THE DEMORALIZATION OF SCIENCE

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'*[W]henever society is in trouble it begins to moralize*'. (1)

The title of this paper may seem perverse. It could be argued that both science and the scientific establishment today are more moral – or at least conscious of the need to become so – than at any previous time in their history. It has been suggested that the old paternalistic formula labeled DAD (decide - announce - defend), is gradually being replaced by a more inclusive approach that seeks to engage with the public on science and scientific decision making issues at all levels.

Calls for greater inclusion of public views or 'values' within the scientific process have come from many quarters including, in the UK; the Royal Commission on Environmental Pollution (2), the House of Lords (3), the Parliamentary Office for Science and Technology (4) and the authors of an influential Economic and Social Research Council publication (5). Such inclusivity, it is held, will make for ideas and institutions that are more people-centred and ethical in their outlook.

More recently MPs on the Commons Science and Technology Committee announced that they were to examine the Royal Society over allegations that Britain's top scientific body is too 'elitist' and 'out of touch' (6). A plethora of new ethics committees, commissions and codes of conduct have also been established to assess both the content of the science that is carried out as well as the purposes of those who undertake it.

Science, it appears, is breaking out of a reductionist paradigm to examine more global, holistic processes pertaining to its interface with society. Parenting, pollution and public health form as much an element of the content of scientific investigation today as do genetic engineering, inorganic chemistry or particle physics. These, more social and ethical orientations, are held to be both good for society and good for science.

But the consequences of this sea-change in outlooks and attitudes has yet to be assessed. Some have questioned the purported effectiveness of negotiated dialogic processes (7). Others have argued that these changes have been driven in large part by fear and confusion rather than confidence and direction. If so, then they may end up contributing to a more widespread disorientation and demoralization in science and society, rather than generating a new sense of purpose and trust.

Science and Society

Technological change, enhanced longevity and social development are all testament to the tremendous impact science has had upon society. In addition modern societies are necessarily dynamic and science is often at the forefront of upsetting the status quo. But – even when its benefits are questioned – the emphasis usually given as to the importance of science for effecting social change is one-sided (8).

Science, as well as transforming society, is itself a product of society. Newton understood this when he wrote in his famous letter to Hooke of 1676; 'If I have seen further it is by standing on the shoulders of Giants' (9). Science comes with a history. Its advances, as well as being limited by material reality, are circumscribed by the state of the society it develops within – including its ambition and imagination – or lack of these.

The world of antiquity yielded many intellectual insights, but constrained by its social structures these proved to be of limited practical consequence (10). Then, from 400 AD to 1000 AD Europe was, in scientific terms, a backwater. Some of the high points of Greek science were kept alive and developed in the Arab world but the feudal order was largely static, positing a relationship between humanity and nature that was conceived as fixed for all eternity (11).

It was the Italian Renaissance that first began to change and then challenge the old order. Built largely upon the development of trade, it raised new demands on individuals and society, encouraging invention through the merger of intellectual activity with practical needs. With the discovery of America in 1492 trade routes began to shift to the Atlantic seaboard. England, Holland and France now began to accelerate as important centres of innovation driven by their own commercial interests.

Within a few centuries in addition to the development of the use of perspective in art and the construction of Brunelleschi's Dome in Florence, the world had been circumnavigated, its largest continents discovered, the compass, telescope and printing press invented. The world would never be the same again (12).

By 1660, when what was to become known as the Royal Society was founded in London, the ecclesiastical domination of the Holy See in Rome had been broken, whilst the trial and execution in 1649 of the monarch, Charles I, was fresh in people's minds. Accordingly, its founders adopted the Latin phrase; 'Nullius in Verba' ('On the Word of No One'), from the Roman poet Horace – the son of a freed slave – as their motto.

This was a bold statement of intent, as well as reflecting the political mood of the time. The champions of the new philosophy wished to emphasise the 'Experimentall Learning' that was central to their outlook – but also their reluctance to take any pronouncement upon trust. The dogma of Pope and King once dispensed with, acquired insight could henceforth truly aspire to replace received authority (13).

Science now formally established itself as a new source of authority. As well as delivering remarkable achievements it was to be a practical battering-ram with which to challenge perception, prejudice and power. But this was a reflection and pronouncement of faith in humanity itself rather than merely in science. Social development had raised human expectations as to what was possible. It had given humanity confidence in the power of its own reason – a factor that then proved of significant importance to the development of science.

The Scientific Revolution represented the triumph of rationality and experimentation over the superstition, speculation, diktat and domination that had gone before. It was more than simply an advance in scientific knowledge – it was part of a wider shift in attitudes and beliefs. The Scientific Revolution was the product of dynamic social progress, as well as becoming an essential contributor to that progress. But just as the initial dynamic behind science was social change, so social change, or more particularly the lack of it, could circumscribe it too.

The vision of nature and humanity now developing, was driven by aspirations for freedom and equality. These concepts represented the needs of a new elite – the commercial, and later industrial, capitalist class. But as such, society would now encounter new constraints, both from the on-going and vociferous rejection of the old religious and monarchical orders it had supplanted, as well as from the inherent limitations of this new social system and the particular world view of its proponents.

From 1789, at the time of the revolution in France, and later due to a growing threat from the dispossessed, promises of freedom, equality and progress came to be seen as highly problematic as they highlighted the failure of society to live up to those promises. The new establishment, in addition to social and political reformation, now needed to circumscribe the claims and effects of scientific enquiry, reason and progress upon society.

A model of science developed known as positivism, which consciously sought to facilitate the restoration of order (14). Reflecting the simple mechanical processes emerging in industry, it posited that science operates on objective, absolute and ascertainable facts connected by rigid links of cause and effect (15). But this view of a clockwork universe with its uniform rules and truths being revealed by pristine individuals disinterestedly recording the underlying workings of invariable natural laws does not stand up to simple scrutiny.

It was a model of science still worthy of esteem – but robbed of any association with historical change and development. The link between the advance of science and that of society was lost. Many of today's confusions about science stem from the misapprehension that this approach, rather than being a limiting constraint, somehow continued the Enlightenment tradition.

Through the Victorian age a compromise was effectively reached whereby science could still develop – quite rapidly at times – but it no longer systematically challenged the old authorities. Darwin's secular universe cohabited that of the bishops but did not seek to tread on their patch. Scientists were held in high regard, but science was now decoupled from the political aspiration to transform society – although its consequences continued to do so.

Over the course of the twentieth century, philosophers of science gradually placed greater emphasis on the uniqueness of individual experience. This corresponded intellectually to the tremendous changes, impasses and uncertainties they found themselves caught up in. Two world wars, a depression and continuing poverty and conflict in the developing world generated doubts as to the possibility of universal human progress and a 'fear of the future' (16).

Accordingly, those seeking to defend science – including many in what we might now consider to be the scientific establishment – sought to separate it further from social and political transformation by increasingly placing it into a narrowly technological or reductionist straitjacket. Harnessed to the pursuit of American security through the Manhattan project and the Apollo missions, science also created opponents for itself amongst its old allies. The political left, that had traditionally supported the liberatory potential of scientific advance, now came to view it with increased suspicion.

They argued that aspiration itself, rather than its failure – as evidenced in the collapse of confidence in social progress – had turned nature into 'mere objectivity' for humanity (17). This attitude could then be found reflected in the subordination of people and countries and was increasingly facilitated through the use of instrumentalist technologies. Science was seen as the amoral steamroller of a dispassionate new modernity crushing communities and tradition.

What is so poignant about the modern disenchantment with science is that it has emerged at a time when its achievements are without precedent. But without social progress the direction and purpose of science has become uncertain and once science had slowed down in relation to what it could do, society began to lose faith in it. Behind the current crisis of science, lies a collapse of confidence in humanity and the possibility of social progress.

Risk and Morality

Clearly, science is far from being value free. It invariably reflects the dominant values of the historical period it finds itself in. But if, as Marx would have it; 'The ideas of the ruling class are in every epoch the ruling ideas' (18), then it is worth reflecting upon what might happen to a society within which the establishment no longer holds distinct ideas and values. The unprecedented convergence of the political left's loss of faith in science and social transformation with the political right's traditional misgivings have lent themselves to a pessimistic outlook leading to the rise of an exaggerated risk consciousness (19).

Despite being two sides of the same coin, risk is now continuously emphasised over opportunity and as a consequence safety and precaution have become new organising principles. Although the world has become more complex and the pace of change much faster, the perception of losing control has been accentuated by a society that rejects uncertainty and change.

The convergence of left and right and the ensuing depoliticisation and demise of political debate has also coincided with and facilitated the breakdown of many forms of social organisation. With the decline of families, neighbourhoods, communities, religious congregations, informal associations, trade unions, political parties or other institutions to be part of, it has become far easier for people's subjective impressions of the world to hold sway (20).

Some have argued that old style moral panics driven from the top-down with a view to cohering society appear to have been replaced by more nebulous social anxieties involving a wider range of public interests and constituted by a vast number of free floating threats, 'with new threats always lurking in the background' (21). Unsurprisingly therefore, the authorities increasingly seek to provide assurances against those they believe to be self-serving or incautious, from profit-seeking multinationals down to feckless individuals.

It is commonly assumed that the media have a significant role to play in such matters by making us more aware than previous generations of the various hazards we face. Certainly, in the absence of political debate, the media do have a more prominent role, but what is often overlooked is the extent to which it is politicians, regulators and even scientists themselves who – charged with ensuring our safety – have now adopted a more ambiguous attitude to the value of scientific evidence as against public opinion.

Our heightened awareness of risk now latches on, not just to new products and processes, but also reinterprets age old activities that were once unquestioned. The sheer range and number of issues now perceived as risky – from beef to bullying and from sex to sun-screen lotions – suggests an underlying process beyond their intrinsic properties that we should seek to understand. It would appear that such problems are in abundant supply, limited only by our imagination.

Social and institutional erosion is often presented in an uncritically positive manner as a celebration of identity, choice and personal preference. Patronage and conformity have, quite rightly, been consigned to the past. But there is now a danger that the old culture of unthinking deference will be replaced by an equally incapacitating culture of unnecessary fear. Without the discipline of, and an active engagement in broader concerns, individuals have also been left incredibly isolated. This social and political disengagement has been reflected in and further fed public disenchantment with science.

This mood of cynicism has in turn driven official concerns. But rather than recognising that a healthy scepticism in science is born of an active body politic, there is now a conscious attempt to artificially restore trust in science and scientists through enhanced participation with a view to relegitimising democratic processes across society. Foremost amongst the new mechanisms proposed to regulate society and attenuate our fears has been the precautionary principle. This latter suggests that in the absence of definitive scientific evidence to the contrary, measures to protect the environment or human health should be taken whenever any threat of serious or irreversible damage to either may be present.

Critics have countered that, as scientific certainty is never possible and that irreversibility is inevitable, the application of the principle is a recipe for paralysis. Further, defining the extent of evidence necessary to justify concern, as well as what measures should be invoked and by whom, are considerations lending themselves to significant political, commercial and non-governmental manipulation. Nevertheless, due to the inflated perceptions of risk, the principle is set to play an ever-increasing role in scientific decision-making.

Unsurprisingly perhaps, under permanent attack and held open to constant questioning, many institutions and experts now seem to lack self-belief, or even a clear vision or purpose. This has led many into overzealous reactions to events or perceived fears. Policy reversals appear increasingly commonplace, thereby sending confusing signals to an already sensitised public.

The Slovenian philosopher and psychoanalyst, Slavoj Zizek, has characterised ‘endless precautions’ and ‘incessant procrastination’, as ‘the subjective position of the obsessional neurotic’. Far from indicating a respectable ‘fear of error’ he suggests, this approach ‘conceals its opposite, the fear of Truth’ (22). But a pursuit of truths, however temporary, lies at the very heart of scientific inquiry. Scientists do not just record and measure, they assess, infer and prioritise as well as experimenting and transforming. It is these active and judgemental modes that are most at risk of being dissolved and lost today.

Ironically, to the extent that social life has increasingly become reorganised around risk, it has recreated a limited sense of moral purpose (23). By using the technical language of risk assessment this new morality does not announce itself as such. Whilst not preaching in an old fashioned way, the new prescriptions for personal and professional conduct administered by unaccountable agencies and regulatory bodies are no less intrusive than the moral codes of previous generations. Unlike scientists however, these new bodies have a more direct relationship to the state and by encouraging caution and self-limitation they set themselves against the very motive force of science – a desire to explore and experiment.

Equivocation and Inclusion

Nowadays, even when the scientific evidence is fairly categorical, scientists have learnt to be much more equivocal about the outcomes of their research. Emphasis is increasingly placed upon the uncertainties rather than the potential benefits of products and procedures. This has occured because of the onslaught of calls for scientists to show 'more humility' than in the past. It is also due to the perceived need to incorporate 'lay and local knowledge' as well as 'wider social interests and values', as identified earlier (24).

Such developments had been evolving steadily over the previous decades but were catalysed to a new level by the BSE (bovine spongiform encephalopathy) debacle of the mid-1990s. They were then consolidated through the process of preparation and prompt endorsement of *The Report of the BSE Inquiry*, also known as the Phillips report (25). In the interim a number of other major risk episodes achieved public prominence and notoriety, including the Stewart inquiry into the safety of mobile phones, the release of genetically modified organisms (GMOs) into the environment and, more recently, the furore over the MMR vaccine.

The Phillips report marked the acceptance of the precautionary principle as a central tenet of future scientific policy making within the UK. Irrespective of which formulation is used (26), the precautionary principle has the consequence of emphasising worst case scenarios thereby encouraging a tendency to overreact to events and, more insidiously, elevating public opinion over professional expertise and subordinating science to prejudice. Accordingly, debates over 'strong' or 'weak' versions of precaution, or over whether it is a 'principle' or merely an 'approach' fall wide of the mark (27).

BSE is remarkable for acting as the basis and justification of much that has happened since, in many other, often unrelated areas. Yet, to this day both the evidence and the outcomes remain essentially inconclusive. In the history of the relationship between humanity and nature this episode is unlikely to merit more than a footnote. Domesticated animals have been a potent source of infectious disease before, with measles, mumps, whooping cough, smallpox and tuberculosis all crossing the species barrier at some stage with intermittently catastrophic consequences and mortality rates of around 90 percent (28).

The link between BSE and variant CJD (Creutzfeldt-Jakob disease), a degenerative brain disorder in humans, has yet to be proven and what little evidence there is suggests there to be no connection. It is almost as if, desperate in their attempts to show the public their willingness to act, both the government and many leading scientists sought to pander to the popular mood in the belief that this would restore some kind of trust. Thus, since neuropathologist Sir Bernard Tomlinson announced in December 1995 that he had stopped eating hamburgers and health secretary Stephen Dorrell announced a possible link between BSE and vCJD to the UK House of Commons in March 1996, concern about contaminated beef has been rife.

Significantly, public concerns about BSE and its transmissibility to humans bore little relation to its actual incidence. The Phillips report itself recognised that actions taken by Ministers as early as 1988 had – if not necessarily being comprehensive or completely enforceable – stemmed the epidemic. Thus the ban on ruminant protein in cattle feed led to the number of BSE cases by year of birth falling from a peak of 36,861 in 1987 to 1 in 1996, the year of the panic (29). Despite early predictions of as many as 500,000 cases of vCJD per annum there have to date been approximately 120 cases with evidence of a tailing-off. It is also not entirely evident that all of these can be directly attributed to eating beef.

In a remarkable article in the British Medical Journal on 13 October 2001, George Venters a public health consultant from Scotland queried much of the prevailing orthodoxy (30). Using the standard epidemiological criteria of plausibility, strength of association, consistency, quality and reversibility – analytical tools established by Austin Bradford Hill and Richard Doll's famous observations on the link between smoking and lung cancer in the 1960s – Venters questioned much of the evidence for a link between BSE and vCJD.

If anything, experiments have suggested there to be a barrier between the transfer of prions from cattle to humans, whilst the incidence of vCJD would have been expected to rise anyway since systematic monitoring for it first started in 1990. The authors of the Lancet article that first described the new variant recognised this latter point, noting that the 10 index cases 'would not ordinarily have been referred to our Unit' (31).

Venters has suggested that there was 'a process of hypothesis *confirmation* rather than hypothesis *testing*' and further that 'evidence that has been awkward or contrary, has either been played down or just outright ignored', accusing scientists and health experts of falling for 'the belief that multiple pieces of suspect or weak evidence provide strong evidence when bundled together'. 'It is' he continues, 'almost like they made up their minds about a link between BSE and nvCJD and so they set about confirming it' (32).

Irrespective of the evidence then – or the lack of it – both government and scientists reorganised their operations according to the worst predictions. *The Report of the BSE Inquiry* is quite explicit as to this, arguing that despite the lack of evidence for a link between BSE and vCJD, 'The importance of precautionary measures should not be played down on the grounds that the risk is unproven'. Certainly BSE acted as the catalyst to a major restructuring and policy reorientation both at the heart of the European Commission and within the UK and the new approaches developed therefrom have already begun to encroach into other areas (33).

But such an approach will itself have a dramatic social cost. As the US risk expert Chauncey Starr argued in a recent article; 'some of today's hypothetical fear-based issues could develop into long-term doctrines that will be politically enduring, difficult to modify, and seriously destructive', comparing these to historical situations 'arising from the amplification of a minor popular concern into an apocalyptic dogma' (34).

One of the other distinctive features of the BSE inquiry was the prominent role it gave to the relatives of the victims of variant CJD. Though this innovation attracted little comment and less criticism, it was a significant development, reflecting the preference for sentiment over rationality. It is not at all clear how the experience of losing a relative yields a privileged insight into the nature of a disease, or any great wisdom into how to prevent or treat it. While official recognition of the families of victims reflects public acknowledgement of the particularly distressing effects of CJD, their involvement in the wider aspects of the inquiry implicitly devalues scientific, clinical – and even political – expertise.

These two key features – an appeal to worst case scenarios and the inclusion of lay views – were paralleled in the Stewart inquiry into the safety of mobile phones, to quite a striking degree. In a soon to be published comparative study of national responses to perceived health risks from mobile phones, researcher Adam Burgess notes that; 'Almost by definition, what is a risk 'issue' is itself determined by the extent and character of government reaction', continuing; 'There is also a more particular sense in which official risk responses potentially animate and cohere diffuse anxieties' (35).

According to this analysis, far from heading off potential accusations of complacency through a proactive strategy to 'keep ahead of public anxiety' (36), the UK government's precautionary response through the establishment of the Independent Expert Group on Mobile Phones led by Sir William Stewart, actually stimulated risk concerns, which increased subsequent to the inquiry. This is, according to Burgess, because 'even balanced public information on negligible risks tends to increase anxiety, on the assumption that *there must be something to worry about if the government is taking action*'.

In a manner akin to the Phillips inquiry, Stewart and his panel acknowledged that 'the balance of evidence does not suggest that mobile phone technologies put the health of the general population … at risk', but nevertheless the study called for a £7 million programme of further research and for leaflets to be included in future purchases of mobile phones warning of the possible risks. This latter led one commentator to conclude that 'in its rush to be open about communicating risk to the public, the government has simply forgotten that there was no risk to communicate' (37).

Whilst not identifying any risk, other than that of using a phone whilst driving a vehicle, these leaflets suggest that the best way to reduce risk is to use the phone less. They also advise taking note of the specific absorption rate (SAR) of phones, which measures their heating effect. This is despite all sides to this argument accepting that such heating is not the problem. It would suggest that recording anything that was easy to measure became the key concern irrespective of the fact that it did not relate to the still to be demonstrated 'non-thermal' effects.

Again, the conclusions of the Stewart inquiry make remarkable concessions to the need to incorporate perceived public concerns and prejudice. Following the recommendations in the report it will now be the case that future research will be required to take account of non-peer reviewed and anecdotal evidence. Indeed, the inquiry itself went a considerable way to acknowledging and accommodating to such concerns by extending its remit beyond a review of the latest scientific knowledge on mobile electromagnetism to the non-scientific terrain of concerns pertaining to the siting of masts or base stations.

In a similar fashion the latest Royal Society study into the safety of genetically modified (GM) crops, elevates these same two features – the exaggeration of risk beyond the available evidence and the by-now almost mandatory concession to the inclusion of public concerns within such assessments. Despite the report finding that 'there is no reason to doubt the safety of foods made from GM ingredients that are currently available, nor to believe that genetic modification makes food inherently less safe than conventional counterparts' the Royal Society gave prominence to new hypothetical concerns in an attempt to improve its standing in the eyes of the public. This prompted a recent review of the study to comment that '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' (38).

Despite some of the members of the working group that produced the report raising their concerns as to the 'extraordinarily selective' media coverage it elicited, it is the case that this emphasis was triggered by the Royal Society's own press release, which was in turn influenced by the hesitancy of the report itself. It would appear that the scientists concerned now want to have it both ways, saying to fellow scientists, government and industry that there is no reason to think that GM is unsafe, whilst assuring the public that safeguards should be strengthened. This incoherent approach is far more likely to backfire than reassure and recreate the trusting relationship they desire.

Many other examples of equivocation and obsessions with the inclusion of assumed public concerns by senior government officials and scientists abound. They are now the norm rather than the exception. Cases range from the Royal Society report into 'Endocrine disrupting chemicals (EDCs)' (39), through the European Commission's restrictions on phthalate plasticisers (40), to the official inquiry into the Bristol Royal Infirmary children's heart surgery unit (41). Variously they cite 'purported effects' or 'public concern' as their instigators before exploring the limited evidence available as to any real problem and concluding with some kind of cautionary comment or call for public engagement.

The trend towards encouraging the public to decide on all matters scientific reached its logical denouement with the refusal of parents to allow their children to be vaccinated with the MMR (measles-mumps-rubella) jab. Triggered by the exaggeration of a bold research paper that proposed a link between the vaccine and autism, the public understandably demanded to be able to opt for separate inoculations, which were not readily available through the UK National Health Service. Whilst highlighting the vast differential between a national immunisation programme and an uncorroborated study based on a dozen cases, the fact that if the measles element of MMR was problematic then a separate measles jab might be too was rarely questioned.

Instead, hoist by its own petard of criticising scientists and the medical profession, as well as promoting the assumption of personal choice in a health-care market, the government were faced with the first significant outbreak of measles for many years in south London where vaccination rates had fallen significantly below those that could guarantee a herd immunity (42). The government then had to set about educating parents as to the real risks and issues involved, often in an exaggerated manner, despite having done much to undermine public confidence in science in the first place.

But one of the real problems facing both government and scientists today is that the public tend to be bombarded with too much, rather than too little, information. And, having projected their own insecurities onto the public, it is not at all evident that the latter will trust reassurances coming from any proposed alternative system of regulation any more. The promotion of the virtues of the risk society as a new moral framework for the 'third way' society would appear to have its limitations.

Values and Costs

Whilst science is necessary to inform democratic decision-making within society, it is not in itself democratic. The contemporary preoccupation with the need for 'public participation' within scientific decision-making threatens to erode this distinction and demoralize scientists.

Rather than embracing uncertainty and change as did previous generations, today we appear to reject them and highlight the risks. What has really changed is not so much the scale of the problems that we face, but the outlook with which society perceives its difficulties, both real and imagined. These issues, whilst different, cannot really be described as greater than those facing previous generations, nor are they uniquely insurmountable. But our collective will and imagination to resist and overcome them appears to be much weaker.

The challenge to the old elites of society is possibly understandable but the form it has taken – an attack on expertise per se – is inexcusable. Dependent on the particular inquiry concerned this challenge has been expressed in various forms, though largely reflecting a similar language. The BSE inquiry condemned the 'culture of secrecy in Whitehall', whilst the Bristol inquiry under Professor Ian Kennedy attacked 'club culture' within the medical profession and outside the world of science the Macpherson report into the murder of a black teenager, Stephen Lawrence, in a south London street challenged a 'canteen culture' within Britain's police force.

Irrespective of these particular labels, the specific prescriptions have all proven to be remarkably similar – the need for greater openness and transparency through the inclusion of members of the public or public 'values' into the decision-making process. But whilst consensus-seeking may go down well amongst woolly-minded bureaucrats in Whitehall and Brussels, it is a process largely unsuited to the needs of scientific inquiry.

Indeed, whilst civil servants, doctors and scientists have been denigrated, what has been less discussed is the extent to which alternative sources of authority have accordingly been elevated. It is ironic that those who would not trust scientific expertise now have to invest their faith in a new breed of expert, who are not required to submit their work for peer review or other ways of establishing the authenticity of their claims, and whose pronouncements are not open to any kind of experimental verification whatsoever.

What's more ethics committees and special agencies have their members directly appointed by the UK government and are thus even less accountable to the public than politicians. While it postures as radical and democratic, this outlook invites a more authoritarian style of government over a more fatalistic, nervous society.

Clearly, there is a tension between those who wish to include the public in order simply to keep them informed or on-side (43), as opposed to those who genuinely hold that the public voice is a missing element for establishing scientific objectivity or accountability. This latter view appears to present a narrowly empirical model of science whereby truth, or an approximation to it, is to be reached through an averaging out process of competing interested parties.

One significant difficulty for all concerned is as to how to include an increasingly disengaged public into such processes. The claims of various advocacy groups to being representative of this wider audience has increasingly been questioned (44). At best such bodies have a passive membership comprising a few percent of any national population (45). Whether directly belonging to such a lobby, or being a hand-picked and carefully vetted outsider, such an approach remains broadly unsatisfactory, especially as there appears to be a remarkable convergence of views between officials presiding over such processes and those of the public who participate within them.

To get around these limitations, there has in recent years been much greater emphasis placed upon the use of quantitative research, such as polls and surveys, as well as qualitative research, including more in-depth interviews, focus groups and other stakeholder dialogue forums. The danger here is well documented. It includes projecting views and values through question-framing and/or selectively finding those selfsame views and values amongst the responses. Even identifying ‘what is not being said’ (46) requires prejudicial priorities amongst interviewers.

Hence, there is a great danger that, rather than recording the wishes of the majority, the inclusion of public views or ‘values’ merely records a small subset of these, which researchers find reflected back at them. Indeed, in the past, much of this research would have been called public opinion. Opinions are open to being challenged, interrogated and altered. Labelling these as ‘values’ seems to have been a conscious attempt to set them apart from further inquiry.

Ironically, in many instances, it is now corporations, governments and the scientific establishment itself, which appear increasingly willing to take on board public concerns into the decision-making process. The reasons for this may be varied, including a misguided attempt at obtaining greater stability despite the likelihood that policy determined according to popular prejudice will be far more precarious. Another clear and perverse motive or outcome is an unwillingness or inability to be held independently to account. This reflects an abdication of leadership and responsibility and a preference to deflect, diffuse, shift or share the blame should things go wrong in the future (47).

Adhering to an increasingly cautionary and restrictive approach under the banner of inclusion may also preclude wider social changes that require ambition and experimentation.

It is precisely because the appearances of nature are deceptive that we need the methods of science – which commonly yield findings which contradict popular impressions and established traditions. Science is not about making us feel good. Many of its findings can be disconcerting, yet we owe much to those who took a stand against public perceptions and challenged prevailing prejudices. These principles are jeopardised by the philistinism of the contemporary political elite – a trend towards which many scientific authorities are, unfortunately, acquiescent.

Far from adding to the richness of scientific inquiry, lay views tend to focus on the immediate, rather than a more mediated or critical appreciation of available evidence. The ability to understand or transcend issues requires rather more diligence and discipline than inclusion and inspiration. To relegate the experienced and considered judgements of scientists to being just another point of view suggests that they merely represent a form of sectional interest. This forces an emphasis on quantity over quality in science that allows for manipulation through subjective impressions and vested interests.

Re-labelling private views as public ‘values’, and insisting that these should be included into the policy-making process simply aggrandizes what remains personal opinions. These dilute the science, denigrate the scientists, and both patronize the public and pander to the conceit of those who claim to represent such ‘values’. The elevation of opinion over professional expertise subordinates science to prejudice. Official recognition of these perceptions and beliefs then implicitly devalue the insights acquired through detailed experimentation and detached consideration. This undermines the confidence of scientists and marginalizes excellence.

Far from being egalitarian, this is an affront to a real democracy based upon reason. Real exclusion begins when prejudice or opinion are taken to be a sound basis for decision-making. Tragically, it would appear that many individuals and institutions within the scientific establishment have themselves abdicated their responsibility to judge and be criticized. Far from relieving them from pressure, this paralyzing diffidence will only further discredit and demoralize their profession.

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