

1 A HISTORICAL PERSPECTIVE ON SCIENCE ENGAGEMENT

Public engagement with science may seem like a modern preoccupation, but its roots run deep. Science communication was a feature of Newton's world, and, notes **Tim Boon**, the themes of a 1943 British Association conference seem uncannily familiar. The big difference, though, is in the nature of the relationship between scientists and the lay public. Gone are the days of 'send and receive' – communication now is much more two-way.

Science has always needed a public. From the early days of the Royal Society, when it was considered important that gentlemen should witness the conduct of experiments, up to the present when science dialogue is all the rage, the public have been in science's frame. But science's reference to non-scientific publics has neither been constant, nor taken the same form over the centuries. In particular, issues in science communication seem markedly different in the periods immediately before and after the Cold War.

It is easiest to look at science communication historically through particular media in each period. Books, for example, leave more tangible traces than popular lectures. And popular science writing is no recent publishing phenomenon. The new philosophy of Isaac Newton was popularised not just in books for adults but also in John Newberry's 1761 children's text *The Newtonian System of Philosophy*. In this, a character named Tom Telescope lectures a group of children on subjects from the solar system to the human mind, with interjections from the children. The Rev. Dr Brewer arranged the entire matter of *A Guide to the Scientific Knowledge of Things Familiar*, which ran through more than 30 editions in the mid-19th century, in question and answer format. "Why has a dreamer no power of judgement or reason?" it asks. "Because the parts of the brain that are concerned with the performance of these functions are inactive and at rest," comes the immediate reply.

The evidence of titles and editions is that popular science was a genuinely popular medium from at least this period. Charles R Gibson, for example,

wrote a whole series of 'Romances' and 'Wonder' books in the Edwardian and inter-war years, including volumes on scientific discovery and technological titles including *The Romance of Modern Electricity*. The first newspaper science reporters in Britain emerged around 1930; first J G Crowther for the *Manchester Guardian* then Ritchie Calder for the *Daily Herald* and dozens more in their wake. This new band of professional science writers was paralleled by working scientists including Julian Huxley and J B S Haldane, whose columns for the *Daily Worker* were collected together in one of the early Pelican books, *Science and Everyday Life*. In North America, where science journalism started around the same time, it reached a critical mass much earlier than in Britain; the National Association of Science Writers had 63 members in 1945 and 413 by 1960.

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In other media too, science has long been a fixture. It has featured on radio since its first decade in the 1920s. It took rather longer to become a regular element of television, but in Britain, since the establishment of *The Sky at Night* in 1957 and still more BBC 2's *Horizon* in 1964, it has had a small but prominent part in the schedules. Applied science featured strongly in non-fiction cinema aimed at general audiences in the guise of scientific medicine and public health. One example was the director Paul Rotha's film *World of Plenty* (1943), made with the nutrition scientist John Boyd Orr.

It is one thing to establish that science in the media has been in rude good health for much of the history of science itself, but quite another to discern what relationship its practitioners expected the public to have with science. (Still less has historical scholarship yet produced a synthetic account of how lay people understood science over long periods.) The 'public understanding of science' became a commonplace phrase with the publication of the Royal Society's 1985 Bodmer report, the establishment of COPUS (Committee on the Public Understanding of Science) shortly thereafter and the launch of the journal with that title in 1992. There is, however, an earlier incidence of the phrase; over the weekend of 20–21 March 1943, the British Association held a conference under the title 'Science and the Citizen: the Public Understanding of Science'. By looking at this, we can see how science communication has changed. The conference was a busy affair, with 30 papers over two days. Four sessions discussed 'The Exposition of Science', 'Radio and Cinema', 'Science as Humanity' and 'Science and the Press'. The overall impression is of scientists confident in science's powers and relevance. Ritchie Calder, one of its organisers, was outspoken, placing science communication in the context of good citizenship:



BEATTY'S BATTLE

The award-winning film *Trafalgar Battle Surgeon* was notable for its historical accuracy – the result of an unusual history of medicine public engagement award.

In 2005, Channel 4 aired *Trafalgar Battle Surgeon*, a historical docudrama vividly portraying the part played by Sir William Beatty, ship's surgeon, and his accompanying team in the struggle to keep the fighting men aboard Nelson's *HMS Victory* fit enough to prevail over the French. The broadcast was timed to commemorate the 200th anniversary of Nelson's death.

The anniversary was marked in many ways, but this project aimed to delve deeper than most into circumstances surrounding this momentous event in British history. In advance of filming, →

TRAFALGAR BATTLE SURGEON

Support

£130 000 (2003, history of medicine public engagement award – film itself was financed by Channel 4)

Applicants

Justin Hardy, Hardy & Sons
Professor Laurence Brockliss,
University of Oxford

More details

www.jhfilms.com

Left: Even Sir William Beatty's medical prowess could not save Nelson's life. By J Heath.

...better government will depend on the individual citizen being properly instructed. He must be made alive to the vast potential of the twentieth century and to the vast complexities which science and technology have introduced into the life of society. The scientist has his contribution to make, not only in the shape of his new discoveries, but in impressing upon the public the implications of these new discoveries.

Or, as Crowther put it: “a hundred years ago, it was desirable that the people should know about science: to-day it is necessary for survival”. These are forceful statements of the citizen’s obligation to understand science, but do not imply any reciprocal obligation on science to listen to the public. This is borne out in one of the governing metaphors of the conference, used by, among others, the biologist Henry Dale, then President of the Royal Society:

...the public understanding of science will need for its achievement the co-operation of the two parties concerned – to speak in the terminology of broadcasting, it will require an efficiency in the transmitter and a tuning of the receivers, which only the proper conditioning can provide in either case.

The transmitters were the scientists and the receivers were the public. But Dale was, in fact, concerned with the ‘receiver’ only in the sense of how to attune them most effectively to the ‘broadcasts’ that science makes. But this is not a telephonic metaphor; communication here is all one-way. This is not, however, surprising for the 1940s, when the opinion survey was in its infancy as a social scientific tool; to turn it on science itself would have entailed a degree of reflexivity about science communication that only emerged later in the century.

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Two types of science communication – both represented at the conference – went beyond this model. The Army Bureau of Current Affairs (ABCA) had been running discussion groups among soldiers on scientific topics including public health, nutrition and agriculture, as well as social issues including town planning and ‘the colour question’. As W E Williams, the scheme’s director, stated, the ABCA experiment “most aptly illustrates the special problem before this meeting, namely, how to instigate and organise the common man’s wayward and fitful interest in the world about him”. The documentary films of Paul Rotha, which used a ‘man in the street’ interlocutor to challenge the authoritative factual voice of the film’s main commentator, suggested another ‘dialogic’ model. In both examples, the audience member was offered a more active role than simply

reception of scientific ‘broadcasts’. But we should note that both these exceptions to the general pattern were typical of the decades after the extension of the franchise, when citizenship was a core term in the political lexicon.

After the War, despite continuing output across all media, newspaper attitudes to science rapidly replaced adulation and expectation with disappointment, hostility or simply ambiguity.

It is worth considering the conference’s sense of why the public might have wanted to become ‘well-tuned’ receivers. In brief, most papers there assumed science to be useful; they promoted an Enlightenment model of a science that can be applied to better human life. Sir Lawrence Bragg, for example, was laudatory: “we are at the beginning of an era in which the material conditions of life are being profoundly modified by the results of scientific investigation”. He concluded that “we cannot plan wisely for the future unless there is a widespread general understanding of what science is and what it can do”.

After the War, despite continuing output across all media, newspaper attitudes to science rapidly replaced adulation and expectation with disappointment, hostility or simply ambiguity, as Martin Bauer and his co-authors have shown. Steve Miller comments that “alongside these ‘mood swings’ there was a tendency for scientists to retreat into their shells, frowning on those who ventured onto the public stage...the Bodmer Report reflected a concern amongst the scientific establishment that this retreat had reached proportions where funding for scientific research was politically vulnerable”. The subsequent problem, as Miller articulates it, was that surveys seemed to show that, despite the extra energy deployed, lay scientific literacy did not rise over the COPUS years. It has become conventional to see the end of that phase of science communication as being marked by the publication of the Third Report of the House of Lords Select Committee on Science and Technology in 2000.

We may ask, however, whether it was the communication that was wrong or the science. The Lords report was published into a world transformed by the Cold War era, in which science and technology had had a remarkable impact on how life is experienced, for the bad as well as for the good. Martin Rees recently commented that “public opinion surveys reveal a generally positive attitude to science”. But he noted that “this is coupled with widespread worry that science may be ‘running out of control’”. Compared with only one very slight reference in 1943 to the negative impact of science, in 2000 risk and danger are said to dominate the relationship between science and society, as the Lords report states:

→ Professor Brockliss and his assistant John Cardwell undertook a period of highly detailed research. They had access to letters written by Beatty, the *HMS Victory*’s log, the surgeon’s log and a wealth of original source materials, many of which were located in the Wellcome Library. By the time Brockliss’s research made it to Hardy & Sons, it was clear there was a veritable goldmine of authentic period detail to call upon, greatly aiding the subsequent development phase.

Armed with historical facts, Justin Hardy and his team went about the business of bringing them to life. Scriptwriter, actors, props and locations all in place, the team went on to produce a full-scale, one-hour drama revealing an aspect of the Battle of Trafalgar that had, until then, been

quietly disregarded: that the diligence of Beatty and his team of surgeons played a pivotal role in Nelson’s victory. By keeping Nelson’s men ship-shape and well exercised, the balance of power swung in Nelson’s favour.

Shown on Channel 4, the programme was well received. The press loved it, 1.4 million viewers tuned in, and a book was written (*Nelson’s Surgeon: William Beatty, naval medicine, and the Battle of Trafalgar* – Oxford University Press, 2005). In 2005, the Royal Television Society commended the film with a Programme Award for History: “The jury admired its rich, characterful and unexpected take on well-known events. Crisp, passionate and hugely entertaining, it struck the senses like a well-aimed cannonball.” →

Right: Filming *Trafalgar Battle Surgeon* on the real *HMS Victory*. P Fisk



Society's relationship with science is in a critical phase. Science today is exciting, and full of opportunities. Yet public confidence in scientific advice to Government has been rocked by BSE; and many people are uneasy about the rapid advance of areas such as biotechnology and IT – even though for everyday purposes they take science and technology for granted.

The dominant new factors are said to be a lack of public trust in science, especially commercial or government science; and the issue of risk associated with the BSE disaster.

We may suspect that society's present concern with trust in science derives from public distrust of science misapplied.

In the place of the earlier broadcast model of communication, the report argues that “the crisis of trust has produced a new mood for dialogue”, overturning the so-called ‘deficit’ model of science communication – in which the main problem was perceived to be lay scientific ignorance – with one emphasising dialogue between the scientist and the citizen and taking seriously the public's knowledge and beliefs. The report's authors surveyed a whole set of different activities including consultations, polling, focus groups, citizens' juries, consensus conferences and internet dialogues. They concluded that “all these approaches have value. They help the decision-maker to listen to public values and concerns; and they give the public some assurance that their views are taken into account, increasing the chance that decisions will find acceptance.” The broadcasting metaphor no longer fits: “in modern democratic conditions, science like any other player in the public arena ignores public attitudes and values at its peril. Our call for increased and integrated dialogue with the public is intended to secure science's ‘licence to practise’,” the report's authors assert.

How are we to account for this change? It would be difficult to argue, given the appeal of popular science in earlier periods, that lay scientific knowledge is now necessarily at a higher level than in previous eras. Instead, we may suspect that society's present concern with trust in science derives from public distrust of science misapplied, as many see it, in military hardware, in the high-protein animal feeds responsible for BSE and in so-called ‘Frankenstein foods’, to take but three examples. These are all instances of the power of science, which the public generally supports when it leads to enhanced human welfare via medical advance, for example. However, blaming science for its negative effects is scarcely new; inter-war scientists had to deal with the perception that unemployment was a product of the ‘march of the machine’ and that warfare had been rendered particularly savage by the development of novel scientific weapons.

Another possibility is that the applied sciences of the Wartime and Cold War periods have simply fuelled doubt about whether science is necessarily benign just because it is factually truthful. The generation that protested against the Vietnam War and campaigned against nuclear power may simply have been ending their deference to scientific authority, as the experience of their grandparents in the Great War is said to have ended deference to social authority. Bruce Lewenstein has similarly suggested that the development of environmentalist science journalism in North America after Rachel Carson's *Silent Spring* marked the beginning of the end for public understanding conceived as appreciation of science. Over the same period, the academic disciplines devoted to the study of science – as a system of knowledge, as a part of society and as an element of culture – have shown how it is possible for members of lay society to hold sophisticated knowledge and opinions about science. It is in this sense that the lay public may validly have views on science that is novel, and that is encapsulated in the dialogic model of science engagement. And, in a sense, this is the coming of age of the democratic citizenship language used by the organisers of the 1943 conference; not only do citizens have a responsibility to understand science, they also have a right to a say in its future direction.

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Further reading

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→ Clearly, the juxtaposition of history and a format mirroring contemporary medical drama struck a chord with viewers. Most of the rules governing *Trafalgar Battle Surgeon's* success are the same for any production: a gripping story, great actors, and a powerful script and talented director to bring them both to life. But this programme had something more. The excellent historical research and support provided by Brockliss gave the production a foundation of granite, an authenticity that viewers responded to.

The success of the programme also illustrates the potential power of historical approaches to communicate science and medicine to mass audiences. History has undergone a renaissance over the past decade, with landmark series such as Simon Schama's *A History of Britain*.

The subject's popularity, and the essential ingredient of human interest provided by a focus on medicine, suggests that this is an area ripe for exploitation in public engagement.

History of medicine public engagement

History of medicine public engagement awards provide flexible support for exhibitions, television, radio or other formats. The aim is to promote the history of medicine, or historical research that stimulates informed dialogue between researchers, policy makers and the public, thereby raising awareness and understanding of biomedical science.

www.wellcome.ac.uk/hom

Right: Extras: John Cardwell and Tony Woods, Wellcome Trust Head of Medical Humanities.

