellectual circles is that of an exhibit in 1994 'Science in American Life' in the Smithsonian Museum in Washington DC, over which a five-year battle was fought between curators and the scientific advisory committee. The advisory committee wanted a theme of 'better living through chemistry'. The curators, who made clear their disdain for big science, wanted to expose its hazards and to show chemical manufacturers as polluters. The result was a largely negative exhibition and the waste of a great opportunity to educate the public about the excitement of science.[25]

The call for more democratic science

Any call for more democratic control is likely to be popular. If you ask people if they would like more say over almost any public

issue, of course they will say Yes. Only the most old-fashioned elitist, it seems, can resist demands for more democratic control over science. But on closer examination many of such demands have no rational basis. They take different forms:

(i) The charge that science is elitist and out of touch

The Science and Technology Committee of the House of Commons set up an inquiry in 2002 into the allegation, which it clearly felt to have substance, that the Royal Society was too elitist and out of touch.[26] The House of Lords Committee previously referred to concluded that we should no longer talk about the lack of public understanding of science, because this betrayed 'a condescending assumption that the many difficulties in the relationship between science and society are due entirely to ignorance and misunderstanding on the part of the public'. There was a need for scientists to see themselves as 'civic scientists', concerned not just with intriguing intellectual questions, but also with using science to help address societal needs'.[27] At the heart of the allegation lies the belief that public misunderstandings about science are the fault of scientists, who are arrogant and fail to communicate effectively with the public.

There is no doubt that there is a mood of suspicion towards many new scientific developments and a widespread feeling that scientists should be more responsive to misgivings felt by the public. It might be summarized as follows:

> New technologies and new developments in science—genetic modification and genetics are two of the latest examples and perhaps nanotechnology will be the next—affect and will affect our lives profoundly, yet in practice we have no say over what is foisted on us. Scientists work in company laboratories, or in university laboratories financed by corporate funds, and are not concerned with what we think or what we want. Because of the needs of commercial secrecy, most of the time we do not even know what they will spring on us next. If we do not have more control over the way science is going, democracy will become a sham.

Many scientists themselves now concede that science must be more responsive to the public. For instance, in 2002 the Royal

Society, representing the cream of scientists in Britain, launched an expensive campaign for meetings and discussions with the public on the theme of science and society. In fact meetings held in different parts of the country attracted few ordinary members of the public and were mainly attended by activists and cranks. The general public might express an opinion in favour of more consultation in principle, but in practice it showed little interest. It is doubtful if the meetings served any useful purpose.

I believe that blaming scientists for the current mood of suspicion towards science is to misinterpret their role. Good scientists are good scientists if they do good science. Einstein was no worse a scientist because he did not speak like Demosthenes or write like Jane Austen. When scientists are also good communicators, like Richard Dawkins or the late Peter Medawar, they can make a hugely important contribution to public education, but there are excellent journalists who inform us about science without being first-class practising scientists themselves. It is important that scientists should be open about their work and willing to explain it, but the public depends for its understanding of science primarily on the media and if there is a lack of public understanding, it is the way in which the media report science that is largely to blame. The popular belief that scientific experts misled the public about BSE and that multinational companies foisted GM foods on them without consultation are frequently cited as examples of how scientific issues have been mishandled. No doubt, with hindsight, both could have been handled differently; but BSE was a most exceptional, largely unforeseeable accident, and it is never mentioned that the public enthusiastically bought genetically modified tomato puree, explicitly labelled as GM, until the press raised the scare about Frankenfoods, based on Pusztai's now discredited experiments, a scare which was brilliantly exploited by the anti-GM NGOs.

Not surprisingly, constant demands that scientists should communicate better with the public and that they should be more socially responsible, less elitist and out of touch have driven scientists onto the defensive. One example of this defensive attitude was

the presentation of a report published by the Royal Society in 2002, updating its assessment of the effect of genetically modified plants on human health. The update in fact confirmed findings of previous reports by the Society that there is no evidence of danger to health from GM food. It went on to say, very reasonably, that special care should be taken to monitor any risk both from new GM and conventional food products for allergenic effects.[28] However, the press release accompanying the report deliberately set out to suggest that the Royal Society was not making the case for GM technology and did not regard it as free from risk. Not surprisingly, journalists who did not read the report but relied on the press release duly reported that the Royal Society had changed its mind about GM food. The impression left was that support for the technology was not something to which any decent, respectable person could publicly confess or, as one commentator put it, 'it would appear that the Royal Society has not become more hesitant about the safety of GM crops and food—just more hesitant about saying so'.[29] The Society, it appears, hoped it would restore trust in scientists by hinting that it understood (and to some extent even shared) public fears.

The same reasoning, a desire to reassure the public that it was aware of its concerns, led the government to set up an inquiry into the risks that microwaves from mobile phones might be dangerous to health, despite the absence of any evidence of risk (see Chapter 7, p. 178). Far from restoring public confidence, treating unfounded fears seriously is more likely to confirm public apprehensions that the risks are real.

(ii) 'The public should have more say over new scientific developments'

The role of consultation

Clearly the public and its representatives have an important role to play in the development of science. The main lines of science policy funded by government, like other aspects of government policy, must be decided democratically by the elected government

itself. Since there will always be limited funds, government must decide priorities and many policy decisions might well benefit from wider discussion. Should we, for example, spend as much public money as we do on CERN, the European laboratory for particle physics, the largest particle physics laboratory in the world, or divert some of those resources to less visionary but more practical research into plant science, where public investment is declining? Scientific developments that raise profound ethical issues, such as human cloning, issues that raise the spectre of eugenics, or the possibility, if it ever materialized, that nanotechnology might enable human consciousness to be separated from the body, cannot be left to decision by a scientific elite and forced upon the public.

A report by the Royal Society on Nanoscience and nanotechnologies published in July 2004 makes a number of sensible recommendations for public involvement at an early stage of the development of the science.[30] Effective public consultation, which may take various forms, can both improve the quality of official decisions and educate the public. One of the reasons why Britain has an enlightened system that permits research on stem cells using human embryos, is that well-informed Parliamentary debates were preceded over a period of years by public inquiries and open public discussions, reasonably well-reported in the press, at which contending viewpoints were presented in a non-adversarial atmosphere. The votes in Parliament in 2001, which resulted in large majorities in both Houses for permitting such research, were left to the individual conscience of Parliamentarians and were not forced through by Party Whips demanding compliance with party policy. When citizens' juries made up of representative lay citizens (not, please note, representatives from anti-science NGOs claiming to speak on behalf of the public) hear argument and evidence on both sides of a controversial issue, (e.g. how to dispose of nuclear waste or whether we should grow GM crops) without media distortion and without strident partisan advocacy by either side, they reach sensible and balanced conclusions. Consulting the public sensibly can often make controversial

proposals acceptable. For example, experience has shown that proposals to build waste incineration plants will be bitterly opposed by local communities if public consultation is seen as a formal process for gaining public approval of predetermined plans. When there is open discussion with local residents, whose worries are seriously considered before proposals are finalized, the chances of public acceptance are greatly improved. Consultation will not win trust if it is seen merely as a way of authority informing the public of the facts.

Secrecy is also the enemy of good government. Transparency is not always possible, for instance in the intelligence services, in diplomacy, in medical research that involves the use of animals, since animal rights extremists can endanger the lives of researchers and their families, or in Budget preparations when premature disclosure of plans could disturb financial markets. But generally, the more open the processes of government, the more likely that they will command trust. The secrecy in which the Ministry of Agriculture enveloped the expert advice it received at the time of the BSE outbreak in the early 1990s only served to foment public suspicions of cover-up and conspiracy. By contrast, the new Food Standards Agency set up in 2000, which meets in public, promotes transparency, yet is dedicated to the evidence-based approach, is gradually gaining public confidence in its judgments about food safety.[31]

The limits of public involvement

Greater involvement of the public in science can therefore bring advantages. However, there are also serious drawbacks: there are limits to the useful involvement of lay opinion, there are harmful aspects to populist control of scientific research, and there is a tendency to equate democracy with the prevalence of the will of the majority.

(a) The role of lay opinion

In the previous chapter I questioned the contribution lay opinion,

as advocated by some sociologists, might make to such discoveries as the hole in the ozone layer. Currently, demands for more account to be taken of lay opinion are commonplace. The Phillips report on BSE suggested that we should take note of the views of victims' families.[32] Reports on railway crashes recommend that we should take note of the views on policies for railway safety of those injured or the families of those who were killed. The Stewart report on mobile phones recommended that in future 'non peer-reviewed papers and anecdotal evidence should be taken into account'. In the media coverage of the MMR controversy, the opinions of parents of autistic children were given equal weight to those of scientific experts on MMR and autism.

Of course we should listen to the experiences of victims and their relatives. But victims of railway crashes, however heartbreaking their experience was, do not automatically become experts on how to run a railway. As a result of treating them as experts, a safety system was recommended for the railways in Britain that would cost £3 billion and save up to five lives a year, when ten people a day are killed on the roads.[33] Nor do victims of disease or their relatives automatically become medical experts or experts in healthcare management. People do not become authorities because they are in the news but because they are reliable and reliability does not depend on having their heart in the right place or being well-known but on acquiring opinions by a reliable method, that is with knowledge of, and regard for, evidence. Regarding lay opinion or anecdotal evidence as equivalent to peer-reviewed scientific findings is another legacy of the post-modernist view that science is 'just another story' with no special claim to objectivity.

Again, some sociologists want to see a greater lay input into the assessment of risk, though risk assessment requires expert statistical analysis. (How to deal with public *reaction* to risk requires a very different expertise, including the kind of understanding that lay people may be better able to provide than scientific experts.) This was not, admitedly, the view of the House of Lords committee on Science and Society, which claimed that 'the public

understands risk well, on the basis of everyday experience'.[34] Statistical analysis is not, however, one of the public's strongest suits. Less surprisingly, Green activists, who reject 'the probabilistic, rational approach', also strongly support the view that lay opinion must play a central role in risk assessment.

Clearly, the call for more public involvement cannot be justified by the argument that public opinion must be right by definition and that to assert otherwise is undemocratic. Many campaigning organizations (including consumer groups) frequently cite public belief that GM crops or pesticide residues in our food are unsafe as conclusive evidence. But what basis can there be for the belief that the public has an instinctive grasp of what are mainly technical issues?

Take, for example, decisions about the level of pesticide residues in food that can be considered safe. Deciding whether the concentration of a particular chemical is harmful is a technical process that depends entirely on expert knowledge. First, the toxicological profile of the chemical must be established, hazards must be identified and characterized, then the presence of that compound must be detected in the food in question, then the amount present must be measured, then it must be determined whether this amount will cause harm to human health. The last stage is the most complex and expert opinions will be exchanged, but on the basis of the best available evidence a committee of experts will set the level of acceptable daily intake, which will be many times above the perceived minimum safe level. This normally allows a margin of safety of approximately 100–1000 times for consumers. The experts would all be blamed if they were not ultra-cautious and someone was to be poisoned as a result.

At least this is the rational way of proceeding, but it is not always applied. For instance, when the European Union sought to replace the precautionary limit for total pesticide residues in drinking water by a science-based standard, it abandoned its proposal as 'politically unsaleable' after receiving 12,000 protest letters in a campaign organized by Greenpeace. Regulating risk by listening to activists and complainers has been likened to the

'scream' tradition in government budgeting, with allocation of funds based on the volume of screams.[35]

How can popular instinct, or the special insights of activists, improve on the assessment by experts in deciding safe levels of pesticide residues? Can the public, or the activist, detect the presence of the chemical by osmosis and know how much of it is harmful to health by divine revelation? How can intuition get it right, except by pure accident? If consulted in calm, unemotional circumstances, ordinary people will generally acknowledge that the assessment of risk that depends on technical knowledge should be left to experts. Unless you are a Christian Scientist, a Jehovah's witness, or so addicted to alternative medicine that you reject conventional medicine altogether, you expect the diagnosis as to whether you have a brain tumour to be carried out by a specialist. If you then need an operation, you ask a brain surgeon to operate.

(b) Public control of science

Ten years ago, a consultancy called SustainAbility proposed that companies should carry out a needs test before they proposed a new product or service. The Demos pamphlet 'See-through science' strongly approves. Throughout it refers to public concerns (which it clearly regards as legitimate) that a technology must be 'needed'. Who will control it, they ask, who will benefit? To what ends will it be directed? It is also argued that there should be no more 'science for science's sake'.[36] In effect it wants all new developments to be under popular control.

Such views show little understanding of the history of science or indeed of what science is. Any number of invaluable scientific discoveries and technological inventions, from Faraday's discovery of electricity to the invention of the laser, came to have uses that no one foresaw, or could have foreseen. Should they have been rejected because no 'need' was proved? The call for more democratic control of science soon becomes a demand for political control over research. 'The people', it seems, are to decide what is allowed, because they, not scientists themselves, must determine the purposes for which scientific developments can be used.

Furthermore, scientific research will only be permitted if it is strictly directed at utilitarian ends which 'the people' approve. No science for the sake of science. Scientists and science are clearly too dangerous to be allowed to pursue knowledge for the sake of better understanding of the world around us. Those who favour a needs or utility test seem unaware that to seek knowledge for its own sake is one of the noblest endeavours of mankind.

But why should science be singled out as needing more democratic control when other activities, which could be regarded as equally 'elitist' and dependent on special expertise, are left alone? Why not more democratic control of sport or the arts? Is there also to be a ban on 'Art for Art's sake'? Science, as well as the arts, depends on inspiration and such creative geniuses as Galileo, Newton, and Einstein can fairly be compared with Michelangelo, Shakespeare, and Beethoven.

The scientific process, has never been a democratic one. It is not a search for some convenient consensus based on compromise; indeed consensus is irrelevant in science. What matters is not how many people declare their support for a theory, but whether a hypothesis stands up to critical analysis and whether experiments are reproducible. Nor is the purpose of science, like the aim of governments, to make us feel good.[37] Furthermore, many of the conclusions of science contradict popular beliefs and are as likely to disturb as to reassure. Science is concerned with our understanding of the world, a search for truth that does not depend on whether the public believes it or likes it. Had there been a referendum in Galileo's time as to whether the earth went round the sun or vice versa, public opinion would almost certainly have rejected his view and supported the Inquisition.

Popular, that is political, control over science, over the research that scientists want to pursue or the publication of its results, has always proved fatal to good science, just as state control is the death of art. The scientific revolution of the Enlightenment became possible because the domination of the church was broken. What was true and what people might be allowed to think could no longer be decided by reference to the bible. Galileo's

magisterial protest that the authority of the almighty church should not interfere with the truth-seeking activities of science and his ridicule of the idea that an 'absolute despot, being neither a physician nor an architect, but knowing himself free to command, should undertake to administer medicines and erect buildings according to his whim' is just as valid if the demos (or the think tank Demos) were substituted for the despot. Since pre-Enlightenment days there have been periodic attempts to re-impose ideology and the results were invariably disastrous. Lysenko's ban on 'bourgeois' genetics, for example, held back the adoption of new hybrid seeds that had been developed for Western agriculture, and Soviet science was the loser. German science took a long time to recover from Nazi views that orthodox science was Jewish science and Jews should not be allowed to practise it.

Those who want more democratic control of science will protest that control by democrats is by definition the opposite of control by communists or fascists. However, the demand for more public input into the subject matter of research, whether in the name of democracy or ideology, would still suppress the independence of science. (The demand for more public *finance* of research, as argued earlier, is eminently sensible, just as public support for the arts need not imply public control of what an artist produces.) More public input would in practice mean public supervision to counteract the 'elitist' character of science and make it more responsive to public consensus. This would mean control by committee and the first result would be a bias against excellence and unorthodoxy. Committees and genius do not mix well.

A second result would be insistence on political correctness. After all, one reason for demanding democratic control is the belief that science itself cannot be value-free. Committees would ensure that the values of research are the right values, values that are politically correct. When Green NGOs refer to public opinion, they mean activist opinion. The British Government's choice of lay appointees to various advisory bodies on scientific policy, such as the Agriculture, Environment and Biotechnology Council,

has made the same mistake: representatives from the same NGOs—Greenpeace, Friends of the Earth, Genewatch (an offshoot of Greenpeace), and the Soil Association—appear and reappear like the same stage army in battle scenes of Shakespeare's histories. The Green pressure groups make the most noise and are the best organized. It is most likely that their view of political correctness will be imposed.

The warning signs are clear from American experience, where in deference to public opinion attempts were made to suppress publication and to ban conferences on highly sensitive subjects such as the correlation of criminal behaviour or sexual orientation with a particular gene. Why allow research that may have dangerous social consequences?[38] Research into racial characteristics has always been regarded as particularly dangerous, whereas in fact its results are more likely to destroy than promote racist misconceptions. Even non-controversial assumptions about race are almost invariably unfounded. Those who believe, for example, that black basketball players have greater natural aptitude for basketball than whites, forget that in the 1920s and 1930s basketball was dominated by Jewish players. It was generally thought at the time that they had the advantage that their race gave them sharper eyesight and a special aptitude for quick movement. At about the same period, nearly all American jockeys were black.[39] Political correctness, whatever its more general justification, conflicts with free speech and, in science, can only inhibit the search for truth.

(c) Misconceptions of democracy

Fundamentally, the demand for more democracy in science and its antagonism to 'elitist' science reflects a belief that the people's will must prevail and that expert minorities must serve the interests of the majority. In general that proposition holds good. However, democracy is not simply a question of ensuring the triumph of the people's will. It requires a balance between the wishes of the majority and the rights of minorities, between respect for expertise and the need to ensure that experts serve the interests of the

majority. It is not self-evident that in a liberal democracy the will of the majority should always be decisive.

Take two controversial examples that involve both ethical and evidential considerations: firstly, should the question as to who should receive public health care when funds are limited be decided by the legislature or by more direct consultation of the public? Secondly, should the issue of capital punishment be left to parliaments or decided by referendum, to ensure that the views of the majority on how to deal with the most serious of crimes are properly respected?

In the first case, a widely-based public consultation exercise in Oregon in the USA found that there was strong public opposition to spending limited public funds on AIDS or mental health.[40] In the second, if a referendum were held in Britain, according to opinion polls, it would lead to the restoration of capital punishment. Not everyone would regard the outcome in either case as a triumph for liberal democracy. It is perfectly democratic to argue that since the protection of minority rights is an essential element of democracy, popular indifference to the sufferings of the mentally ill or the affliction of gays should be ignored. In Britain, despite public support for capital punishment, Parliament, after full argument and careful consideration of evidence, has consistently decided against its restoration. Two arguments in particular carry weight with the legislature: contrary to popular belief, there is no evidence that the death penalty reduces the number of murders, and from time to time, even with the most careful legal safeguards, innocent people will be convicted for whom no posthumous pardon or reprieve can restore justice. Of course, when Parliament flouts popular opinion, the majority may always get their revenge, since the people can always vote out of office those who ignore their views.

There are other reasons why automatic acceptance of majority opinion does not always serve the interests of democracy. Public opinion is often fickle. If laws had to reflect popular sentiment at all times some would have to be periodically repealed, reinstated, and perhaps repealed again. A Dangerous Dogs Act was passed in

Britain in 1991 after some well-publicized cases in which children were savaged by dogs. It fell into disuse when sympathy shifted to the owners of much-loved pets ordered to be put down by court decision. Laws that are unpopular when passed can become popular in practice. Thus, legislation against drink-driving and the imposition of congestion charges on cars in London were both introduced in the teeth of popular opposition but later proved popular. Sometimes, therefore, governments are justified in ignoring the popular will and giving a lead.

In fact, there are many decisions that affect people's lives profoundly that governments delegate to groups of experts. In the Euro-zone, in Britain, and in the United States crucial decisions over the future of the economy are delegated to central banks whose boards are unelected and which consist exclusively of economic or banking experts. Yet it can be argued that decisions on monetary policy are no more technical, or less amenable to lay challenge, than issues such as the setting of minimum safety levels for pesticide residues in food. Universities are elitist organizations that select entry on the basis of talent and ability to profit from further education, although most countries seek to maximize the number receiving higher education. Professors are not elected by popular vote. Judges who decide important issues of justice are not elected, at least not in Europe, but appointed for their expertise and other judicial qualities. The more 'democratic' American system of electing most judges has few admirers outside the United States. Not the least of its demerits is that it politicizes the judiciary. For instance, President Ronald Reagan's appointment in 1986 of William Rehnquist as Chief Justice of the US Supreme Court was made with the express intention, since fulfilled, of reversing two decades of legal liberalization.

It is true that we leave it to a jury of ordinary citizens to decide if their fellows are guilty of serious offences, but more complex issues of civil law are left to an expert judge. Britain abolished the role of juries in civil proceedings long ago, except in, relatively rare, libel cases. (The general view among barristers in cases where there used to be a choice between a trial by jury or by a

judge sitting alone, was that if you had a bad case, you chose a jury; if you had a good case, you chose a judge.) Critics of the American system, where juries still decide issues involving complicated technical and scientific evidence in patent law and negligence claims, argue that juries in civil cases often reach decisions, both in their verdicts and the damages awarded, that can only be described as perverse. In patent cases their verdict is widely regarded as a lottery. In claims of medical or environmental negligence, sympathy for plaintiffs, or antipathy towards rich defendants, often seems to outweigh regard for evidence. In her book *Science on trial*, Marcia Angell, a former editor of the *New England Medical Journal*, has described the perverse verdicts reached by juries in cases about breast implants. Huge damages were awarded although claims for negligence were based on non-existent, scientifically unproven, links between silicon implants and connective tissue diseases such as rheumatoid arthritis.[41] The experience of American juries in civil cases is not a convincing argument for giving lay people more say over complex scientific issues.

In conclusion, science has been attacked by postmodernists and relativists because it represents reason and reason has gone out of fashion in parts of academia. The call from influential Green lobbies that science must be more democratically accountable finds a sympathetic response from the public because health scares (and some public mismanagement) have made the public suspicious of experts in general and of scientists in particular. Some forms of greater public involvement with science may reduce suspicion and improve understanding, but public distrust will not be dispelled by abandonment of the uncompromising commitment of science to the pursuit of truth or by questioning its objectivity. '*Nullius in verba*' is the motto of the Royal Society: On the Word of No One. It is one of the most important messages the Enlightenment brought to the world.