

## 4 RHETORIC AND ROADSHOWS: AN AMBIVALENCE ABOUT AUDIENCES

Science communicators have multiple masters. On the one hand they have to justify their work to their sponsors, whose objectives they are aiming to achieve; on the other hand they have customers, with their own needs and desires – which may not necessarily correspond to those of the sponsors. This tension, suggests **Colin Johnson**, is rarely acknowledged and yet lies at the heart of science communication and public engagement. Can science communication please all its masters, or does it continue to say one thing to one audience and one thing to another?

**We science communicators are an ambivalent lot. When we speak to potential funders we have plenty to say about the democratic imperative of a science-literate population, about recruiting and retaining our best young people for science-based careers, and about the significance of building public confidence in scientists (and engineers) and their work. Yet, faced with those audiences – families, young people, the public at large – we are much more oblique: science is fun, we say; you can do it, scientists are real people too. And of course we use the phrases ‘science communication’ and ‘science engagement’ interchangeably.**

As a community, we have a number of stakeholder groups, all of whom must be courted and satisfied by what I will call ‘inbound’ messages. Corresponding to each of these is an ‘outbound’ message that is disseminated to customers, visitors and other participants in science engagement activities (see table, right).

In a similar way, John Holden has argued in a recent Demos report that, for the cultural sector as a whole, “politicians and policymakers appear to care most about instrumental economic and social outcomes, but the public and most professionals have a completely different set of concerns”.<sup>1</sup>

STAKEHOLDER	INBOUND MESSAGE TO STAKEHOLDER	OUTBOUND MESSAGE TO CUSTOMER
<b>Politicians</b>	We will help you meet your democratic objectives; associating yourselves with us provides a neutral forum for your policies.	We stand aside from political influences and offer wide-ranging discussion of the interplay between science and society.
<b>Schools</b>	We will support the teaching process and enrich the learning process.	You can relax – we will look after your class, and you may learn some new teaching ideas or techniques for yourself.
<b>Parents</b>	We will give you an educational day out.	Your children will have a safe and enjoyable time, self-paced and in the care of others.
<b>Scientists</b>	We have the audiences, you have the science – work with us. There are no Brownie points in this, but you can present science communication as good institutional PR, which someone else will probably pay for.	You can meet a scientist on equal terms here. See and hear someone who’s no different from you underneath, but has a real enthusiasm for science and works on it every day.
<b>Funding partners</b>	Your message can be associated with our delivery method. You will get exposure in an environment that is perceived as impartial.	People as important as X, Y and Z think that our work is significant, and are prepared to support it in cash or in kind. You can benefit from this, and know that the quality of what we do has received external endorsement.
<b>Media</b>	We have lots of human interest stories that will grab your audiences.	The media are interested in us, so you should be interested too. On the other hand, we probably need them more than they need us, and we don’t really trust them to get the story right!



## SILENT SCIENCE

How do you explain stem cell biology to someone with impaired hearing?

More than 70 000 deaf people in the UK use British Sign Language (BSL), a rich marriage of hand shapes, hand movements and facial expressions, to communicate meaning. However, sign language for scientific words barely exists; what does exist is cumbersome, slow and limited. It is easy for insiders to forget how exclusive the language of science can be. Important steps are now being taken to generate an entirely new biological sign language, bringing everyone into the discussion. →

### SIGN LANGUAGE FOR DEAF PEOPLE

#### Funding

£12 249 (2003, People Award) – Signing Biotechnology (plus a Royal Society Copus grant)

#### Project lead

Professor Mary Bownes, University of Edinburgh

#### More details

[www.biology.ed.ac.uk/public/sibe/signingbiotechnology/MMOV/](http://www.biology.ed.ac.uk/public/sibe/signingbiotechnology/MMOV/)

Left: Sign language for the letter D. Communicating ‘DNA’ used to mean signing each letter.

### Facing reality and declaring our aims

In practice, science communicators are faced with a series of potential conflicts or contradictions. There is:

- an ambivalence between adopting a campaigning approach for science, based upon the expertise of marketing, PR and media activity, or an approach based upon democratic engagement
- a continuing reluctance to accept that the evidence for impact (of a science communication activity) is generally not available at the time, but is normally well separated from it in both time and space
- a growing realisation that those who practise science are frequently not its best advocates, while those with the skills of advocacy (or of drawing others into dialogue) may not have the scientific knowledge and insights to provide rigour in the engagement activity
- an understandable reticence about the real possibility that those who choose to take part in a science engagement activity (e.g. a visit to a science centre) may have had no thought of science in their minds.

So are we engaged in ‘education by stealth’, in which the fundamental goals are not the same as the objectives that are publicly declared? Do we have our own ‘hidden curriculum’?

The science centre sector, in which I have worked for some time, shows how difficult it is to chart a course without ambivalence. Consider, for instance, this selection of mission statements from a number of centres, listed here in order of the number of words employed.

#### Science centre mission statements

“The Centre is concerned with the resurrection of Scotland’s proud spirit of innovation and creativity through the establishment of a scientifically aware and technologically capable society as the foundation for renewed and sustainable social, economic and cultural prosperity.”  
(Glasgow Science Centre, Scotland)

“To promote interest, learning and creativity in science and technology, through imaginative and enjoyable experience and contribute to the nation’s development of its human resource.”  
(Singapore Science Centre, Singapore)

“The Centre is committed to helping families and students understand the importance of science and technology in their lives by providing fun-filled learning experiences.”  
(Calgary Science Centre, Canada)

“Bringing science and technology closer to the people.”  
(Technopolis, Belgium)

Here we can see that struggle between ‘ticking every box’ and creating a bland umbrella beneath which all stakeholders can shelter.

The 2006 Research Councils UK publication *Science in Society* sets out its goal: “We aim to foster a climate of trust in which researchers can work and to develop a society equipped to debate scientific issues”.<sup>2</sup> Does this not encapsulate the very ambivalence in which the rest of the sector is trapped?

#### Evaluation: evidence base versus smiley face?

Perhaps a single focus may be found by measuring the outcomes of science engagement activities, though in the words of the Parliamentary Office of Science and Technology, this is “essential, but difficult to do and rarely achieved”.<sup>3</sup>

We need two kinds of information: where do our audiences stand when we first meet them? And how have they been influenced by their experience of engaging with science? Audience research based upon microscopic examination of how an individual engages with a particular science experience may be valuable, but the data are rarely capable of generalisation. Time and again we are hampered by the indeterminate interval between the experience and the opportunity to make sense of it through further contextualisation. (See ‘A Guide for Successfully Evaluating Science Engagement Events’, pages 80–85.)

#### So are we engaged in ‘education by stealth’, in which the fundamental goals are not the same as the objectives that are publicly declared?

Consider the following (true) story. A visitor at a science centre is speaking of her granddaughter who is hauling at a rope connected to some sandbags by a series of pulleys:

I didn’t quite realise what she gets out of [visiting the science centre] until the other day, when she was with her father who was moving some heavy boxes in the shed. “What you need, Daddy, she said, is one of those things they have [in the science centre] where you pull down on the rope and the weight goes up easier.” She’s only six, and of course she doesn’t really understand what’s happening here – but she has taken away the essential message.

Like that little girl, we all make sense of our experience when a suitable context presents itself. The real challenge for those seeking an evidence base for the impact of science communication is exactly this: we only take ownership and make sense of our ‘science engagement’ when we get a chance to talk about it or to apply it in a new situation. No amount of microscopic examination of body



→ The approach taken by Professor Mary Bownes and her associate, Dr Jan Barfoot, Deputy Director of the Scottish Initiative for Biotechnology Education, involved deaf people from the outset as well as interpreters, scientists and teachers, using workshops and an accessible website to maximum effect. They took a hard look at what BSL already existed, plus the new signs naturally creeping into common usage. As with spoken English, non-verbal language evolves, adapting to find new forms of expression – but this takes time and science moves too fast to wait for this drip feed of new terminology.

The next stage was to fill in the blanks, looking at specific topics (genetic modification, for example) and focusing

on how to distil the terminology in a way that made sense, in terms of BSL, and was also scientifically relevant. Analogies, for example, are a powerful tool, with DNA being successfully communicated by signing a double helix.

Suddenly, the doors to communication started opening. Teachers gained access to resources transforming the way they could teach modern biological concepts and techniques to their deaf pupils. Deaf people and interpreters became able to access a resource to help them discuss contemporary science – an activity that had, until then, been stilted and difficult.

Even events such as Edinburgh’s International Science Festival began to draw larger numbers of deaf people, no longer excluded by the barrier of →

**Left: Double helix:** the Deaf community may wish to join in debates about genetics.

language, conversation with companions, or puzzled frowns and smiley faces will reveal the true effectiveness of an engagement with science or its eventual impact.

How should we conduct our evaluations? If we are ambivalent about our objectives, how can we make a valid evaluation of the extent to which they have been achieved? Do we always have the convenient refuge of allowing ourselves to justify what we have completed in differing ways to different audiences? My report 'Science Centers as Learning Environments', available on the website of the Association of Science-Technology Centers, considers these questions in some detail.<sup>4</sup>

Faced with a government consultation paper on out-of-school education, the National Trust has produced a report based upon a follow-up study after five years of its work with young people.<sup>5</sup> It concludes that school trips can help to improve children's learning through the development of social, practical and cognitive skills, and reported that one in ten students said school trips had been a key factor in their choice of future studies and career.

Ultimately, the key question is: "How will you act differently as a consequence of taking part in a science engagement activity?" And there is an associated question: "How will anyone know?" Rarely is one asked to undertake a public affirmation, such as the BA's recent 'Click for Climate', which attracted 20 000 pledges.

### Involving people

Upstream engagement, as exemplified by the Nanotechnology Engagement Group and the Quality Research into Dementia network, attempts to capture public involvement in setting the values and priorities that direct scientific research. It is less readily applicable to blue skies research than to applied science and technology, and we have little experience yet on which to test its value. If it can be validated as a disinterested approach to the setting of public agendas, rather than cynically suspected of being a variant of political spin, then it has important potential. Perhaps the current government Energy Review will prove to be its first real test.<sup>6</sup>

As Jorge Wagensberg points out in his paper for the 4th World Science Centre Congress (Rio de Janeiro, 2005):

We have a very serious problem, even in the most highly developed societies. All votes have the same value in a democracy; and yet science, which is the form of knowledge that most impinges on our lives and affects the decisions to be made daily on issues that impact our coexistence (energy, hygiene, health, the ethics of science, the environment, technology...)...science is outside the sphere of interest of the great majority of people.

→ language. Now science centres are also accessing these resources, helping them run more inclusive workshops. Perhaps even more significantly, students can now be examined in their first language, signing, rather than their second, written English.

Dr Barfoot feels the success of the project is down to its relatively simple aims plus a strong credibility born of her multidisciplinary project team. Signing Biotechnology is one large step towards a more inclusive society, enhancing BSL with a highly directed approach. This linguistic transformation will help to bring forward a time when everyone can more fully participate in science education and the emerging debates.

### People Awards

These flexible awards, of up to £30 000, offer a rapid-response system of funding; they can be applied for any time. They are intended for activities that:

- communicate biomedical science to the public
- stimulate thought and debate about biomedical science
- improve understanding of the powers, and limitations, of science.

[www.wellcome.ac.uk/engagingscience](http://www.wellcome.ac.uk/engagingscience)

This presents our public figures with their greatest challenge in communicating science: should they rely on evidence or emotion? These two contrasting statements exemplify the problem:

We intend to conduct all our public engagement in accordance with evidence-based best practice.

(Ian Diamond, Chief Executive of the Economic and Social Research Council, speaking about the emerging Science in Society strategy of Research Councils UK to BA Science Communication Conference, London, May 2005.)

Your chances of winning the lottery are about 1 in 14 million. Your chances of catching bird flu are more like 1 in 100 million, even if we had H5N1 among the chicken population in Britain.

(Sir David King, Government Chief Scientist, quoted in *The Times*, April 2006.)

### Conclusion

Engaging public audiences with science is not a business proposition. No one has yet suggested that you can make money out of it. So the process of engagement requires an investment of funds – private or public. The motives of the funders are universal – the creation of a public good, relating to nurturing the young, empowering the old or making life easier for the legitimate social, commercial and political aspirations of the sponsor. The motives of the provider of public engagement with science may relate directly to the purposes of the sponsor, but they are more likely to embrace institutional and reputational goals for themselves, and for this reason to be person-directed rather than cause-directed. The funder's goals are not time-limited, but the provider must send the client away smiling, or she/he may not return. This creates an unresolved tension between the funder and the agent, the provider. We are all ambivalent about our audiences – how frequently does the roadshow match the rhetoric?

Colin Johnson is Executive Vice-President, Young People's Programmes for the BA, former director of Techniquet, Cardiff, and founding chair of Ecsite-UK.

### References

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- 2 *Science in Society*. Swindon: Research Councils UK; 2006.
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- 4 [www.astc.org/resource/education/johnson\\_scienters.htm](http://www.astc.org/resource/education/johnson_scienters.htm) [accessed 5 June 2006].
- 5 Peacock A. *Changing minds: the lasting impact of school trips*. The National Trust; 2006.
- 6 *Our Energy Challenge*. London: Department of Trade and Industry; 2006.

