Session 4 Science and society now

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The Twin Vision of Science

Following the recent controversy about the biologist James Watson, who had made unwise statements about race, *Nature* (2007a) magazine said this:

Scientists explore the world as it is, rather than as they would like it to be.

These are words that themselves need exploring, and I shall make that task the work of this brief commentary. In particular, given that my brief is to consider the ethics of scientific research, I shall suggest that thoughtful scientists face a conundrum. On one hand they must, as *Nature* suggests, gaze sternly out at the world, and read its secrets. On the other, they must look inward at their laboratory life, and ensure it is incorruptible.

Sir Francis Bacon and the origins of modern science

The idea that scientists must look outwards, with a gaze undistorted by personal or public issues, can be traced to the origins of modern science. Sir Francis Bacon (1561-1626) is the man many label as the 'founder of modern science', partly because when the Royal Society was founded, it claimed to base itself on his principles of scientific conduct. Ranking high amongst Bacon's recommendations to 'natural philosophers', is the necessity to avoid certain 'idols' or delusions. Bacon, a lawyer, saw experimentation as a process of interrogation, with nature the resistant victim. To exact the truth from nature, great clear-sightedness would be necessary. The scientist-inquisitor could be a reliable conduit for the truths being gleaned from experimentation provided he avoided imprecise language. Personal bias, and a fawning attitude to tradition (Bacon was referring to Aristotle) are also extremely prejudicial to accurate science (Bacon 2000, pp 40-42).

From the early 19th century onwards we have labelled this sternly impersonal outward gaze of science 'objectivity'. The large philosophical literature that examines objectivity in science has in recent decades decided it might be hard to attain. Some have labelled it an illusion we should resist; others describe it as a venerable tradition, or even a 'legend'.

The peculiarities of contemporary science

I don't intend here to explore the question of science's objectivity further, beyond noting that my starting quote from *Nature* has the weight of tradition behind it. It is likely that it would be accepted by most scientists without a second thought, even if it would ring alarm bells for science's more philosophical commentators.

Our interest here is in the second part of the *Nature* comment, which implies that the 'likes' of scientists are quite unimportant in their work. We can ask this question: if the scientist is trained to see his or her work as entirely unconcerned with how the world should be, can we expect that scientist to be able to direct his or her gaze

'inwardly' and reflect productively on the ethics of science? I would argue that the answer to this question is 'perhaps not'.

In relation to its past, contemporary science is unusual in two respects. The first peculiarity is that contemporary scientists are increasingly aware of an anxiety about public attitudes to science. There is a view, prevalent especially in scientific institutions and in government, that efforts should be made to 'improve' the relation between the citizenry and the scientific research being carried out in its name. To put the matter briefly, it is often claimed that an 'informed' and, by implication, 'supportive' public will provide the kind of benign environment that guarantees scientists their autonomy, and their productivity. This will require hard work, perhaps by scientists who will have to leave their laboratories, and go out into the country's schools and science centres, and engage with the public. Those scientists might then come across unforeseen, lengthy and intellectually-demanding problems. For instance, suppose that an 'informed' public, or a group of citizens, decided that a particular direction in scientific research was not to their taste?

This anxiety about public engagement, and its possible complications must surely ruffle the imperturbable gaze of science as it looks out at nature. To risk a very crude analogy, it is difficult to turn your loft telescope up towards the heavens if at the same time you are worrying about a crowd of neighbours you imagine are circling your house and looking in at your furniture.

Activity 1
Many institutions now see 'public engagement with science and technology' (PEST) as an important part of their work. A good example would be the Wellcome Trust. Visit their public engagement web-site http://www.wellcome.ac.uk/funding/publicengagement/., which explains that £3m a year are awarded each year, through several schemes.

Scrutinise the various Wellcome Trust public engagement schemes and evaluate whether any would be a suitable 'vehicle' for putting your current research on a public stage.

The second 'peculiarity' of contemporary science is the current anxiety about 'research integrity' or research ethics. You may already be familiar with the high-profile of medical ethics, which for example adjudicates on drugs trials and on issues such as the possibility of 'informed consent'. You will be familiar too with the field of bioethics, an umbrella term for discussions about xenotransplantation, stem cell technology and many other controversial matters. Research ethics is different. This is a field which studies the inside workings of scientific research, in particular the extent to which it is 'honestly done'.

Research ethics, like public engagement, is attracting the attention of the science institutions. If the objective 'outward gaze' is supposed to be the task of science, research ethics is a distracting problem that has sidled up, and needs to be dealt with. For should science ever get a reputation for being dishonest, nepotistic or narcissistic, then damage to its public image would indeed be great. This was an idea spelled out in the Government's science white paper of 2000, *Excellence and opportunity: a science and innovation policy for the 21st century.* The paper notes that "science is too important to be left only to scientists... When science raises profound ethical and social issues, the whole of society needs to take part in the

debate" (p54). It also notes that the inner regulation of science cannot be ignored, and explicitly makes the link between public engagement and the ethics of research practice: "People must feel that science is serving society and that it is *properly regulated, open and accountable*. The BSE crisis and the controversy over GM foods have raised questions about the value of scientific progress in society (p5, emphasis added).

The 'norms' of science

One response to stories of misconduct in science is to suggest that there should be instituted a code of conduct that scientists should follow. An argument to be made against such control is to suggest that the great majority of scientists are honest, and to be trusted with an autonomy that will guarantee their greater productivity. It is sometime said that scientists have 'norms', tacit agreements about how the good scientist will behave. More than sixty years ago, in 1942 the great American sociologist Robert Merton laid out what such norms might be.

Robert Merton suggested that scientists behaved according to the following 'norms' or rules: communalism (the sharing of data and results); universalism (political and social factors are not involved in evaluating work); disinterestedness (it is truth, not financial or careerist gain that motivates scientists); and organised skepticism (scientists are rigorous and critical in evaluating evidence). These ideas, easily remembered through the acronym CUDOS are quite high-minded, and very broadly drawn. There is nothing wrong with them – except that they may not describe the average contemporary scientific life very well. Indeed it has been suggested that Merton's norms are partnered with other, counter-norms. The sociologist Ian Mitroff (1974) interviewed NASA scientists and found that the same scientist could hold contradictory beliefs, for example praising communalism while admitting the necessity of being guarded in professional discussion.

That gap between Merton's norms, now 60 years on and the current (2008) *actualité* makes them suitable as ethical norms only if it is agreed that they are important goals; how modern scientists should be governed. Even if they are important goals, they are useful only if there is a strategy for working towards them. However flawed we might find Merton's description of science, his idealised account suggests something important to us: that interest in how science works might have practical value, by attempting to make recommendations on peer review, education and training, authorship, and so on.

Research ethics and the contemporary science environment

Clearly, research ethics has gained a higher-profile recently because of famous cases involving the South Korean stem cell scientist Woo-Suk Hwang and the physicist Jan Hendrik Schön. Cases of malpractice, where a scientist falsifies data, invents whole experiments, or obtains human tissue unethically, are indeed dramatic and unacceptable. Yet, increasingly, commentary on research ethics has been pointing out that beneath these dramatic examples lies a possibly much greater, but much less visible problem. This is the problem where Merton's norms are simply ignored as scientists, responding perhaps to a competitive work environment, are pushing themselves to get published as much as possible, and to get their names on as many papers as possible. *Nature* magazine, very much to the fore on the issue, once put it like this: "... as laboratory life has become more competitive, and especially where experiments are difficult to replicate, fraud and other types of serious misconduct

have become less rare". Discussing a particular detail of the problem, namely whether young scientists get proper credit for their work, MRC biologist Peter Lawrence wrote a paper for *Nature* in which he stated: "Students are like boosters on space rockets, they accelerate their supervisors into a higher career orbit, and when their fuel is spent, fall to the ground as burnt-out shells" (Lawrence 2002).

Lawrence's article sparked a long debate in *Nature* about fairness within science, and exposed anxieties that the contemporary research environment, especially within the biosciences, has become so competitive, commercial and aggressive as to make ethical behaviour less likely.

Should scientists be taught ethics?

One response has been the rise of ethics workshops for young scientists, for example as part of their graduate training. Leaving aside the problem that such courses might be taken as implying it is the young, rather than their elders, who need to be taught the difference between right and wrong, there is evidence that 'ethics' education can actually be counter-productive. *Nature* magazine recently reported on research (Anderson et al. 2007) which showed that when postgraduates were mentored on how to survive in the field and how to foster professional relations, the tendency towards 'misbehavior' increased. It was also found that formal training in ethics was correlated with "... a higher likelihood of not giving proper credit to others" (Nature 2007).

Activity 2
Is scientific malpractice a matter of a few misguided individuals 'getting away with it' or is it a broader problem of scientific management?

Sir David King, recently the Chief Scientific Advisor to the government, issued in 2006 a code of practice for scientists.

Scrutinise the code, noting where Sir David implies that ethics is a matter for individuals, and where he implies it is a matter for institutions. The code is available on http://www2.cst.gov.uk/cst/business/files/ethical-code-letter.doc.

Research and the ethics of publication.

The science ethicist David Resnick has himself produced an ethical code, with ten points (Resnick 1998). Here are the first five of his recommendations:

1. Scientists should not fabricate or misrepresent data.
2. Scientists should avoid self-deception and conflict of interest.
3. Scientists should share information and ideas.
4. Scientists should have the autonomy to pursue research in any area.
5. Credit should be given where it is deserved, and not given where it is not deserved.

You might consider all these as self-evident. Perhaps the commonest difficulty and heart-ache arises over the issue of authorship, the fifth of Resnick's recommendations, and the subject of Lawrence's paper, cited earlier.

It was concerns over publication ethics that caused a number science journal editors to set up a group, the Committee on Publication Ethics (COPE). The group publishes

reports on ill deeds and mishaps encountered among the manuscripts which come their way. They describe their decisions, and make recommendations about good publication practice.

Activity 3 Go to the COPE web-site http://www.publicationethics.org.uk/ and examine some of the 'cases' they report. Evaluate for yourself whether the right decision has been made, and consider whether any of the examples you encounter on the web-site are familiar in your experience too.

Conclusion

This commentary has made a rough sketch of issues in science – in particular public engagement and research ethics – which seem likely in the near future to make greater demands on a scientists time and intellect. It was suggested that such factors constitute 'an inward gaze' because they concern the organisation and the accountability of research itself. 'The outward gaze', the objective search for the truths of nature is a more common representation of what scientists are concerned with. We can conclude by wondering how well the standard scientific education and training prepares the scientist for a professional life that needs 'double vision'.

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