3th International Conference on Public Communication of Science and Technology (PCST), Montreal,Canada,10-13 April,1994

STATE SHUTTERS ON SCIENCE: HOW SINCERE ARE WESTERN LIBERAL DEMOCRACIES ABOUT PUBLIC UNDERSTANDING?

Ros Herman

Head of Science Communication, Imperial College, London, England

Abstract

Governments sponsor a wide variety of scientific research covering topics from basic science through health and safety and environment to nuclear and defence science. A major problem for science communicators dealing with is the tendency of governments to construe most science and technology issues as "technical", i.e., best decided on by "experts". In this they differ from other public policy issues such as housing, health service provision, foreign policy, education, which are often widely discussed in a wide range of fora. Such discussions take into account and are enriched by the personal experiences of a wide range of individuals. The same cannot be said of scientific topics. Here the key players are "experts" on "scientific" topics who often become part of the internal policy-making process or even of government itself. They are rarely publicly accountable and often completely muzzled by the state. In this situation, the media are almost the only source of information for the public on scientific issues. One often considered a legitimate vehicle for science, but tends to be vilified – often by scientists themselves – when they participate in controversies rather than merely "informing" the public of scientists' results.

Now we are seeing states – individually and through supranational organizations such as the European Union – sponsoring and actively supporting "public understanding" of and involvement with science. Is it really possible to reconcile these two "stories" about the way the public should confront scientific knowledge and expertise? This is a particularly important question for science communicators. They mediate the relationship on a day-to-day basis. They are the ones who suffer when editors, on behalf of their readers, turn down their stories because they rarely "matter" in the sense of influencing policy and practice. And they are the ones the scientists, however unforthcoming with information, hold responsible when the public is unaware of their pioneering work.

1. Introduction

Why are the people – or their representatives – never asked about science policy decisions?

Why is there such a low level of scientific literacy?

Two questions or one?

Let me ask you a question. How much do you know about cars?

A lot – or nothing, like me? Let me ask you another question. Have you ever bought and driven a car? Would you think the two answers might be related?

Another question. How much do you know about washing machines and the various parameters that define them? Again…

All right, let's get more technical. How much do you know about treatments for asthma? Have you ever suffered from or treated asthma? OK – last question coming up.

How much do you know about radioastronomy? You can figure out what's coming next – have you ever had occasion to buy or operate a radiotelescope? Few could claim to have done this for themselves. Yet actually with very few exceptions, all of us, as taxpayers, have done this.

Moreover, we have all as taxpayers backed nuclear weapons that we know virtually nothing about (not to mention nuclear testing).

The difference is that we get to choose and live with our cars and washing machines and all their quirks and faults; we get to live with our asthma, or that of our patients; but we never get to set hands on the radiotelescope, and we see the results of it only indirectly – say, through the media. Still less do we get to say that we never wanted it in the first place.

As a public policy issue, science is one of the last to come out of the closet in the current environment where we believe that we have the right to know about and be consulted on all aspects of the life of the state and what it does with our taxes.

What I want to argue in this paper is that for people to want to come to grips with scientific ideas and their potential, it is necessary to establish some clear mechanisms by which people can have an impact on science and what it is doing or might do to and for them.

One example of a scientific system that is driven by public demand is the American medical research system. Here – though this may change soon – the customers for health care, and their virtually unlimited insurance purses – have driven a research system that has come up with some wonderful results and a lot of very expensive technology. Public sector funding for research has essentially underpinned the work. Whether the benefits have accrued in the way the citizens would have democratically chosen is another matter. It is difficult to see how to promote interest in the latest developments in heart surgery to those never likely to be able to benefit from it.

Again, it is difficult to see why an unemployed farmhand should be inspired by the latest jump in the speed of supercomputing.

If anything, the march of science and technology are likely to seem to be a threat – particularly against jobs – against which the individual citizen is impotent. Indeed, by funding research from taxes, the citizen is being made party, perhaps, to his or her own redundancy. For all our talk of the "culture" of science, we have not been able to develop an image of it that can be seen to be consonant with a humanitarian or even democratic culture.

2. Biotechnology and the environment in the public domain

In the development of genetic engineering and biotechnology we see the assumptions of these knowledge relations breaking down.

After the difficulties with nuclear power and weapons and the failures and unforeseen consequences of energy policies, the public is no longer willing to leave

such policy areas entirely to the sciences. However, an effective model for the mediation of open consensus formation in this area has not emerged.

Not surprisingly, in view of the rhetoric of the links drawn in industrialised countries between science and industry, people tend to hold industry and, to a lesser extent, scientists responsible for environmental problems.

Rio headline

In a 1990 opinion poll commissioned by the Daily Telegraph, 10 per cent of a randomised sample of British adults held scientists to be the group most responsible for current environmental problems. On the top of the list were industrialists with 45 per cent thinking them most to blame, and politicians only just beat the scientists with 12 per cent.

Many people are clearly not aware that the many scientists are charged by the state or take it upon themselves to act in a regulatory role. Where the cogency of public interest is forcefully demonstrated, the scientists can find themselves lined up on the side of drafting legislation to minimise risk. Often they do this on behalf of the state. This association, this high task of advising the government in the formation of policy and legislation, usually excludes them in itself from entering the public domain with their view and information: publication of the "technicalities" of their advice is in gift – often withheld – of government (Everest, 1990). Similar restrictions affect the ability of scientists to "go public" in areas where commercial or security interests are again held to necessitate secrecy. The principle of science as "public knowledge" – said to be vital to the progress of science, because of the essential role of scrutiny, criticism and argument in regulating the quality of scientific work (Ziman, 1968 p. 8-9) – goes completely by the board.

But in the public perception it is not the state (or industry) that is being secretive: it is the scientists. In the poll mentioned above, 35 per cent of respondents agreed that "scientists are very secretive, even more than the 28 per cent who thought that scientists are bad at communicating their work".

Whether it is because of their associations or their reputation, the scientists are not even trusted when they do enter the public domain. Of 14,000 people surveyed

throughout the European Community, only 16 per cent considered school or university to be the most reliable source of information on biotechnology/genetic engineering. Whom do they trust? 30 percent place their faith in environmental organizations, and another 26 per cent in consumer organizations (Commission of the European Community, 1993, p. 85).

3. The technocratic agenda and the state/science conspiracy

Let us look at how this situation arose. I want to confine myself on this particular occasion to the domain of curiosity-oriented science – in other words the generation of knowledge, rather than the questions of how it is applied, although the notion that what is known will automatically be applied unless strenuously resisted, will of course be important.

Since the war, Western liberal democracies have invested increasingly in R and D. They have done this for three reasons: because of the perceived importance of science and technology in the defence and welfare state and other public policy issues; the importance of innovation in keeping industry competitive; and to back up education systems. As far as the first two objectives are concerned, the specific tasks that need to be tackled can be defined through the relevant organs of government and industry. In a sense, the information needed can be reasonably closely defined, and the work needed to develop it "bought". The terms on which it is "contracted" and "bought" can be very different in different countries and even from organization to organization, but that is not a story for today. The third function generates a different kind of politics – the politics of "blue skies", curiosity-driven research: that sacrosanct network of cloisters where ideas as yet undreamed of are supposed to emerge and be nurtured. By and large such work takes place in state-funded institutions such as universities and research institutes.

At one time the general cultural and educational mission of such work was enough to justify its funding by the state, or at least so some historians would have us believe. In fact, the state funding for science has almost always had some practical object in view, whether, in the case of post-Napoleonic Prussia, this was the strength and inviolability of the state, or whether, as in the case of the competition to solve the problem of making a time-piece sufficiently accurate to enable longitude to be established at sea in 18th-century England, it was more a matter of

having the technology to grab more in the way of far-flung colonies and thereby access to raw materials.

The state's increasing involvement postwar with the costs of research have led to national systems for allocation of funds for specific research projects between different individuals and institutions. Most of these involve the state setting aside a specific "pot" for such research, which is allocated by the scientists themselves, and usually the most senior of them, on the basis of scientific promise and the track-record of the researcher. After the war, the promise of science looked so certain – and the status of its practitioners so unimpeachable – that there was no problem in justifying such a system on the basis of elitism and the autonomy of government to act through some kind of internal consensus. However, there is a problem – that of accountability. To what independent body can the public – or the government itself – turn in order to monitor the effectiveness of such spending? There is no simple answer to this question. To the scientist, it is "self evident" that it will work. Indeed, the "purity" of these peer review systems – in other words their immunity from influences outside the scientific system – is something that scientists set great store by in maintaining a system that encourages and rewards scientific merit. There are methods for evaluating research projects through systems based on measures such as citation counts, but these merely quantify (perhaps uncritically) the measures agreed by the scientists themselves. The use of even these are fiercely resisted by scientists, who will allow only a minor quantitative element to enter the peer review process.

On this view, the agenda for research is to be set by scientists, with the public and industry as onlookers. Scientific research then becomes a public good in itself, and its independence and autonomy is a key value that is never to be compromised by issues external to the research system. A certain sum is set aside by society for the purpose: the scientists manage its best use but have no objective case for determining the magnitude of the resource. If they are not happy with their share of the public cake they can only point to internal criteria such as grants they have assessed as first-rate going unfunded. However, others have sought to develop methods for evaluating the fruits of science through objective measures external to such systems, and to advocate other, more prescriptive methods of getting the best out of science.

In recent years, however, this "strong autonomy position" has been somewhat modified by the introduction of "agenda-setting" through the customer-contractor principle, and identification of priorities by industry and ministries. This situation allows some penetration of the science system by external criteria (for example, the exigencies of military, economic and health "wars": Department of Trade and Industry, 1988; Commission of the European Communities, 1990). States experiencing expanding responsibilities but contracting resources have indeed been forced to review the scope for allowing such licence to the scientists. In recent years, the planning mechanisms of the research councils have been forced to take into account the rhetoric of economic competitiveness, the necessity of picking industrial "winners".

In some cases, this basis has been applied to the whole of the state's scientific enterprise as in the recent British white paper on science and technology, (Realising Our Potential, 1993), and also in Clinton's new policy "to establish clear national goals for federal science and technology investments" (Clinton, 1993). Another trend in Britain has been to privatise research in line with other aspects of government policy; also giving over a substantial proportion to the EU, whose aim is also to improve economic competitiveness (Cabinet Office, 1993, p. 33).

Also, research relevant to the issues of interest to public policy are mediated through government agencies such as the health service. An interesting consequence of such an arrangement is that the "customer" often lacks the agenda and the facilities to monitor the research activity per se, and assess topical issues associated with its infrastructure. A separate but linked consequence is that it is rare for questions of resources and priorities to be addressed within the democratic process; rather, they are settled largely by negotiation within the relevant interest groups. An example is the reorganization of the British National Health Service. In theory there is a free market in hospital services, with the local authorities, elected by local citizens, electing to place contracts for services. But, with the prospect of many hospitals closing and many services apparently unavailable to individuals who need them, there is no perception that the new system has been arrived through any kind of democracy.

But even taking these modifications into account, we observe "weak autonomy" positions where the agenda is still set by an essentially corporatist and technocratic system that can still invoke the rhetoric of "peer review", though the scope of peers is somewhat enlarged.

4. The role of the democratic process

It is interesting to ask, for each of these models: What is the role of the democratic process? It seems to me that for either of them the role is minimal. In this kind of decision-making there is little requirement or initiative for public debate, e.g., in parliamentary chambers. There is no point of entry for public debate in the cycle of decision-making and review. More crucially, there is no regular debate in the cycle of decision-making and review. Most crucially, there is no regular debate on these issues in parliament, no scope for votes on budgets for science, no audits of the research councils and so on.

One arena where "everyone" meets science is in the education system. Yet even here the model for learning is of wisdom going in one direction from teacher to student. The teacher, as the representative for the students of the scientist who did the work bends over backwards to define the subject and how it should be tackled, even to restrict the scope within which students conduct and observe experiments. Far more even than in the research laboratory, the agenda is defined, the outcome determined, the codes of the scientific priesthood reinforced, even to that majority who have somehow managed to miss their initiation into the spirit of the enterprise and its basic principles.

Another assumption that is buried in the state packaging of science is the free exploitation of science in the pursuit of commercial objectives without considering social or other consequences. An example of how such questions can be handled is that of the public enquiry, though such exercises are not popular with the present government, which has resisted such an exercise in the case of the THORP reprocessing plant. Another mechanism, the Royal Commission, has again fallen into disuse.

Insofar as it is part of the state, many aspects of government science and science policy (though not so much university science) are confidential to the relevant

ministry. Scientists who are civil servants – as many defence and forensic scientists are, even if engaged on basic research work – may not speak in public, even in their own defence, without explicit clearance from their political masters. Scientists who have given technical advice to government may not disclose their advice beyond what the government decides to make public.

There are now certain categories of information about, for example, pollution of waterways and the air, that must now be made public, but for the most part technical information generated for whatever purpose within government remains secret unless explicitly published. Such information includes, for example, information about toxicity and contents of foodstuffs. In principle, some of this information may now be opened up in Britain under the new guidelines enunciated in the White Paper "Open Government" (1993), though commentators have observed that its many caveats and disclaimers may severely limit the real usefulness of the Act: "citizens, if they got anything in response to their requests, would get papers rewritten by civil servants, supposedly to meet the precise purpose of the request.

It sounds like an expansive, last-ditch move to maintain secrecy, for which concerned citizens will have to pay through the nose for the time spent by civil servants in "massaging information" (Price, 1994). Similar provisions apply in all the major European countries apart from Sweden, which has a freedom of information act. The environment of secrecy adds to the difficulty of convincing the public that the information that the science system generates is genuinely being used on their behalf, and in their interests. Even more worryingly, the European Union has emulated the British system in its approach to secrecy (Williams, 1992). However, the EU has recently decided to change its approach and explicitly adopt a policy of openness (European, 1994, p. 1).

This situation, I would like to argue, is no longer acceptable in what claims to be a democratic society. It is in the interests, surely, of the scientists to argue, as a profession and as a lobby, against such gratuitous and sinister censorship of their work. Raising the standard of openness in a democracy is surely the business of those who believe in the scientific ethos, even if it is disavowed by those who claim to be the guardians of democracy itself.

5 Where is the public "market place" for science?

It is no accident that the Roman "forum" – the marketplace – was the principal site of political debate and decision. Since the 19th century, science has closed off its fora, for reasons that perhaps seemed highly sensible at the time. But the result is that there is now a shortage of public marketplaces for science. The state, as a major customer for science, sees no advantage in bringing the haggling into the public domain, and the scientists, fearing for their precious peer review principle, which as we have seen is already being eroded, have been co-conspirators. If we compare funding of basic science with other public policy issues, we see, as we have already said, an absence of individual "customers" in the sense of people who have a vested interest in the results. There is no equivalent, for example, to the offices that defend the interests of the consumer of gas, electricity, telephones, schools. There is no science "ombudsman". There are no ways of constraining the government to undertake research in certain areas through the courts. Science remains in many ways closed off within the cordon of the state, subject with the state's active encouragement to influences from a certain type of external vested interests – i.e., those with a wealth-creating capacity. Lacking its own economic power, within a free market economy, it has no natural defence from the depredation of other issues with louder voices. At least in part through the elitist and diffident attitudes of its practitioners, it has found no specific public allies to maintain its ethos – for example stability and continuity – its overall level of resource, or to debate and reflect on its performance. There is a kind of bizarre logic about this position. Who, after all, could be an expert "about" science, when science is the source of expertise? Quis custodiet custodes? In recent years, as I mentioned earlier, a community of science policy experts has grown up with just such a role in mind – to evaluate the work of scientific research. However, even more than their colleagues in more traditional disciplines, they have been the victims of the new agenda-setters, and their work is largely now about the effectiveness of industrial innovation.

There are some areas where there is a lobby for very specific kinds of research. The medical charities – the British Heart Foundation, the Imperial Cancer Research Fund and Cancer Research Campaign, for example, get their funds largely through the efforts of those who have a particular interest in a particular disease.

6. The media as the primary marketplace for science

The lack of an alternative marketplace for science highlights the importance of the role that the media plays in mediating science and its values with the public. If there is no other negotiating forum, the onus lies heavily on the media. Once again, though, there is little way of policing those with "power but not responsibility". The kind of codes and laws that exist to keep the media free – both from harmful restraint and from knowledge that politicians don't want them to get hold of – provide little incentive for outlets to be responsible in their coverage of scientific issues. This is particularly true of the press, where there is no onus to be balanced or even accurate. There is no redress for mistakes of fact or emphasis unless what is printed is libellous, seditious or results in financial loss.

As a distinguished British scientist averred recently, "Newspapers, radio and particularly television develop powerful images of science and technology. Their influence can be profound and stimulating but is sometimes malign. Simplicity, brevity and the ubiquitous "sound bite" make news and current affairs programmes particularly vulnerable to criticism. But dwindling interest in and enthusiasm for science and technology make it imperative that scientists harness the power of the media to broadcast their message" (Fells, 1994).

Of course, it is usually the sensationalist tabloid press who are responsible for scientific howlers and misleading the public, though on closer analysis, they carry few stories apart from medical information. The stories about astronomy, particle physics, materials, electronics, largely reach the already well-educated middle-class (Meadows, 1991). Clearly such publications as the quality press and the more intellectually-oriented channels are likely to devote more space or time to such material, but, as a student of mine, John Kent, showed last year, scientists are also more willing to speak to the representatives of such organizations. Thus, it is an adult, middle-class audience that is primarily being addressed. Once again, we are back to the preferential enjoyment of and negotiation with science by a privileged group within society.

We also have to look at the style in which science is presented in the media. The vast majority of science stories and the traditions of science books, articles and

broadcasts have followed less or more closely the "we are telling you" mode through which science is presented in education.

Exceptions to such an approach have generally existed on the margins of public understanding of science. An example is the detailed investigation into thalidomide and its effects by the Sunday Times Insight Team – an investigation thwarted rather than encouraged by scientists, not to mention the company (Sunday Times Insight Team, 1980). Interestingly it was Article 10 of the European Convention on Human Rights that decisively brought the facts the journalists uncovered into the public domain against the wishes of the Distillers company. Article 10 says: "Everyone has the right to freedom of expression. This right shall include freedom to hold opinions and to receive and impart information and ideas without interference by public authority and regardless of frontiers." (Gomien, 1991, p. 71, 77-79). Journalists wresting the right of exposure of research from scientists makes an ugly spectacle indeed.

And we are back to the question of why, after all, should people take the trouble to inform themselves about scientific issues, particularly in basic science, if they are never likely to be involved with or consulted about them, even though the work is being done with their money and on their behalf? If researchers and others want science to be taken more seriously than as a part of "optative" culture, like art or music, then they must urgently find a way of making its core activities part of the publicly negotiated political culture. To do this may mean rethinking some of the most basic foundations of the scientific ethos – in particular, the reluctance to engage with issues outside the strictly scientific domain. Nevertheless, one could argue that as benefactors of the public purse, university scientists had an obligation to be accountable and answerable to their backers, and if the sponsors want to raise wider issues it is up to the scientists to contribute what they can to the debates. The question is, are the scientists capable of developing such an institutional framework through their own initiative? I have shown that if they do, the state is likely to discourage rather than encourage their efforts. Can they act, as the medics have, in defiance of the state's passive resistance, successfully to bring their messages and agenda into the public domain in such a way as to achieve a respectable, responsible and responsive public image for themselves?

7. Whatever happened to science for the people?

The fact is that such efforts have already been made, and in the not-so-distant past. I refer to organizations in Britain such as the British Society for Social Responsibility in Science, the Council for Science and Society. I would argue that these organizations have lost their chance to be effective public fora for science through neglect by the state – not primarily financial, but by not engaging in dialogue with them. But it is the bulk of the scientific community who have, by sins of commission or omission, colluded in the downfall. And a major factor has been the failure to engage the interest of the public in the need for such a forum that could operate independently in the public domain (Herman, 1989, p. 61).

Interestingly, the premier learned societies in Britain and America have broken the mould by choosing to enter the public domain with a statement on world population and the environment (Royal Society and National Academy of Sciences, 1992). It will be interesting to see how this new strategy develops.

8. Conclusion

To sum up: it seems to me that the social contract under which scientists work has to be revised. When governments are hostile to science, in the sense of milking rather than nurturing its enterprise, scientists should be reaching beyond their erstwhile protector and womb for allies and allegiances that would give them an independent and public arbiter of their needs and preconditions. As publics become at once more powerful and more sophisticated, perhaps scientists should look to be changing the balance of their loyalties and information dissemination efforts. They should be looking, more humbly than hitherto perhaps, for genuine dialogues with the public rather than regard them as pitiably deficient knowledge acquisition machines. To do this, scientists will have to shed their youthful "Superman" image for an older, wiser, more reflective and cautious face.

As a Cumbria farmer said recently

"We may be on the eve of a new age of enlightenment. When a scientist says he doesn't know, perhaps there's hope for the future" (Wynne, 1992, p. 292).

Returned to his shattered house, Ulysses can still enrich, enchant, and advise. By all means let him consult and participate. But he may no longer lead the Greeks in the march of progress. In the twenty-first century, the Greeks may look eastward towards more holistic worldviews of the Gaia variety. And if they do, countries that claim to be democratic should be looking beyond technocracy towards a more genuine sharing and more open and questioning reconciliation of views. Even if this has the effect of dissolving "the merger of knowledge with power" (Ravetz, 1990), it may be a step towards a new role and set of relationships in self and state governance and its relationship with the use, abuse, and perhaps voluntary self-denial of the exploitation of new knowledge.

References

Cabinet Office, 1993, Annual Review of Government-funded Research and Development 1993, Her Majesty's Stationery Office, London.

Clinton., W., Statement of the President, 1993, Office of Media Affairs, The White House, 23rd November 1993, Washington.

Commission of the European Communities, 1990, EC Research Funding: a guide for applicants (2nd Edition), Brussels.

Commission of the European Community, 1993, Biotechnology and Genetic Engineering: what Europeans think about it in 1993, DGXII, Unit E/1 Biotechnologies, Brussels.

Department of Trade and Industry, 1988, "DTI: a department for enterprise", Her Majesty's Stationery Office, London.

European, 10th February 1994, London.

Everest., D.A., 1990, "The provision of expert advice on environmental matters: the role of advisory committees, Science and Public Affairs, vol 4, p. 17-40.

Fells, I., 1994, Abstract of talk "Science and the Media", Royal Society Michael Faraday Lecture, 27th January 1994.

Gomien, D., 1991, Short guide to the European Convention on Human Rights, Council of Europe Press, Strasbourg.

Herman, R., 1989, "A bandwagon for the taking", New Scientist, 2 September 1989.

Meadows, A. J., 1991, "Quantitative Study of Factors affecting the Selection and Presentation of Scientific Material to the General Public", Scientometrics, Vol. 20, No. 1, p. 113-119.

Open Government, 1993, Cm 2290, Her Majesty's Stationery Office, London.

Price, C., "Wedging open the doors of secrecy", Guardian, 21st January 1994, p. 22.

Ravetz, J., 1990, "The Merger of Knowledge with Power", Mansell Press, London.

Realising Our Potential, 1993, Cm 2250, Her Majesty's Stationery Office, London.

Royal Society and National Academy of Sciences, 1992, "Population Growth, Resource Consumption, and a Sustainable World", 1992, A joint statement by the officers of the Royal Society of London and the US National Academy of Sciences, London and Washington.

Sunday Times Insight Team, 1980, Suffer the Children, Futura, London.

Williams, S., 1992, "Europe's silent citizens", Guardian, 16th June 1992, p. 23.

Wynne, B., 1992, "Social identities and public uptake of science", Public Understanding of Science, Vol. 1, p. 281-304.

Ziman, J., 1968, Public Knowledge, Cambridge University Press, Cambridge.