Going Public

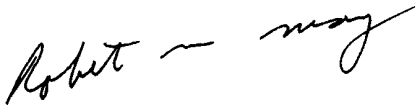
An Introduction to Communicating Science, Engineering and Technology

Communication has never been more important for everyone involved in science. If there ever was a time when the research community could afford to lock itself away in the laboratory, oblivious to the views of the world outside, that time has surely passed. In the research community, we have to remind an often sceptical public of the value and relevance of science and technology, and that today's research will affect their lives tomorrow. We must also convince young people that a career in scientific research is for them.

This short and accessible guide is written with practising scientists and researchers in mind. Its has three aims. First to encourage the communication of science, engineering and technology to a wider audience. Second, to give a few tips on how you can do it well. And finally to point you towards the many other resources available to researchers who want to help to improve the public understanding of science and technology.

It would be completely wrong to see the communication of science as a necessary but onerous public duty. As I know from my own experience, venturing beyond the lab and office brings its own benefits and rewards. Indeed, most researchers who do take the plunge find it fun.

With its examples of successful communication, and advice from active researchers, this guide can help to ensure that your first experiences of 'going public' are highly rewarding too.



Sir Robert May
Chief Scientific Adviser and Head of the Office of Science and Technology

Going Public

An introduction to communicating science, engineering and technology

A brief survival guide to working with the public

With pressure on scientists and engineers to deliver tangible and useful results, and to fuel the academic paper chase, it may seem perverse to suggest that researchers take on another task. As we hope to show here, there are good reasons why it can be both fruitful and enjoyable to put time and effort into 'going public'.

Why bother?

First and foremost, communicating science and technology to the public can entertain - both the communicator and the audience. And communication need not be a one way process. As we will show, there are plenty of opportunities for scientists and engineers to become personally involved in helping to improve public understanding of science, engineering and technology. In the process researchers can improve their own understanding of the public, and the scientific issues that concern people.

Report back

For most researchers, much of the money invested in their research comes, directly or indirectly, from the Government. The taxpayer picks up the bill.

Researchers expect the public to continue to support their research through government funding. Such essential tasks as chasing grants and dealing with research assessment exercises are one part of the process of accounting for how academic researchers spend the taxpayers' money. Likewise companies are also an important source of income, and scientists are accustomed to producing reports when such organisations commission research from them.

But while enlightened self-interest might be enough to encourage researchers to go out and evangelise to the academic community and to immediate customers, these activities do little to reduce the ignorance, and sometimes fear, with which many people approach science. The general public is also your customer and deserves to be kept informed.

Peer Review

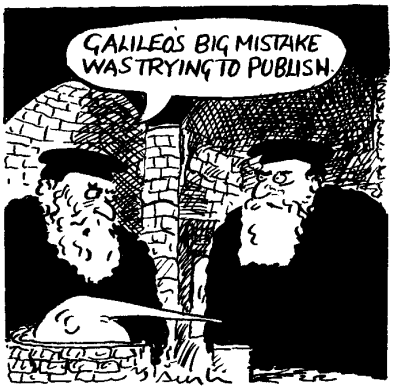
Communication to a wider audience can also help to inform others in the research community of your own activities, an increasingly important function in these days of research that crosses and breaks down the boundaries between disciplines. The pace of science and technology is so rapid that it is impossible for working researchers to have a thorough understanding of all but a tiny area of science. Everyone, then, is a member of the 'public' and an 'amateur' naturalist may well know more about some aspects of modern biology than many a particle physicist or materials engineer.

Home base

In a university, your audience consists not just of readers of the newspaper or magazine that has commissioned an article or chosen to report on your activities. Your vice-chancellor, perhaps even the head of department, certainly the heads of the research councils, all are members of the general public. Getting through to them can have more impact than you might think.

Outside the academic world, there are many different publics, and numerous ways of reaching out to them. The most visible route in enhancing the public understanding of science and technology is through the media. Every day millions of people read newspapers and watch TV programmes. Then there are magazines and radio programmes.

Talks and lectures are another way of enhancing public understanding. Every day across the country scientists stand up in front of audiences that include retired people, women's



"For most scientists, communicating to the public is still not something that comes immediately to mind. We've got to accept that open communication is part of our duty. This isn't to say that every scientist should be compelled to appear in person on TV or radio, or to write for the press; but we should all think about how we can make our work accessible."

Professor Colin Blakemore FRS, Oxford University

groups, people in business, local science associations, schools, further education groups and so on. Each audience poses particular challenges and opportunities.

Beyond the media and the lecture hall there are local museums and science centres. Then there is the annual National Week of Science, Engineering and Technology, the Edinburgh International Science Festival and the Annual Festival of the British Association for the Advancement of Science. Every one of these, and numerous other events, depends on active researchers to give lectures, put on exhibitions, conduct demonstrations and open their laboratory doors to the public and generally make themselves available.

The next generation

When thinking of possible audiences, it is all too easy to overlook schools. They can be as important a target as any. Science depends on a constant flow of bright youngsters; and on a note of self interest, university researchers know all too well that if they fail to recruit undergraduates their funding will decline. Give science a higher profile and you might help to ensure your own job security.

Fun factor

There are, then, many reasons for communicating science to the public. Not least of these is the enjoyment and satisfaction that it can bring.

To a large extent, researchers are pushing at an open door when they go out to talk to the public. Opinion polls and surveys carried out over many years have shown that people are as interested in science and medicine as they are in politics, sport, economics and many of the subjects that seem to obsess the media.

Cheap jibes

It would be unfair to obscure the fact that going public can have its drawbacks. Even eminent scientists who have been active in the media admit that colleagues do not always greet their expeditions into the public domain with enthusiasm. There are dark hints that research has been oversimplified, or somehow cheapened.

There is only one way to deal with this response, often inspired as much by jealousy as misconception. Ignore it. They're wrong.

And for all the dire warnings that follow, avoiding the pitfalls that are highlighted in this guide is a piece of cake for anyone who has negotiated a career in scientific research.

Each route to the public requires different skills. You probably know which you are best at, if not the notes that follow can help you to decide which path to take. This brief introduction cannot hope to cover every mechanism deployed in bringing science to the public. It can sketch out some of the key attributes required.

Fortunately, quite a few organisations realise how important it is to improve the Public Understanding of Science, Engineering and Technology, a label that is, if we take our own advice, far too clumsy to appear again in this document and now becomes PUSET. They have developed resources and material to guide you on your own expeditions into this new territory. Key contacts in PUSET are listed later in the resources section (See page 16). Here we hope to show that the task of going public is by no means insurmountable.

Working With the Media

"The fact is that much research is interesting and newsworthy, if only scientists would be prepared to spend time not only explaining the content but also the context of what they're doing. It's almost a rule, I've found, that the best people in their field can explain and are willing to explain what they're doing."

Bill O'Neill
Editor, *Guardian* OnLine

When dealing with the media never forget that different audiences come to science with different levels of understanding. Remember this fact of life whenever you consider writing about science, or when a journalist wants to ask you questions.

Food chain

Popular science magazines and publications from learned societies can assume some familiarity with the language of science. They also have room for longer articles. This is one reason why it makes sense to start your journey into the popular press with one of these publications. Do remember, though, that while the specialist press might be writing for an audience more knowledgeable than a newspaper's readers, even these publications reach a general audience in comparison with journals dedicated solely to research papers.

Further down or, depending upon your viewpoint, up the editorial food chain you have to assume less and less knowledge. Space is harder to come by in the broadsheet newspapers *The Guardian, The Times, Financial Times* and so on. Every word has to count. Don't expect either your own article or those by science writers to include the credits and the qualifications and provisos that add rigour to scientific papers.

The hardest audience to satisfy is the tabloid newspaper. Don't even try it. Well, think long and hard. There are tabloids and tabloids. But few have a specialist science correspondent. It might be best not to court them, but if they come your way, be careful and follow the advice elsewhere in this brief guide.

Turf wars

When you do want to rub shoulders with the media, there are two key questions: How do you get their attention? What do you do when the media show interest in your expertise?

To answer the first question, you need to know a bit about the battle that science writers themselves have in 'selling' articles. Science writers generally have a science degree, many have research experience. But most of them have to pitch stories to a news editor who has little sympathy for, or understanding of, science. News editors also receive offers of stories from a team of reporters who want to write about juicy scandals, ' 'orrible crimes', City chicanery, you name it.

The need to sell ideas to a news editor, or an editorial meeting, can colour the shape of a story, or the direction it takes. Science writers rarely bend' articles to get space in the paper, but they may emphasise aspects or use language that makes scientists blanche. The word 'breakthrough', for example, upsets science journalists as much as it perturbs researchers. But if the writer doesn't use this language, there's a fair bet that it will be introduced by the sube-

ditors whose job is to take a writer's words and cut them to fit the space available. As well as 'improving' the text, subeditors also write the headlines- so don't blame the journalist for misleading headlines.

Lack of control over the fate of a story is one reason why journalists bristle at demands, or even requests, to see articles before they appear in print. The version that the writer produces can be very different from the printed one. By all means offer to make yourself available to confirm facts and details, but refusing to talk unless you are shown the result is pointless.

In your own write

As we said earlier, specialist publications are usually the best outlets for your first forays into popular writing. Some newspapers do commission articles from working scientists, but usually from people with a track record. In any case, articles in the trade press can spark off newspaper articles. They can also end up as cuttings in a newspaper writer's filing cabinet, to be dredged up when the topic resurfaces. That is when the phone calls can start to come in.

Whoever you write for, you have to get the language right. Keep your readers entertained with clear, colourful, punchy language and a humorous touch where possible. Done well this will not detract from your argument, in fact it will enhance the points you want to make. It will certainly keep the reader's attention.

Please release me

Ever wondered why your latest paper went unnoticed while a very similar publication made the headlines months after your seminal work hit the journals? Perhaps the competition put out a press release.

Press releases come from many different directions. The more 'street wise' journals, *Nature* and *Science* for example, ensure that the media know about newsworthy papers. Your funding body may also be interested in promoting your results. The Medical Research Council, for example, publishes a steady stream of press releases, about one a week, most of which command attention. The next line of attack, has to be your university or institute, although some issue press releases so often that journalists become immune to them.

While there are fairly simple rules to writing a press release - COPUS has published a guide in its *Bringing Science to the Public* series (see resources) - it is just as well to leave it to the professionals to write press releases. But they need your help. First

"It is vital to remember two things: find the human interest angle, and avoid jargon like the plague. Copy on new research written in a dry, academic style, no matter how accurate scientifically, will be returned swiftly by the news editor with colourful comments."

Nick Petford, Royal Society Fellow in the Department of Geological Sciences at the University of Kingston, was a Media Fellow in 1995. He spent his time with *The Times Higher Educational Supplement*.

the press office needs to know that you have something to say. Begin with a phone call followed up by a copy of your paper and a one-page description of what it says and why it is important.

When the release goes out, make yourself available to field queries. Don't disappear for a two-week conference in the middle of nowhere. All science journalists, and their publications, have their own interests and ways of approaching stories. So writers usually follow up a release with a call.

Pictures

A good picture, or a 'photo opportunity', can help to get a story into print. If you do have a photogenic topic, offer photos. You don't have to send expensive glossy prints: a black and white photocopy and the opportunity to get the real thing, will do. Do not, though, expect anyone to show much interest in pictures of shiny new equipment even when you do show people in the pictures. (Photos without people in them stand next to no chance of publication.)

When the phone rings

Sending out a press release on your research is no substitute for talking to journalists. If the phone rings and someone wants to talk about your press release, at least you should know what the writer is on about. What if they want to talk about someone else's research or the subject in general?

The main problem with a cold call is that you haven't had time to prepare yourself. If you need this, there is nothing wrong in asking for 10 minutes so that you can retrieve something to refer to, or just to jot down a few notes. Ask the journalist about their deadline and what they are writing about, then get them to call you back or return the call yourself.

Even when you are answering a call, it isn't a bad idea to take notes. Then you will have something to check the story alongside when it appears. Be clear about the basis of any call. Even journalists can get confused about what is 'off the record' (what you say is not to be used, so it is best not to say anything on this basis) and 'unattributable' (use it but don't say who told you).

Broadcast views

Broadcasting has many things in common with print journalism. Radio and TV journalists also have to sell stories to news editors and programme planners. With limited air

time available, the fight for time can be even more competitive. Television also has the natural demand for pictures. Without them, it becomes much harder to sell a good story.

After the obvious similarities, broadcasting is very different from print journalism. TV offers fewer 'media opportunities'. Only superstars and 'important people' become regulars. Lesser mortals can, though, help: TV reporters welcome useful contacts they can call on.

World view

There are areas of broadcasting where time is easier to come by. The World Service of the BBC, for example, can deal with stories in more depth, but it has to assume that English is not the native tongue for many listeners. When seeking outlets for stories, never forget the BBC World Service. With an audience of 130 million or more, it gets to listeners in parts of the planet that other media just cannot reach.

Any university or research institute needs to maintain good relations with the local community. Local radio stations are important outlets here. Don't overlook them. Many local stations welcome the opportunity to work with research institutions in their area. They also offer a great opportunity to develop your own broadcasting skills.

Courses for horses

Appearing on TV can be intimidating. There is a whole industry that runs (often expensive) courses to prepare people for the ordeal of the TV studio. Courses can be invaluable to individuals who are likely to be called on to make regular appearances, either because of their position or because of their subject, but for most scientists this is a waste of time. There won't be enough media opportunities to justify the effort. So here's how to survive without making a complete fool of yourself:

- ***As in print journalism, different programmes have different agendas. When TV wants to use you as an expert, ask about the programme that you will appear on. You need to know the level of the audience. Horizon and Science Now are very different from local news programmes.***

- ***What will be the line of the questioning?***

- ***Will it be live or recorded?***

- ***Who else will appear? (Are they setting you up for a row with someone you violently disagree with?)***

- ***Think carefully about your answers. You can hope to convey only a small number of key points. Think about these in advance so that you can answer questions naturally and without reeling off pat responses. Avoid scientific jargon like the plague.***

- ***Don't gabble. Talk slowly. Don't move around a lot. (Cameras hate moving targets, and microphones aren't too impressed either.) Avoid jargon...***

- ***If you are going to appear on TV, choose your clothing with care, or you could come across as yet another scruffy scientist.***

"Working scientists have the advantage of being able to add a personal touch and to convey some of the tensions and excitement of the subject first hand. To bring this out it helps to start the collaborative process at a very early stage in an article's gestation."

Richard Stevenson, Editor, Chemistry in Britain

CASE STUDY:

A Media Fellow at the Pink Un

Today's newspapers may be littered with columnists, but few of them can claim also to be working scientists. Andrew Derrington, Professor of Psychology at Nottingham University, writes regularly in the *Financial Times*, an assignment that, he says, landed in his lap after he had spent a time with the newspaper as a COPUS Media Fellow.

"I got involved in writing through the Media Fellowships Scheme partly because I was fed up that I'd never been interviewed in English," says Derrington. "I had been interviewed twice in Spanish," he adds. But there was another reason for wanting to try his hand at writing. "I'd thought for some time that I could write well as a scientist and I thought I'd like to see whether I could do a decent job of journalism."

Derrington shows that it is possible for scientists to write about subjects that are well removed from their own expertise. His own research is into how the brain decodes the signals that come from the eye. In his column Derrington writes about anything in science that appeals to him, from electrically conducting plastics, to how babies learn to speak. "I love the stimulus to broaden my interest and cover other areas of science," he says. Another challenge, he adds, is "to write things clearly and simply enough to get them past the subeditors".

His experience at the FT taught Derrington a lot about the working of the media and the problems of the science journalists. "They have to express the scientist's story in an interesting way, in very few words, and in very little time. But above all, the story has to compete for space in the paper with everything else happening that day."

Watching the press in action can be interesting, says Derrington. He ended his spell at the FT covering the annual meeting of the British Association for the Advancement of Science. There he saw the writers hunting as a pack and trying to cover a meeting with dozens of simultaneous sessions. "My general impression," Derrington explains, "is that they are a highly professional group of people, with a very difficult and very enjoyable job."

Derrington is not so complimentary about some of the scientists he encountered. He found them "rather childish" in their attitudes towards the press. Most of the journalists, including Derrington, had to write three or four stories every day. "They could only do this by ignoring the lectures and working from advance copies of papers and from the press conferences," he explains. "Resentful scientists sometimes deliberately obstructed this strategy, treating the journalists like students who wanted to pass an exam without having done any work, making statements at the press conference that would only be understandable to people who had attended their lecture."

Derrington says that the BA meeting also taught him the real meaning of pressure. "There is nothing quite like having to write three stories, on completely different topics about which you know absolutely nothing, within three or four hours."

Back to school

Schools pose particular challenges as an audience. They are not like the readers of, say, a popular science magazine or people who deliberately choose to go to a public lecture. School students, they don't like being called pupils these days, can bring with them a fair dose of scepticism, if not downright apathy. They can, though, provide researchers with an audience whose enthusiasm, and ability to ask challenging questions, far exceeds that of any technical conference.

To a school audience, science can be something that is inflicted upon them. You have the opportunity to persuade youngsters not only that science is fascinating, and well worth studying, but also that scientists are ordinary people who just happen to 'do science' rather than sell cars, work in banks or play football for a living.

Play to the audience

You have to counter the view of scientists spread by parts of the media and others. A good way to confirm pupils' fears is to give a talk that is little more than a toned down version of your usual scientific presentations.

By providing a role model for the youngsters of today, you can do your small bit to counter the decline of science as a subject that youngsters choose to study.

The first thing to remember is that schools have changed a lot in recent years. No matter how young your own scientific career may be, it is a fair bet that you would find it difficult to recognise a modern science class. Remember too that schools are busy teaching the National Curriculum. They have little time for luxuries that don't meet this objective.

The best way to communicate the thrill of science, not to mention its value, is to help schools in their scientific endeavours, perhaps by assisting pupils in their own investigative work. Demonstrations and experiments are far more compelling than a talking head. And since research is what you do, that is the activity to push in the class. Leave it to the professionals to do the teaching.

It is well worth remembering that just as the classroom isn't the sole venue for working with schools, you can work with teachers as well as students. Many laboratories and departments hold open days and sessions for teachers. They too need to have their knowledge, and enthusiasm for science, topped up. One of the year's larger meetings for teachers is the annual meeting of the Association for Science Education.

Practical advice

Standing in front of a classroom can be even more intimidating than addressing a lecture hall packed with your peers. The MRC has produced a brief 'crash course' that details the pitfalls facing scientists face when entering the lions' den:

- ***Talk to the teacher in advance about the subject you will deal with***
- ***Find out what the audience already knows***
- ***Check the technical terms you want to use with the teacher***
- ***Pick three key points to get across***
- ***Don't talk for more than 15 minutes in the formal presentation***

Here's how to get it wrong:

- ***Talk way above their heads***
- ***Tell them nothing new***
- ***Give them any old presentation, they are only school kids after all***

Slides are as important for schools as for other audiences. Check the advice in the section on public lectures.

Scheming

A good way to work with schools is to attach yourself to one of the many schemes run by the research councils or professional bodies. For example, PPARC and the EPSRC run an ambitious Pupil Researcher Initiative, which places PhD students in schools. The objective is to make science more interesting to young people, particularly those between 14 and 16. To underline the need to get it right, the scientists go through a one-day briefing session.

It is unfair to leave it to young researchers to make all the running with schools. They may be the best ambassadors for science and engineering, but the initiative should come from the top. If the head of the department considers schools to be important, and shows it, PhD students are more likely to join in the fun.

CASE STUDY:

The Right C60 Chemistry

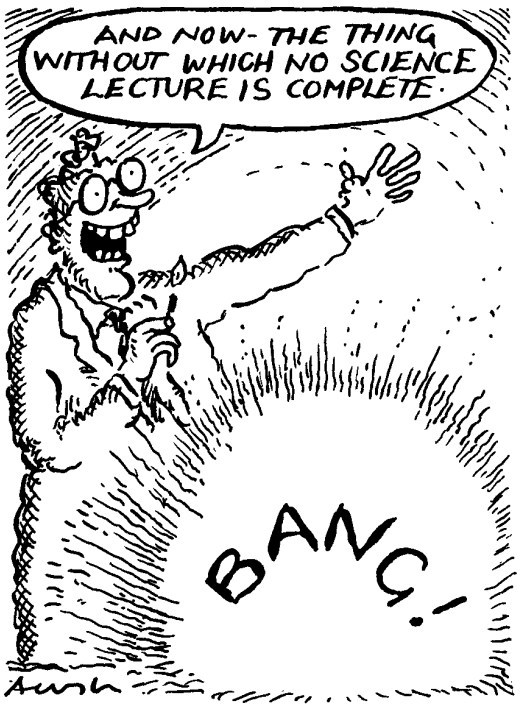
The science of fullerenes, the strange molecules with 60 carbon atoms, is well and truly at the frontiers of modern chemistry. And yet schools can also study this newly discovered form of carbon. One of the world's leading research teams in C60, led by Professor Sir Harry Kroto at the University of Sussex, works closely with school groups, through talks, open days and workshops.

The Sussex group participates in dozens of events every year. "Some of our best work has been helping schools to develop their own fullerene programmes," says Dr Jonathan Hare, a member of the group. "I have never had better questions about C60 science than with sixth forms," says Hare.

Before 1990, chemists found it very hard to make fullerenes. In 1994, with the help of the Sussex team, a sixth form group at Angmering School in Worthing, West Sussex, became the first school anywhere to design and build its own fullerene generator.

Working with schools grows easier all the time, says Hare, as he gets to know how different audiences will respond. "I used to worry about giving talks. Now I just slap the overheads together and pick up the samples."

Hare believes that it is important to help school groups to do 'hands on' work. "There has to be a practical bias in science. You have got to be making things."



Hare's advice is not to think that the audience is stupid and to get the language right. "Many lecturers haven't got a clue about what other people know. The answer isn't to make it simple. You should keep it quite hard, but give it in a language that people can understand."

"To explain what you do to a school or sixth form audience, without jargon and with few assumptions about previous knowledge, is a substantial challenge; but it can help you to think in fresh and simple ways about your own research. And it can also help you to expand your horizons and to avoid being too narrow in your knowledge and your thoughts."

Professor Colin Blakemore FRS, Oxford University

CASE STUDY:

Finding the Art in Science

There are many ways of approaching the public understanding of science. Matthew Holley believes that researchers can achieve a lot by helping to bring art and science together. He put his thinking into practice in the *Look Hear* exhibition, now on the road after a spell at the Wellcome Centre for Medical Science in London.

The exhibition brought together the science of the ear with paintings, ceramics and sculpture inspired by the science. The science came across through photographs, models and videos.

Holley's objective was to integrate science and art and to persuade people to come in off the street, without saying, this is science and you have got to learn about it. In this way he hoped to get through to people who might otherwise avoid anything labelled with a science tag.

While *Look Hear* was an art show, "I hoped that visitors would pick up some science in the process," says Holley. "I wanted to get science to people who would otherwise have nothing to do with it." He believes that getting artists interested in science is a way of reaching a wider audience. "We tried to present science to the public through art."

Some scientists are less than enthusiastic about this approach, Holley admits. But a lot of scientists did enjoy it and the exhibition certainly went down well with the public. "It did hold their attention," he says.

Holley's own research, in the Department of Physiology at Bristol University, is into the ear. "This is a remarkably precise mechanically tuned piece of apparatus," he explains. "It is built before you are born and never repaired during your lifetime. I study the delicate mechanism which converts sounds into electrical signals, how this mechanism develops and how it might be repaired following damage, for example, by loud disco music, personal stereos, antibiotics and age."

It was Holley's interest in ceramics that took him to a local art school. There he found that people were interested in his science. He ended up giving talks on hearing. This led to the idea of the exhibition, which received financial support from the Wellcome Trust. Putting the exhibition together was hard work, Holley admits, but it gave him the opportunity to bring science not just to the public, but to artists.

It is important to reach a wider audience if you want the public to be able to understand. Only then can people deal with more difficult questions. "As a scientist you have to ask yourself what are the real implications of the research that you are doing," says Holley. "If people don't understand the science, they certainly cannot deal with the ethical issues that it throws up," he says.

It isn't so much the combination of art and science that interests Holley. "The real driving force comes not from trying to mix the two, but from mixing scientists and artists," he explains. Scientists can play an important part by going out into art colleges, for example, and talking to artists, enthusing them about science and persuading them to deal with it in their art.

The Lecture Circuit

With the chance of reaching many thousands through the printed word, millions through broadcasts, the lecture hall seems like small beer. It is, though, somewhere that an audience can ask questions, or even answer back. Think of lecturing as the scientific equivalent of the stage actor. You can repeat the same role, improving it as you go along, responding to the audience.

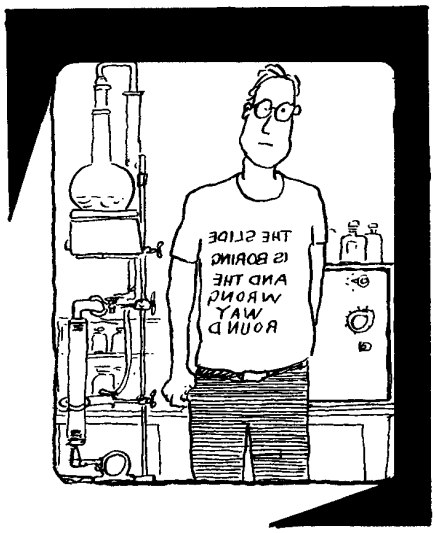
Talk talk

A live audience can see that scientists aren't all hand waving maniacs with strange accents, but are mere human beings who can explain what they are doing in terms that everyone can understand. In other words, public lectures give us the opportunity to hold a dialogue with the people who pay not just our salaries but also the cost of our expensive hardware.

Remember that for many people in an audience, you could be their one and only encounter with a real scientists. Get it wrong and you mess things up for everyone else.

Know it all

As a scientist, you do, of course, know about everything from particle physics to the origins of life. You don't? Well, you may have to break that gently to your audience.



No matter how fascinating your talk on the discovery of the Higgs boson, someone will ask about BSE, chaos, relativity. Be prepared to duck the issue. But do it in a positive way that explains the complexity of science. (Here is where you point out that it is impossible to prove a negative effect, that something is completely safe, only that the risk is very very small.)

The key to speaking in public is to match your talk to the interests of the audience. They may have chosen to invite you to talk to them and to turn up, but that does not mean that they will sit quietly through an hour of boring and irrelevant information that they cannot understand.

So you have to ask yourself two questions: Why should anyone be interested in what you have got to say? Why is your subject important?

You also have to ask yourself about the audience. If you are talking to a bunch of business people, then they will be interested in the economic implications of what you are saying. A general audience, on the other hand, will have very different interests.

As in any PUSET activity, you will fall flat on your face if you ignore the needs of your audience. You may get away with illegible and scribbled slides when delivering a scientific paper- your audience almost expects it, as a sign of how new the results are, and will be suspicious of anything too flash- but a general audience may well have sat through many a multimedia extravaganza. You can't compete with the flashy presentations of corporate PRdom. You can follow a few simple rules:

- ***Visuals make a big difference. But they need careful preparation. Transparencies can be better than slides as you have more control over them and they are less likely to go wrong.***
- ***Check that the appropriate equipment is available.***
- ***Don't clutter your slides. Only three or four points per slide***
- ***Don't rush through them. No more than 1 overhead per 2 minutes of your talk***
- ***Check the order in advance***
- ***Look at the audience rather than the screen.***
- ***Don't talk from a prepared script. No matter how well written, it will sound dry and formal. Use speaking notes or bullet points.***

Professor Frank Close, scientist, broadcaster and author, has travelled the world to talk about the fundamentals of physics. He has some very simple advice on giving decent talks. "Copy the good things from talks you like, and note the bad things in bad talks and ensure that you do the opposite."

CASE STUDY:

Talking of Volcanoes

There aren't any active volcanoes in Britain. This is one reason why Hazel Rymer likes to give talks to the public. Her audiences, from such groups as the University of the Third Age and schools, as well as local geological societies, include people who fund her research as a volcanologist in the Earth Sciences Department at the Open University. Rymer's expertise is in geophysics, in measuring gravity and how the ground deforms around active volcanoes. One objective is to be able to predict when volcanoes will erupt, not a threat that many people face in Britain.

"I see it is partly a duty to accept invitations to talk," says Rymer. "You have to ask yourself why anyone in Britain should pay to study volcanoes. Volcanoes can influence the environment, especially our climate," she adds, "but I still feel that I have to explain myself to the taxpayer." Of course, researchers also have to justify their work to their peers, but, says Rymer, "It is harder to impress the public."

Rymer also enjoys her encounters with the public. "I wouldn't do it if I didn't enjoy doing it," she adds. "Some of the questions people ask are often very leading," she adds. "They bring in so many other aspects of science and technology." It doesn't happen very often, says Rymer, but from time to time a question sparks off a new train of thought, or an idea that is worth pursuing.

While Rymer says that she would continue her work to improve the public understanding of science anyway, she agrees that it helps to be funded by an agency that positively encourages its researchers to go public. As a Royal Society Research Fellow, it is almost a part of the job description. Other research funding bodies are gradually taking up the idea that the scientists they support should actively promote the public understanding of science. Some funding agencies even allow grant holders to claim some of the costs of going public.

Is it hard work to prepare for close encounters with the public? Not now, says Rymer. "The more you have done it the easier it gets," she explains. "You also get a lot less nervous."

You don't have to make copious notes to give a talk. "My notes are just a list of slides," says Rymer. "And I always take lots of props. If you have plenty of familiar objects that you can talk about, you know you won't get tongue tied," she explains. "And I do slide shows. I can always show pretty pictures of volcanoes," she admits. Most researchers should be able to come up with something reasonably entertaining, or visually appealing.

You may have to 'cheat' a bit in picking your props. Rymer herself would never claim to be a geologist, but she does take along pieces of rock that she can pass around an audience. Apart from making it easier to talk about the research, props are a good way of prompting questions. And questions are an important part of the exercise, says Rymer. "Any question shows that people are interested in what you do," she explains. "That fires you up a lot."