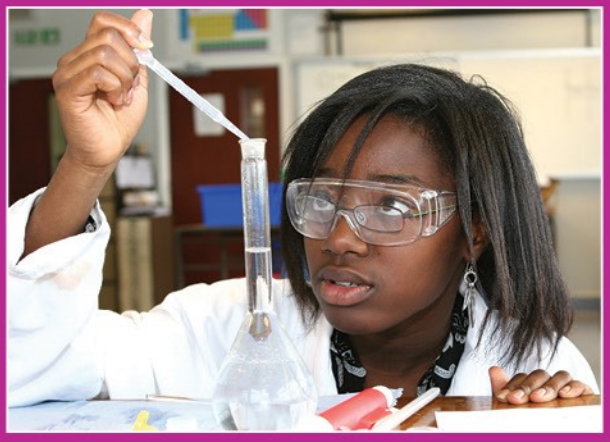
Ipsos MORI
Social Research Institute



PUBLIC ATTITUDES TO SCIENCE 2011

Summary Report
May 2011

BIS | Department for Business Innovation & Skills

Contents

Foreword

I am pleased to present Public Attitudes to Science 2011, the fourth in our series of such studies, enabling trends to be measured back to 2000.

Since becoming Science Minister, I have been particularly struck by the way people react to scientific issues. The complexity of their attitudes is vividly illustrated in this study, which has used a broad methodological approach to get to the heart of how people feel about science, how they engage with it, the trust they place in it, and the role which it plays in their lives and careers. The results show that attitudes to science are not simple or one-dimensional, but subject to nuances including age and personal circumstances. I was interested, for example, to read the report's conclusion that attitudes to science change and develop as individuals became more exposed to science.

There is much food for thought here, on attitudes to science and research, on our approaches to engagement, and the trust which we put in institutions and individuals.

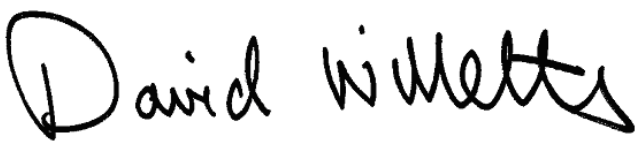
I am pleased to see that the report shows the UK public to be broadly supportive of science. But even with some recent strong advances in strengthening public engagement in the UK, the report suggests that there is still much to do if we are to become a nation where an increasing appetite for science is matched by personal commitment and action.

Given our focus on Growth, I am pleased that so many of our respondents recognise the economic value of science and research, and value the role that both have to play in driving our economy forward. But the results show that there is more to do to increase awareness of the full range of opportunities that are available to those still to enter the job market. The report's conclusion that trust in businesses and their use of science is an issue which may in itself be a barrier to greater interest in the range of career choices available is of note.

In total, the survey presents a picture of a country which is proud of its scientific heritage, and curious to know more.

To encourage that spirit of curiosity further, and rightly to assist transparency of the results in the report, we are making the survey raw data available. I encourage all of you with an interest to make use of that, and help us develop an ever clearer picture of how our attitudes are shaped.

David Willetts MP
Minister of State for Universities and Science



Summary

Public Attitudes to Science (PAS) 2011 is the fourth in a series of studies looking at the UK public's attitudes to science[1], scientists and science policy, building on previous research in 2000, 2005 and 2008. The Department for Business, Innovation and Skills (BIS) commissioned Ipsos MORI, in collaboration with the British Science Association (BSA), to conduct this latest study.

This Summary Report outlines the key findings from the research. A more detailed analysis of the data can be found in the Main Report.[2]

The study finds that people's definitions of science are varied and multifaceted. People often see science not just as a collection of disciplines, but also as a way of thinking or working.

PAS 2011 provides further evidence that the UK public values science and is interested in finding out about it, with two-thirds agreeing that knowing about science is important to them personally. Furthermore, the data indicate that public interest in science has increased since the first PAS study in 2000, with half the public wanting to hear and see more information about science than they currently do. Most also see careers in science as desirable, although there is less enthusiasm for working in science among 16-24 year olds.

The overwhelming majority believe that science will make people's lives easier and that scientists make a valuable contribution to society. People recognise not only science's economic impact but also, on reflection, its impact on policy and on quality of life, as well as its role in entertainment and culture. Most support Government funding of science even for projects that bring no immediate benefits, even in the current context of reduced Government spending generally.

Many of the trends evidenced in the 2008 survey have continued in PAS 2011. Compared to the first PAS study in 2000, and to the 2008 study, more now agree that the benefits of science are greater than any harmful effect, and that scientists want to make life better for the average person, indicating a society more at ease with science than a decade ago.

PAS 2011 also supports the Science and Trust Expert Group's assertion that there is no singular "crisis of trust in science".[3] The public has high levels of trust and confidence in scientists even though, as in previous studies, trust in industry scientists is lower than for scientists working in other institutions. The data suggest that recent media controversies such as "climategate" have had little impact on how much people feel they trust scientists, with a clear majority saying they trust scientists *"about the same as [they] did five years ago"*.

That is not to say people do not have concerns about science. The research finds that many are still concerned about what scientists choose to do *"behind closed doors"*, and the extent

[1] This was based on the BIS definition of science, so explored attitudes not only to science, technology, engineering and maths (STEM) subjects, but also to research more broadly.
[2] See http://www.ipsos-mori.com/assets/docs/polls/sri-pas-2011-main-report.pdf.
[3] Science and Trust Expert Group (2010) 'Starting a National Conversation about Good Science', BIS [p.11.]

to which they consider the consequences of their work. More generally, as in previous PAS studies, the speed of development in science and a sense of science going against nature still worry many people, although the latter is less of a concern than in 2008. The extent of these concerns is topic dependent, with the survey indicating that, among the various topics explored, GM crops, nuclear power and animal experimentation are particularly contentious.

In addition, the public does not always feel well informed about science – fewer people say they feel informed than say they do not. The data suggest people tend to have less of an understanding of the funding and design of scientific research than they do of its outcomes and applications. Many also have a stereotypical view of scientists, largely thinking of them as men, working exclusively in laboratories.

People also tend not to understand how scientists and researchers go about their work. Although people often assume that science is regulated and that data are checked, there is limited recognition of the formalised systems in place for this, such as ethics committees and peer review.

The proportion feeling informed about science has declined since 2008, although the reasons for this are unclear. Trend data indicate that while more find it easy to access information on science now than was the case in 2008, more also now think that science and technology are too specialised for most people to understand, and that the speed of development makes it difficult to keep up. This highlights that feeling informed about science is not simply a case of getting more information, and instead depends on a variety of factors.

The survey-based indicators also highlight the challenge of public engagement with science. While people tend to think that scientists should listen to the public, and that the Government should act in accordance with public concerns, they also tend to be cynical about public consultation. In addition, while many are keen for the public to be involved in decision-making on science issues, most do not want to be personally involved.

There is, however, potential for more of the public to become more involved in public consultation and dialogue on science. Around three in ten state that they either want more of a say, or want to become actively involved in this. It will nonetheless be important to consider how involvement might be widened across more of the public.

Like previous studies, PAS 2011 also highlights the importance of science education, finding that many people feel their attitudes to science, both positive and negative, were formed at school. In all, perceptions of science education are mixed. People tend to be divided over whether the science they learned at school is useful to them today. They also have mixed views of the quality of science teaching, relative to other subjects.

Given large public interest in science, coupled with the need to respond to the public's concerns, the study ultimately reiterates the importance of public engagement with science. The survey suggests there are certain demographic groups that tend to be less engaged with science, so might represent priorities for engagement. These include young people aged 16-24, women and those from less affluent backgrounds (C2DEs). The cluster analysis we have done also underlines that different groups in society require different engagement strategies, and provides a useful starting point for the necessary targeted strategies.

Introduction

In *The Allocation of Science and Research Funding 2011/12 to 2014/15*, the Government acknowledged the importance of science in UK society, through its substantial and increasing impact on public policy, culture, quality of life and the economy.[4] In this context, the Government noted that public engagement with science has never been more important.

Public engagement with science is a core strand of the Science and Society Programme led by BIS. By facilitating greater public engagement, BIS aims to ensure that Government and scientists are responding to public priorities and concerns. In turn, this will enable greater citizen engagement in our modern, technologically-driven society, and with major societal issues such as climate change, while at the same time developing a healthy sense of scepticism among the public towards what they see or hear about science. BIS also aims to attract more children and adults to study and work in science, with the expansion of the science skills base recognised as being vital to the UK's future prosperity.

Public Attitudes to Science (PAS) 2011 is the fourth in a series of studies looking at the UK public's attitudes to science, scientists and science policy. It builds on the three previous studies conducted in 2000[5], 2005[6] and 2008[7], and represents the Government's main mechanism for assessing progress on public engagement with science. The Department for Business, Innovation and Skills (BIS) commissioned Ipsos MORI to conduct this latest study. It was based on the BIS definition of science[8], so explored attitudes not only to science, technology, engineering and maths (STEM) subjects, but also to research more broadly.

This Summary Report outlines the key findings from the quantitative and qualitative research. A more detailed analysis of the data can be found in the Main Report.[9]

Aims of the Research

The broad aims[10] of PAS 2011 were to explore:

- what the public thinks about science, scientists, science policy and science regulation in the UK, and why they think this way;
- how people engage with science and their views on public consultation;
- the perceived impact of science on society, in terms of its impact on entertainment and

[4] See http://www.bis.gov.uk/assets/biscore/science/docs/a/10-1356-allocation-of-science-and-research-funding-2011-2015.pdf.
[5] OST/Wellcome Trust (2000) *Science and the Public*, OST. See http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/wtd003419.pdf.
[6] MORI/OST (2005) *Science in Society*, OST. See http://www.ipsos-mori.com/researchpublications/researcharchive/poll.aspx?oItemId=720.
[7] People, Science & Policy/TNS (2008) *Public Attitudes towards Science 2008*, RCUK/DIUS. See http://www.rcuk.ac.uk/per/Pages/PublicAttitudes2008.aspx.
[8] For the wording of the BIS definition, see http://www.bis.gov.uk/policies/science/science-and-society.
[9] See http://www.ipsos-mori.com/assets/docs/polls/sri-pas-2011-main-report.pdf.
[10] This is a summary of the full list of research objectives, which can be found in the Main Report.

culture, and on the economy;

- perceptions of science as a school subject and a career choice; and
- whether, and how, public attitudes have evolved since previous PAS studies.

Methodology

PAS 2011 used a mixed methodology approach broken into three stages:

- Stage one consisted of a **review of the existing literature** on attitudes to science in the UK and internationally, which has been provided as a separate report.[11]
- Stage two consisted of a **face-to-face survey** of 2,103 UK adults aged 16+[12], generating data which have been weighted to be representative of the UK population, and **four sets of deliberative workshops** with members of the general public.
- Stage three involved a **cluster analysis** of the survey data (a statistical technique used to segment public attitudes), followed by **four discussion groups** with members of the public to explore the emerging clusters qualitatively.

Interpretation of the Data

It should be remembered that final data from the survey are based on a sample of UK adults, rather than the entire population. Consequently, results are subject to sampling tolerances, and not all differences are statistically significant. Throughout this report, **we report only on differences that are statistically significant at the 95% level of confidence**.[13]

We sometimes refer to "net" scores. These represent the balance of opinion on attitudinal questions and provide a particularly useful means for comparing results across a number of issues. For example, if 40% agree and 25% disagree, the "net agree" score is +15.

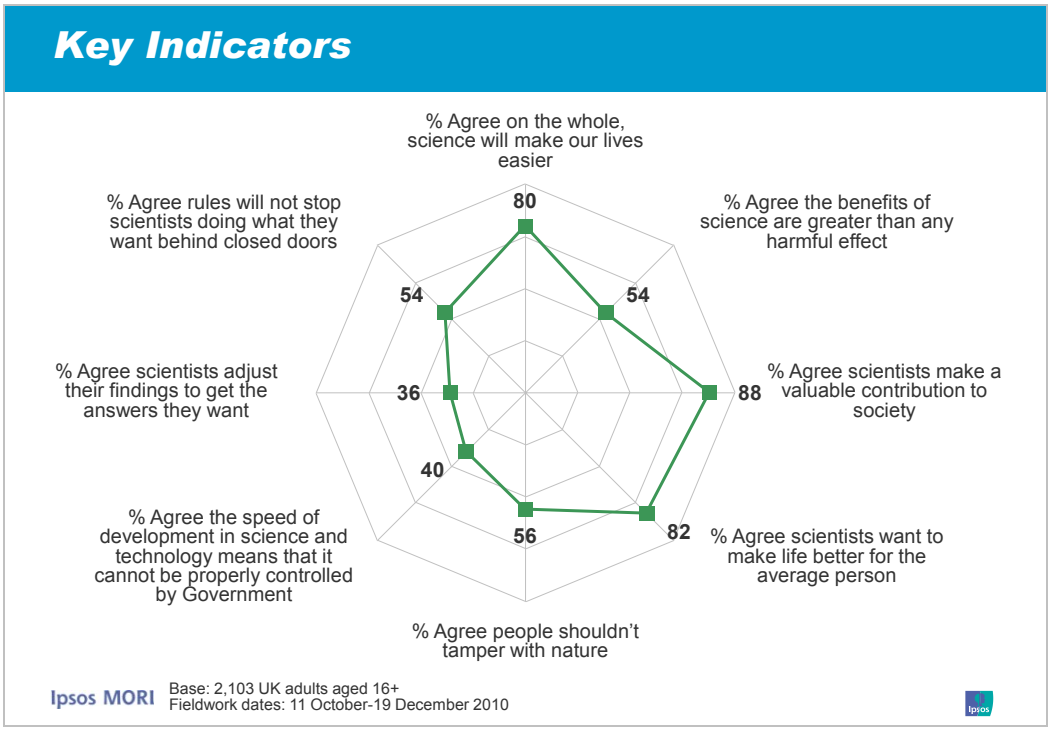
Where possible, we have compared the results of the 2011 survey to those from previous studies. There have been changes to the organisation conducting the research, the survey mode[14] and the questionnaire since the 2000 study, so the trend data should be treated with appropriate caution. Nonetheless, comparison still provides an indication of the direction in which public attitudes have moved in over the last decade.

Where we refer to findings from the workshops, these are intended to provide further context for the findings from the survey, as well as insight into why people may hold certain views. They are not statistically representative. In addition, it is important to bear in mind that we are dealing with people's perceptions, rather than facts.

[11] See http://www.ipsos-mori.com/assets/docs/polls/sri-pas-2011-review-of-existing-literature.pdf.
[12] Fieldwork ran from 11 October to 19 December 2010.
[13] Strictly speaking, confidence intervals apply only to random probability samples, whereas this research, in line with previous PAS studies, used a quota sample. However, in practice it is reasonable to assume that they provide a good indication of the margins of error in quota surveys.
[14] This moved from paper to Computer Assisted Personal Interviewing (CAPI) between 2005 and 2008.

Key Findings

1. How People See Science



How People Define Science

When asked what comes to mind when thinking about "the sciences", most people think of biology, chemistry or physics (36%). The research shows that there is, however, no single accepted definition of science. Instead, different people see science in different ways, and tend to emphasise the aspects of science that are most prominent in their own lives:

- Younger age groups tend to think more of biology/chemistry/physics, which perhaps reflects their more recent experience of science at school. Older people are more likely to mention health/drugs/cures for diseases.
- Those who describe themselves as engineers are more likely than average to mention engineering. Similarly, those who have studied social sciences to a higher level are more likely to mention social sciences.

In addition, while the survey suggests people initially take a narrow view of what constitutes science, the considered responses of workshop participants tended to be much richer, with many ending the sessions expressing much broader definitions of science than they started with.

On the evidence of workshop discussions, these broader definitions often centre on two factors:

- Firstly, people often think anything must be a science if it can be directly linked back to

biology, chemistry or physics. For example, some viewed engineering as a branch of physics, so definitely a science.

- Secondly, when people cannot make this direct link to biology, chemistry or physics, e.g. in the case of social sciences or humanities, many instead appear to judge how scientific these areas were based on the extent to which they incorporated maths, or used evidence and experimentation to prove things. This highlights that people view science not just as a collection of disciplines, but also as a way of thinking or working.

Enthusiasm for Science

As in previous PAS studies, the public generally views science and scientists as beneficial to society:

- Four-fifths (80%) agree that, *"on the whole, science will make our lives easier"* and over half (54%) think that *"the benefits of science are greater than any harmful effect"*.

- Nine in ten (88%) think *"scientists make a valuable contribution to society"* and eight in ten (82%) agree they *"want to make life better for the average person"*. The proportion agreeing with the latter statement has risen by fifteen percentage points since 2000.

- From a list of phrases shown in the survey, people are most likely to pick out serious (48%), objective (41%) and rational (33%) to describe scientists. From this list, they are least likely to associate scientists with being narrow-minded (9%), friendly (9%), too inquisitive (7%) and good at public relations (5%).

In the workshops, the contribution that participants most wanted science to make to society tended to reflect their life stage:

- Younger participants were more focused on technologies and gadgets that would make everyday life easier.

- Older participants thought more about advances in medicine.

Participants were divided as to whether to prioritise scientific developments which would help tackle global issues such as hunger, and climate change, or developments more likely to benefit those living in the UK, such as a cure for cancer.

Concerns about Science

Although people are generally optimistic about science, there are nonetheless many areas of concern about future developments in science:

- Almost half (46%) agree they *"cannot follow developments in science and technology because the speed of development is too fast"* while two-fifths (40%) agree that *"the speed of development in science and technology means that it cannot be properly controlled by Government"*. Both scores have risen four percentage points since 2008.

- Over half (56%) agree that *"people shouldn't tamper with nature"*, although this is markedly lower than in 2008 (70%).

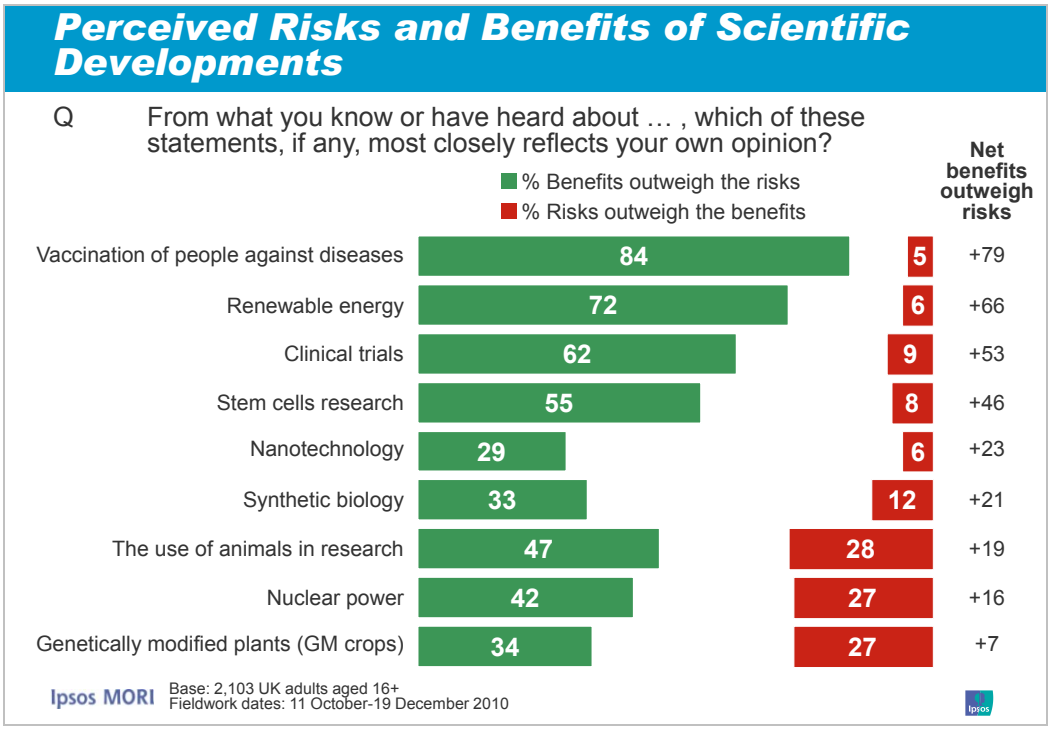
- Regulation is a concern, with over half (54%) of the view that *"rules will not stop scientists doing what they want behind closed doors"*.
- Three in ten (30%) agree that *"scientific advances tend to benefit the rich more than they benefit the poor"*, although this is down eight percentage points from 2008.

These concerns were similarly raised by participants at the workshops, and in addition:

- Some thought recent scientific advances were too focused on commercial gain, as opposed to the investment in science for the good of society.
- A few older participants were concerned about science inventing labour-saving devices to take over human activities and put people out of work.

Perceived Risks and Benefits of Scientific Developments

The survey also asked people about the risks and benefits they attached to various scientific issues. The more contentious of the issues explored, where people are more split over the risks and benefits, are GM crops (+7 net score), nuclear power (+16) and the use of animals in research (+19). These are historically controversial areas of science, and are all issues which have received considerable media coverage in recent years.



Awareness of the How Science Is Done

Despite holding science and scientists in high esteem, people generally have little knowledge of how science is carried out today. The workshops found that people tend to have a stereotypical view of scientists, seeing them exclusively as men and working in laboratories.

People tend to know less about the funding and design of scientific research than they do about the outcomes and applications. This comes across in both the survey and the workshops:

- When thinking about who funds science, people tend to think of Government funding (71%). Fewer than half (44%) mention funding from industry, even though the majority of funding for UK research and development comes from the private sector.
- Most workshop participants had no knowledge of how funding priorities are set, but believed the Government prioritised research that would benefit society.
- Workshop participants had concerns about the transparency of the funding process. None had heard of Research Councils before, but were pleased to hear that they existed to avoid political interests affecting what research is funded.

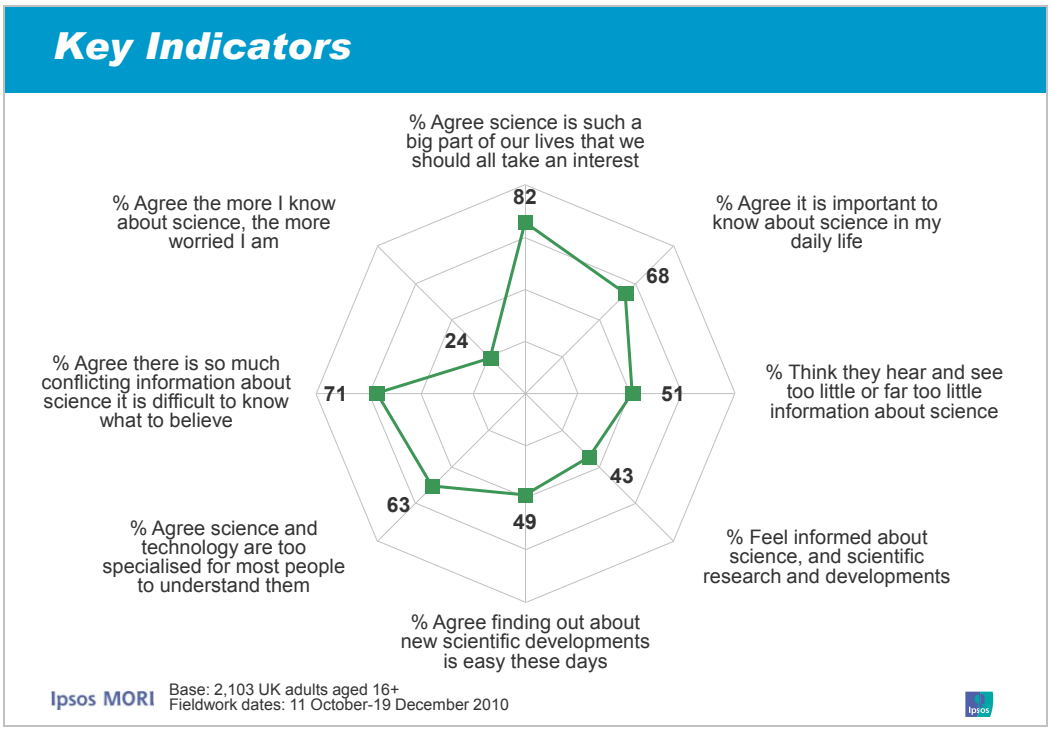
People also have a mixed understanding of peer review:

- Three-fifths (62%) agree that *"before scientific findings are announced, other scientists have checked them"*, but a third (36%) think that *"scientists adjust their findings to get the answers they want"*.
- Our workshops found low awareness of "peer review". When the system was explained to participants, some expressed doubts about the motives of reviewers and how they were picked as reviewers.

Finally, people want to hear more about the wider implications of scientific research:

- Two-thirds (65%) agree that they *"would like scientists to spend more time than they do discussing the social and ethical implications of their research with the general public"*, though this has decreased since 2005 (80%).
- Workshop participants wanted to know more broadly how research informs decisions in policy and in business, and what this means for society and the economy.

2. Finding Out about Science



Interest in Science

The UK public is highly interested in science. Four-fifths (82%) agree that *"science is such a big part of our lives that we should all take an interest"*, with a quarter (25%) strongly agreeing. Two-thirds (68%) also think *"it is important to know about science in my daily life"*. Agreement with both statements has increased since 2000, by nine and eight percentage points respectively. The middle classes (ABC1s) and those with a higher education are more likely than average to agree with both statements.

However, the difference in scores for these two statements indicates that some people see science as important, but not necessarily personally relevant. They think the public should take an interest, but are less willing to do so themselves.

Fewer than one in ten (8%) think they hear and see too much or far too much information about science, suggesting that most people do not feel overexposed to science. Instead, four in ten (38%) think they hear and see the right amount of information, while five in ten (51%) think they hear and see too little or far too little, indicating an appetite for knowing more about science. The proportion saying they hear and see too little or far too little has increased by 17 percentage points since 2008.

Sources of Information

People's most regular sources of information on science tend to be traditional media, such as television (54%) and print newspapers (33%). Only a fifth (19%) say one of their two most regular sources of information is the internet. To put this in context however, some

participants in the workshops actively sought out information on health topics online, but did not always consider this to be information about "science".

Those aged 16-24 tend to read about science less frequently in print newspapers than people aged 55+, and tend to get their information on science more frequently online.

Feeling Informed

Fewer people say they feel informed about science, and scientific research and developments (43%) than say they do not (56%). Women and the less affluent (C2DEs) tend to feel less well informed than average, which is consistent with previous PAS studies. Those with internet access generally feel better informed than those without.

The proportion feeling informed (43%) has actually declined by 12 percentage points since 2008, although it is still in line with the 2005 level. The findings suggest there are many factors at work here. On one hand, access to information and confidence in understanding science has increased:

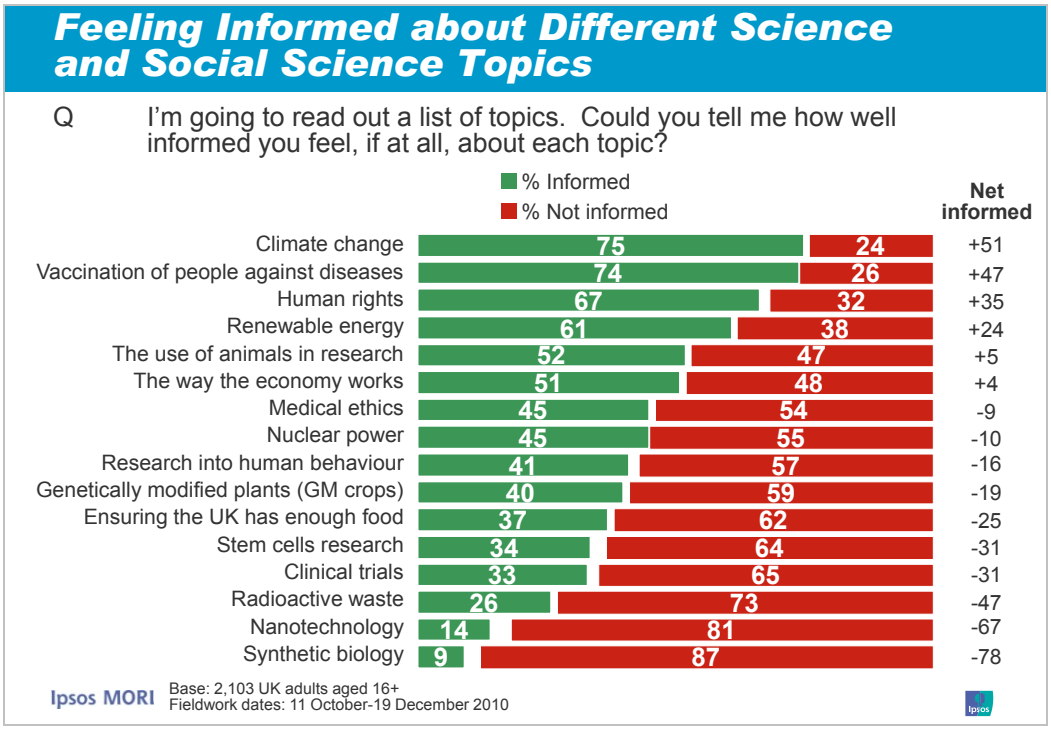
- The proportion agreeing that *"finding out about new scientific developments is easy these days"* (49%) has risen by 13 percentage points since 2000.
- Three in ten (32%) think they are *"not clever enough to understand science and technology"*, but this proportion but has fallen by six percentage points since 2000.
- Just 15% say that they *"don't understand the point of all the science being done today"*, with seven in ten (72%) disagreeing. The proportion agreeing has fallen by 14 percentage points since 2000.

On the other hand, more people now think the complexity of science and the speed of development are making it difficult to keep up:

- Six in ten (63%) agree that *"Science and technology are too specialised for most people to understand them"*, up seven percentage points since 2008.
- Almost half (46%) think that they *"cannot follow developments in science and technology because the speed of development is too fast"*, up four percentage points since 2008.
- Seven in ten (71%) also agree that "*there is so much conflicting information about science it is difficult to know what to believe"*.

How informed people feel also varies by topic. Of the various science and social science topics explored in the survey, people feel most informed about climate change (+51 net informed[15]), vaccination (+47), human rights (+35) and renewable energy (+23), perhaps reflecting the greater coverage these issues receive in the media. People feel far less informed about nanotechnology (-67) and synthetic biology (-78), both relatively new areas of research.

[15] The net informed score is the proportion informed minus the proportion not informed.



The Impact of Feeling Informed

Feeling informed about science often correlates with positive attitudes to science and greater trust in scientists. However, the survey finds that those who feel informed about more contentious scientific developments, such as GM crops and the use of animals in research, are not necessarily more positive towards them, but instead more polarised in their views. This highlights that there is no simple linear relationship between feeling informed and attitudes to science.

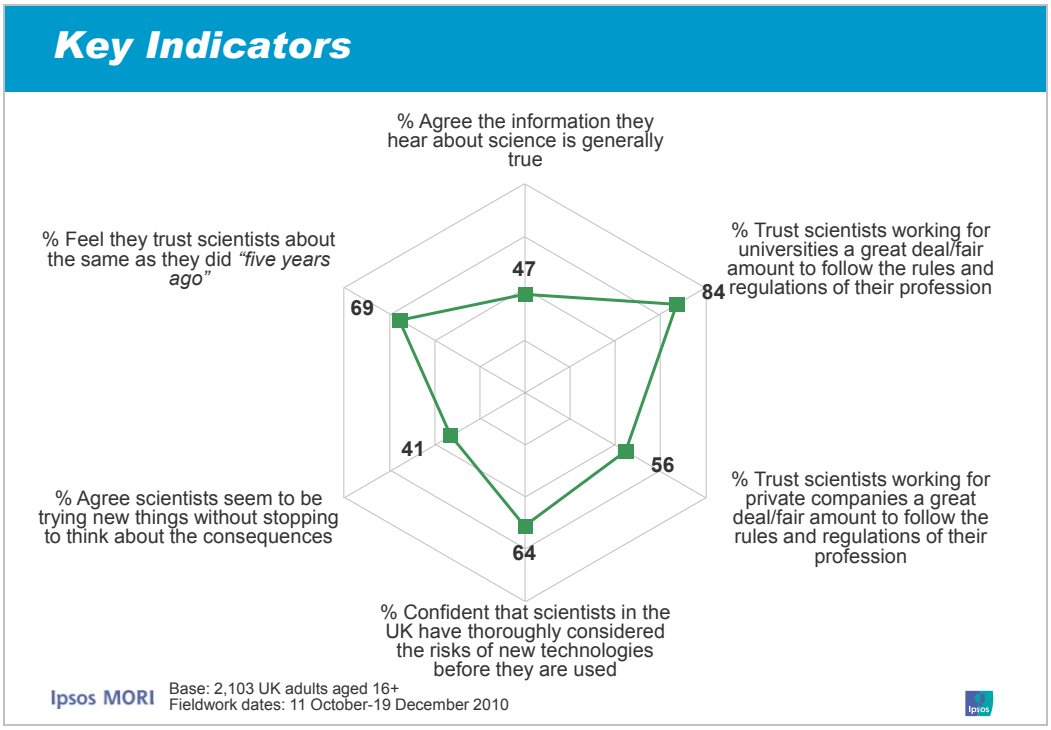
Information and Worry about Science

The survey examined the extent to which more information might generate negative attitudes towards science, by asking respondents whether they agree that *"the more I know about science, the more worried I am"*. Generally, this does not appear to be the case, with just over half (53%) disagreeing with the statement. The proportion agreeing (24%) has fallen by eight percentage points since 2000.

3. Trust in Science

The Science and Trust Expert Group has noted that trust in science is multilayered and depends on a variety of factors.[16] PAS 2011 explored two aspects of trust in science in particular: trust in the information people see and hear about science, and trust in scientists themselves.

[16] Science and Trust Expert Group (2010) *Starting a National Conversation about Good Science*, BIS. See: http://interactive.bis.gov.uk/scienceandsociety/site/trust/files/2010/03/BIS-R9201-URN10-699-WEB.pdf.



Trust in Information about Science

By a margin of more than five to one, people agree that the information they hear about science *"is generally true"* (47% agree, while 9% disagree). However, a third (34%) are undecided.

The reasons people give for agreeing or disagreeing are often linked to whether they think science is regulated or not, or to whether they think scientific findings have been checked. Half (52%) say they would be more likely to trust scientific findings if they knew other scientists had formally reviewed them, suggesting that there is potential to raise trust in science by raising awareness of peer review.

Just under half (47%) also say they would be more likely to believe scientific findings if they heard the same thing from a number of different sources. Two-fifths (39%) say they would be more likely to believe findings if they were published in a scientific journal, indicating that many people do consider the credibility of sources.

These issues were explored further in the workshops, which found that trust in information about science also depended on the channels it came through:

- Participants generally thought that scientific journals were most trustworthy, because they assumed the information in them was checked more rigorously.
- Many were less trusting of newspapers, feeling that they often focused on bad news stories about science. However, participants nonetheless tended to assume journalists writing about science had a depth of knowledge in the area they were writing about.
- Television was more trusted than newspapers for providing science information, mainly because participants felt they could see the evidence for themselves on the screen.

- Many thought the internet had many conflicting opinions on the same issues, so it was more difficult to know what to believe. There were also concerns that some websites were open to anyone to edit, making the internet less trustworthy than newspapers.

Trust in Scientists to Obey Regulations

The majority trust scientists working for various institutions *"to follow any rules and regulations"*, though trust varies by institution. Trust is highest in scientists working at universities (84% trust a great deal or a fair amount), followed by scientists working for charities (77%), environmental groups (72%) and the Government (72%). Trust in scientists working for industry is lower (56%).

Men are more likely than women to trust scientists to follow regulations. Young people aged 16-24 are also more trusting of scientists than average. Those in the lowest social grades (DEs) tend to be less trusting.

The workshops give an indication of why trust in scientists working for private companies and for Government is relatively low. Participants tended to assume that private companies were less focused on making scientific discoveries than they were on making money, so were likely to be more secretive with their work. When it came to Government scientists, some participants thought they would be sacked if they did not say what the Government wanted them to, so felt they were less trustworthy.

Trust in Scientists to Consider the Implications of their Work

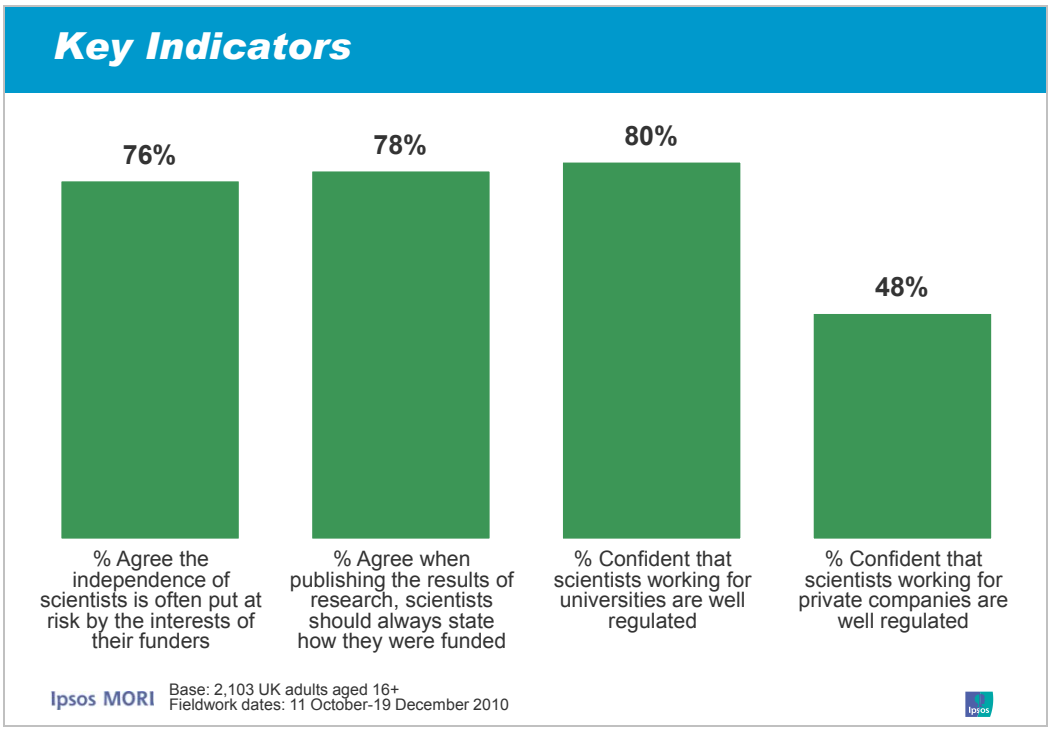
Over six in ten (64%) are confident that UK scientists have thoroughly considered the risks of new technologies before they are used. Just three in ten (31%) are not confident.

However, concern is higher when looking at whether people think scientists consider the implications of their work more generally. Four in ten (41%) agree *"scientists seem to be trying new things without stopping to think about the consequences"*, while just three in ten (30%) disagree. The proportion agreeing has, nevertheless, declined by 15 percentage points since 2000.

Has Trust Changed Over Time?

People do not generally feel their trust in scientists has changed from five years ago, with seven in ten (69%) saying they personally trust scientists *"about the same"*. Moreover, the proportion saying they trust scientists more than they did five years ago is around twice the proportion that says they trust them less (18% versus 10%). This suggests that, while it may have affected trust in climate science, "climategate" has had little long-term impact on trust in scientists as a profession within the general population.

4. Regulating Science



Awareness of Regulation

When asked, unprompted, who sets the rules and regulations for UK scientists, most people (62%) spontaneously think of Government regulation. Few think of self-regulation by scientific professional bodies (13%) or scientists themselves (8%), and very few can name the specific bodies in place such as ethics committees (5%).

The survey also finds that more people think scientific professional bodies and scientists themselves should regulate science than think this is already happening. This suggests that the public would be interested in knowing more about the self-regulation that goes on in science, through systems such as peer review.

Priorities for Regulation

At the workshops, we explored participants' priorities for the regulation of science. Many wanted regulation to deal primarily with conflicts of interest between scientists' research and the priorities of their funders. This concern is also reflected in survey findings:

- Three-quarters (76%) agree that *"the independence of scientists is often put at risk by the interests of their funders"*.
- Eight in ten (78%) agree that *"when publishing the results of research, scientists should always state how they were funded"*.

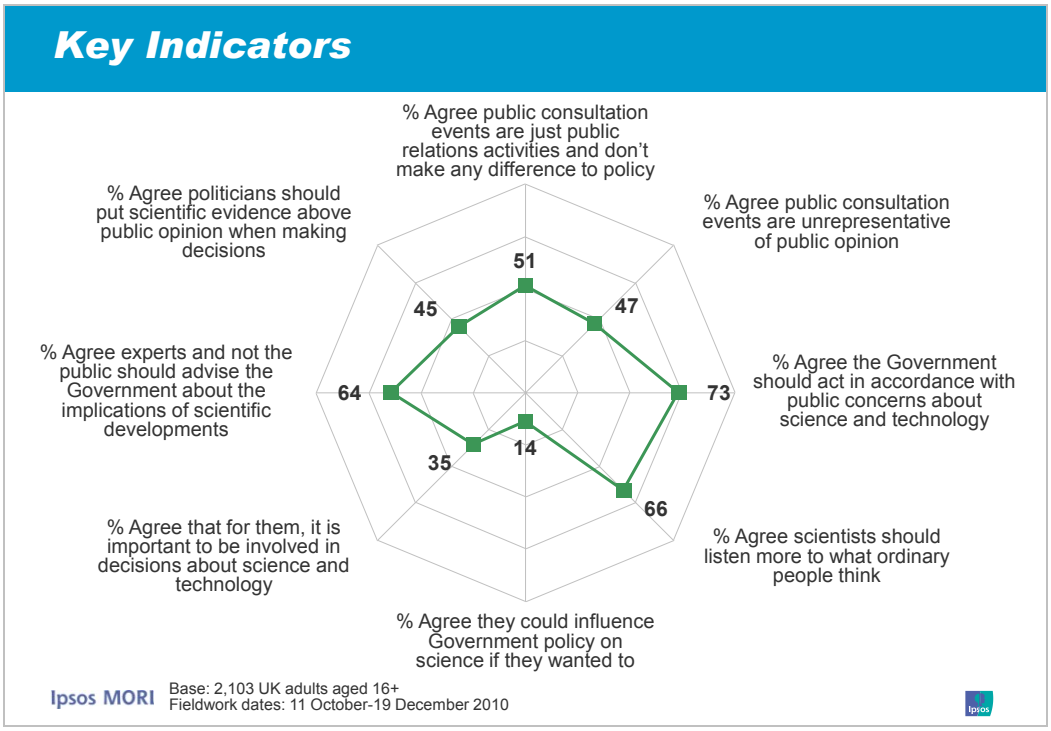
Many workshop participants also wanted regulators to ensure that scientists were not harming people, animals, or the environment both during their research, e.g. during clinical trials, and through any new technologies that they developed. Here, participants did not

spontaneously mention ethics committees or frameworks, and tended to be unaware of their existence.

Confidence in Regulation

Confidence that scientists in the UK are well regulated is generally high. Again, this varies depending on the institutions scientists work for. Reflecting the findings on trust in scientists, people are most confident in the regulation of university scientists (80%), followed by scientists working for charities (70%), environmental groups (65%) and Government (62%). Results are less clear-cut for scientists working for industry – only half (48%) are confident these scientists are well regulated.

5. Public Consultation and Involvement in Science



Awareness and Understanding of Public Consultation

When asked unprompted what "public consultation on science" means, many are confused, with two-fifths saying either that they don't know (17%), saying nothing (16%), or saying they have never heard of it (5%). This stems from a lack of understanding of public consultation in general, a finding which also emerged from the 2008 study.

There is also a high degree of cynicism about public consultation in general. Half (51%) agree that public consultation events *"are just public relations activities and don't make any difference to policy"* and almost half (47%) think that they *"are unrepresentative of public opinion"*. These sentiments are in line with responses in the previous two studies, suggesting people have remained consistent in their views about consultation since 2005.

However, when asked in a less direct way whether the Government should take on board the public's views, people tend to be supportive – around three-quarters (73%) think *"the Government should act in accordance with public concerns about science and technology"*.

Perceived Benefits of Public Involvement

People see a variety of benefits to greater public involvement in decision-making about science. The main benefits mentioned (unprompted) are about allowing the public to make informed decisions about their lives (15%) and enabling them to better judge science issues for themselves (13%), indicating that people tend to value what they could personally get out of becoming more involved.

Perceived Barriers to Public Involvement

When asked (unprompted) to identify the main barriers to having greater public involvement in decision-making about science, the most common reason offered is that the public does not understand science (26%). Around one in five (19%) also think the public are not interested. These views contrast with findings elsewhere in the survey suggesting that there is in fact a high level of interest in science, and that most feel personally capable of processing the information they get about science.

Do People Want to Be Involved?

People think it is important for scientists to listen to ordinary people more than they currently do. Two-thirds (66%) agree that *"scientists should listen more to what ordinary people think"* and just under a fifth (17%) think that *"the public is sufficiently involved in decisions about science and technology"*.

Currently, people do not feel they have much power over decision-making. Under two in ten (14%) agree that they *"could influence Government policy on science if I wanted to"*, while seven in ten (68%) disagree.

When asked if it is important for them personally to be involved, however, there is little consensus. Only around a third (35%) agree that *"for me, it is important to be involved in decisions about science and technology"*, while a similar proportion (33%) disagree. When asked directly how involved they would like to be in public consultation on science issues, half (50%) want to know that the public is being consulted, but not necessarily get involved themselves.

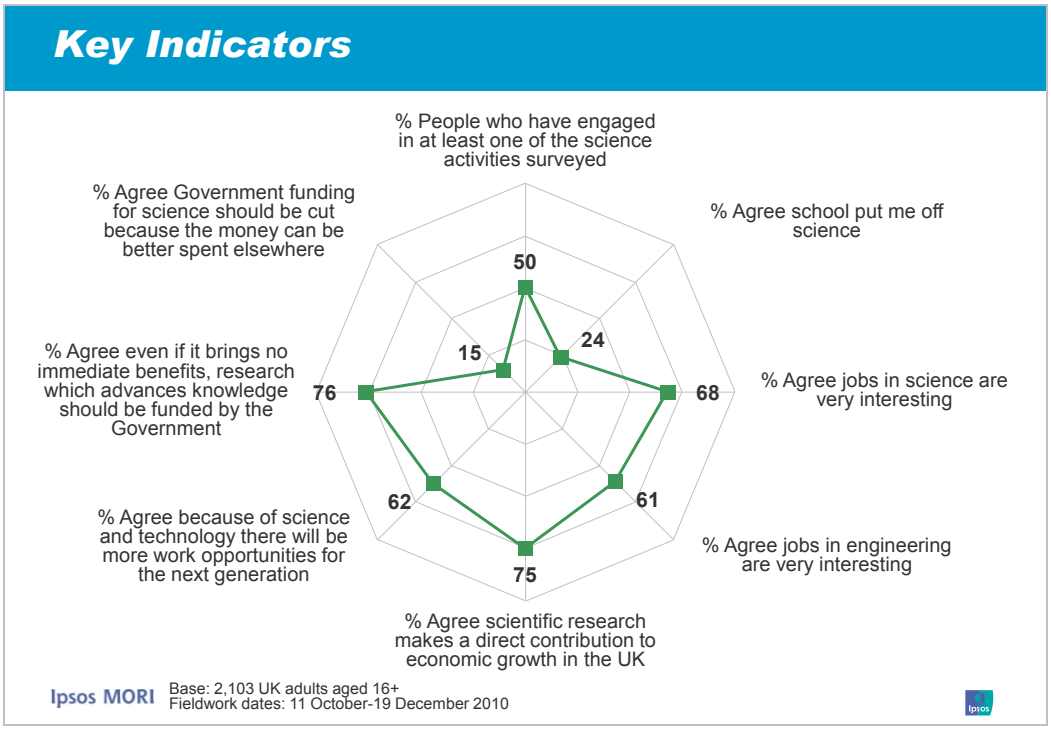
There is, however, potential for more of the public to become more involved in public consultation. Around three in ten either want more of a say (21%), or want to become actively involved (7%). It will nonetheless be important to consider how involvement might be widened across more of the public.

Those who would like to get more involved in public consultations on science issues tend to be men, young people aged 16-24 and the more affluent in social grades AB. People from ethnic minority backgrounds are also more likely than White people to want to be more involved.

Public versus Expert Opinion

There is some debate over the extent to which the Government should place more importance on scientific evidence and on expert opinion, rather than public opinion. Two-thirds (64%) say *"experts and not the public should advise the Government about the implications of scientific developments"* and almost half (45%) agree that *"politicians should put scientific evidence above public opinion when making decisions"*.

6. Science in People's Lives



Science in Entertainment and Culture

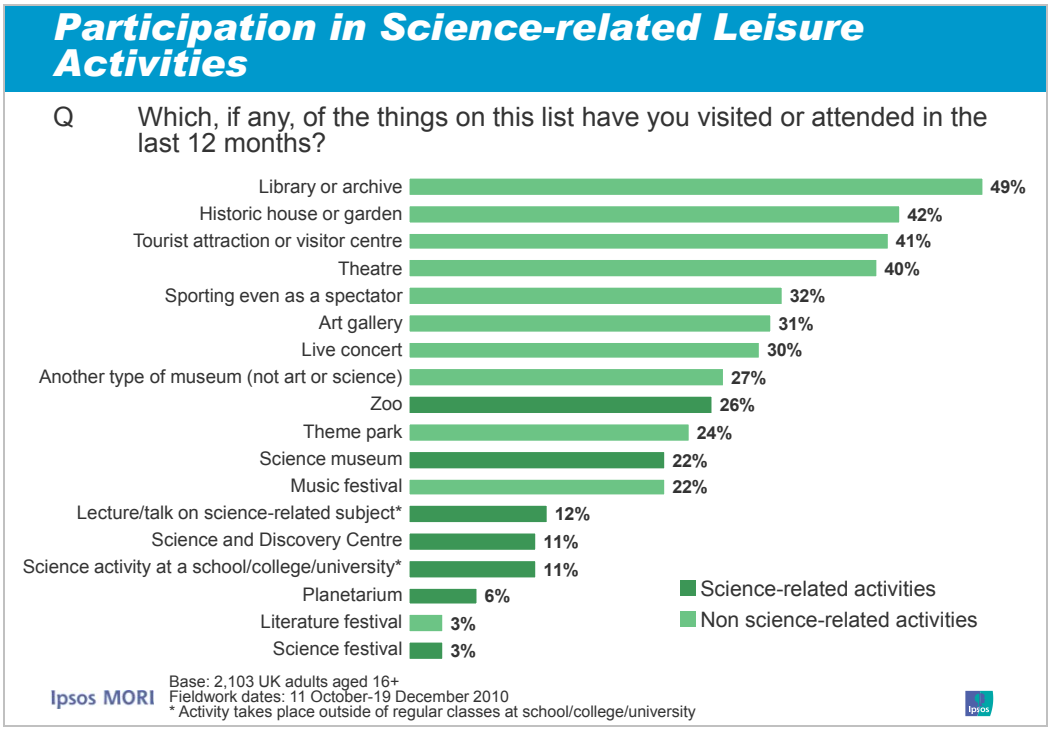
In the workshops, we explored how participants saw science fitting in with entertainment and culture. They had generally not considered the role of science in culture before the workshops. However, by the end of the sessions, they had identified various cultural benefits from science:

- Many thought science improved people's quality of life, through both medical advances and new consumer technologies and gadgets.
- Science was seen to enhance entertainment and popular culture. Some noted that specific technological advances had led to improvements in other areas of culture, such as in art, music and television. Some also thought that science itself could be entertaining, for example when enhancing the enjoyment of television programmes.
- Some felt that an understanding of science equipped the public with the tools and ability to challenge the status quo, politically or culturally, and that without this, people would lose informed public debate.

- Some felt that science added to the art of conversation, from popular science books through to simple conversations about the weather.
- Finally, some saw an inherent Britishness within inventiveness, extending back to the industrial revolution, so saw science as a part of a national cultural heritage.

Science as a Leisure Activity

In the past 12 months, half the public (50%) have engaged in at least one of the science activities[17] asked about in the survey. The most popular of these are visiting the zoo (26%) or a science museum (22%).



Most of those who have visited them have only been to science museums or science and discovery centres once in the last 12 months. This suggests that people consider visiting a science museum or discovery centre as a special outing rather than a regular leisure activity.

The findings suggest that science activities are primarily seen as family leisure activities. The majority of those have been to a science museum, discovery centre, zoo or planetarium went with other family members, primarily children or partners, rather than with friends.

There are also indications that people see science as an activity for boys rather than girls. People who have been to any of the science-related activities asked about are more likely to have gone with sons than with daughters. By contrast, people are somewhat more likely to have taken their daughters to art galleries.

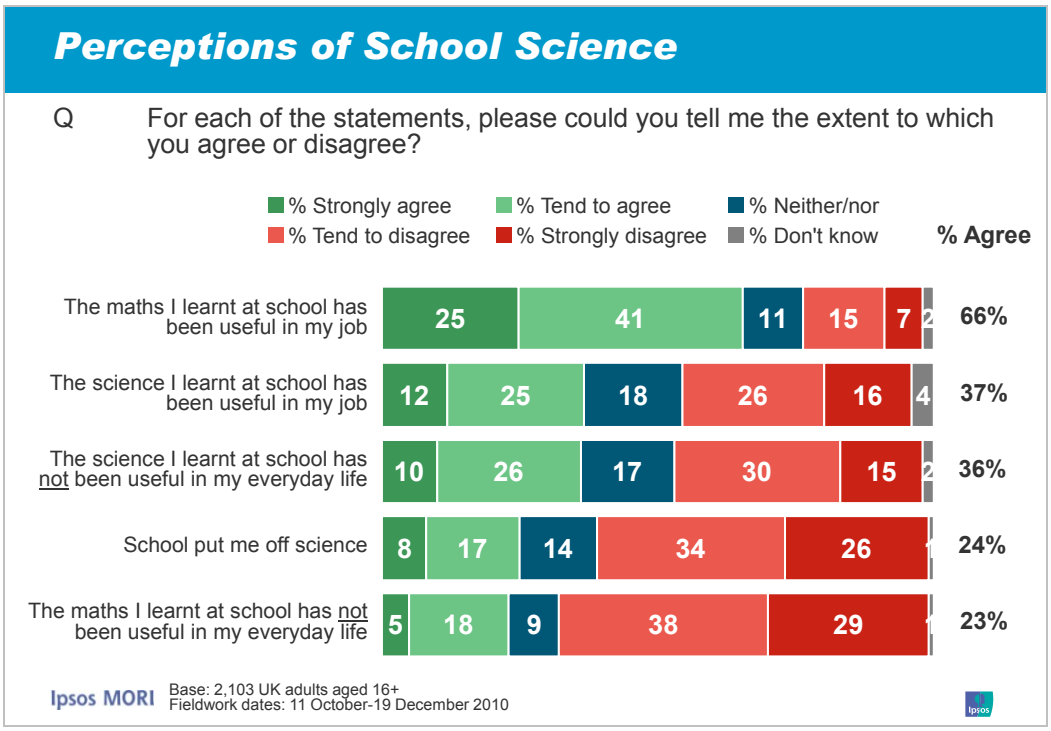
[17] Of the activities asked about, we defined the following as "science activities": lectures/talks on science-related subjects outside school/college/university, planetariums, science activities at school/college/university outside of regular classes, science and discovery centres, science festivals, science museums and zoos.

Studying Science

The importance of science education is apparent in the survey findings, where a quarter (24%) agree that *"school put me off science"*. This is somewhat higher than in 2008 (21%) and 2005 (20%). Women are more likely to agree than men. Those from social grades DE are also slightly more likely than average to agree.

People are divided about whether the science they learned at school is useful in their everyday lives, with slightly more thinking it was useful than not (44% versus 36%). They are more likely to see maths as useful in their daily lives (67%).[18]

People are also uncertain about how useful school science has been for their job – around two-fifths think it has been useful (37%) and a similar proportion say it has not been useful (42%). Again, more (66%) think maths has been useful in their jobs.



People have a mixed view of the quality of science teaching, relative to other subjects. When asked whether the teaching of science was better or worse than the teaching of the other subjects, half (51%) say it was about the same, and a slightly higher proportion say it was better (22%) than say it was worse (18%). The proportion saying it was worse has fallen by seven percentage points since 2008.

Among those who think science teaching was better or worse than the teaching of other subjects, common (unprompted) reasons for this relate to the teacher. Relatively few say that they think science was taught better or worse than other subjects because it was easy or hard respectively. This suggests that it is not necessarily the level of difficulty that puts people off science at school.

[18] These questions asked respondents whether science or maths has not been useful in their everyday lives, so those who think it has been useful are disagreeing with the statements.

Careers in Science

People see careers in science as desirable. Around seven in ten (68%) think that *"jobs in science are very interesting"*. However, young people aged 16-24 are less likely to think this. This highlights the challenge of increasing the numbers working in Science, Technology, Engineering and Mathematics (STEM), even when the UK public as a whole finds jobs in STEM sectors attractive.

Six in ten agree *"jobs in engineering are very interesting"* (61%) and that *"compared to other professions, engineering offers a well paid career"* (58%). There is however uncertainty about the future of the engineering sector, with similar proportions agreeing (36%) and disagreeing (39%) that *"engineering is a dying industry in the UK"*.

Science in the Economy

People see science as integral to the UK economy. Four-fifths (79%) agree that *"the UK needs to develop its science and technology sector in order to enhance its international competitiveness"*, while just four per cent disagree. Three-quarters (75%) agree that *"scientific research makes a direct contribution to economic growth in the UK"*, and just three per cent disagree. Finally, almost nine in ten (87%) think *that "young people's interest in science is essential for our future prosperity"*.

Generally people are positive about science's role in job creation. Six in ten (62%) agree that *"because of science and technology there will be more work opportunities for the next generation"*.

These responses should, however, be seen in context. Half do not feel informed about how the economy works, so the answers may reflect a received, though not necessarily understood, wisdom that science is good for the economy. The findings may not indicate any particular appreciation among the general public of how science affects economic growth. Indeed, the workshops point to people being largely unsure of the role of the sciences in the economy.

Public Funding of Science

There is a high level of support for the public funding of scientific research. Three-quarters (76%) agree that *"even if it brings no immediate benefits, research which advances knowledge should be funded by the Government"*, suggesting that people acknowledge that not all Government-funded research will have immediate economic benefits, and that they recognise the wider benefits of research. Just one in seven (15%) agree that *"Government funding for science should be cut because the money can be better spent elsewhere"*.[19]

However, the workshop findings indicate that some people's attitudes towards public funding of science have shifted in a climate of public spending cuts. A few participants thought that in this climate, the Government had to place a greater emphasis on the potential economic

benefits of research when considering whether or not to fund it. Some also thought that spending in other areas, such as health or the environment, would itself contribute to scientific research (e.g. through medical research), which meant that the idea of cutting spending on "the sciences" did not register as having as important an impact on science funding as it might do in reality.

7. Segmenting the Public

As in the previous PAS studies, we carried out a cluster analysis on the survey data. This is a statistical technique used to segment the population into distinct clusters of respondents who have similar attitudes to science. Below, we give a description of each of the six clusters identified in the 2011 analysis, and an overview of the best engagement strategy for each cluster.

It is important to note that the clusters group together respondents who tend to have similar attitudes across a range of areas, but not identical attitudes in each area. Therefore, if the people in one cluster are more likely to hold a certain view, this does not necessarily mean that most people in that cluster hold this view. Clusters should be seen as illustrative typologies rather than exactly representing the views of a group of the population.

We have given each cluster a name that reflects their overall stance. Again, it should be noted that these names cannot reflect the whole breadth of opinion within each cluster and instead are chosen to represent the overall defining characteristics.

The Concerned

The Concerned[20] are the largest cluster, with around a quarter (23%) of the population belonging to this group. Religion tends to play a more important role in their lives than for other clusters. The strong presence of people from ethnic minority backgrounds in this cluster also suggests they are subject to a different set of cultural influences to other clusters.

The Concerned have strong views on the limitations of science relative to other clusters. They are among the least convinced of the economic benefits of investing in it, so focusing on the economic impact of science might help to improve their attitudes towards it. Further to this, they are more likely to have reservations about the intentions of scientists and about whether science and technology is sufficiently under Government control. This suggests they would want to know how scientists and scientific professional bodies are responding to the concerns about science raised in public consultations.

The Concerned are more likely than others to read tabloid newspapers. They are less likely than average to regularly read websites specifically on science and technology, although their internet usage is otherwise close to average.

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[19] It should be noted that the survey fieldwork took place when the Government announced its Comprehensive Spending Review. During this period, there was considerable media coverage as well as an online campaign in favour of public funding of science, which may have affected responses to these questions.

[20] This cluster is not related to the "Concerned" cluster from the 2000 study.

The Indifferent

One in five (19%) belong to the Indifferent[21], making it the second largest cluster. The Indifferent tend to be much older in makeup than any of the other groups, with around a quarter being over 75 and almost half being retired. While they are less likely to feel informed about science, they are not especially negative or worried about it. They tend not to be as interested in science as other clusters, and consequently are far less inclined to get involved in public consultations on science.

The Indifferent might engage more if they had a better understanding of the extent to which science affects their lives, so that they feel less isolated from it. Many might also require a better basic understanding of how scientists conduct their work before they can engage. Communications about science should therefore attempt to demystify science for the Indifferent, explaining that it can be simple, and that anyone can do science.

The most important media for the Indifferent are television and newspapers, as they tend not to use the internet. They also tend not to actively seek out science information, so would be more likely to find out about science if it was incorporated into the non-science programmes they already watch, or the magazines they already read.

Late Adopters

Around two in ten (18%) belong to the Late Adopters cluster. The Late Adopters are so called because while they did not enjoy the science they studied at school, they now take a strong interest in science, and are interested in becoming more involved in public consultations on science. They appear to engage more strongly with science when it is not treated as an isolated subject, but instead when it is placed in a wider context, and relates back to their daily lives and personal concerns.

Late Adopters are also characterised by their relatively strong environmental and ethical concerns. They are more likely to believe in man-made climate change and support the development of renewable energy than average. They also have strong reservations about areas of science such as GM crops and the use of animals in research. Related to this, they want to hear scientists talking more about the social and ethical implications of their work.

They are more likely than average to have internet access, and also more likely to use social networking websites. Given their media usage, any engagement targeted at the Late Adopters would benefit from an online element.

Confident Engagers

Confident Engagers make up 14% of the population and tend to be the most affluent and well-educated cluster. They have a strongly positive attitude towards science and towards various scientific developments. At the same time they have relatively few concerns – they are confident that scientists across institutions are well regulated and are more likely to trust scientists to follow the regulations.

[21] This cluster is not related to the “Indifferent” cluster from PAS 2008.

They want to get more involved in decisions about science, but are also keen for the Government to put expert advice and evidence above public and media opinion when making these decisions. Related to this, the concerns they have tend to be about the media's influence over science policy and the way science is reported in the media.

Confident Engagers are more likely than average to read broadsheet newspapers. They also use a variety of media to find out specifically about science issues, including science blogs and other websites on science and technology. Like Late Adopters, they also tend to be users of social networking websites.

Distrustful Engagers

One of the smaller clusters, Distrustful Engagers make up 13% of the population. They tend to be fairly affluent and well educated, and many have backgrounds in science or engineering. They are very interested in science, think of it as beneficial to society and feel relatively well informed about it, much like Confident Engagers.

What separates them from Confident Engagers is that, while they have a very positive attitude towards science, Distrustful Engagers are less trusting of those that work in science, and less confident in the Government's ability to regulate them. They tend to think the public should play a larger role in decision-making on scientific issues alongside experts. They are also interested in personally becoming more involved in this, so could be made aware of the opportunities to do so.

Just like the Confident Engagers, this cluster is more likely than average to respond to engagement online, through specialist science websites and blogs. They are not however especially like to use social networking websites, possibly reflecting their older age profile compared to Confident Engagers.

Disengaged Sceptics

Disengaged Sceptics also make up 13% of the population. They tend to be less well educated than other clusters, and feel less informed about science. Many were put off science at school. Today, they find science overwhelming, and do not see it as useful in their everyday lives. Given this, they may engage more strongly with science when it is shown to impact on their daily lives, much like the Indifferent.

Disengaged Sceptics have concerns about scientific developments, and the ability of the Government to control them. They do not trust scientists to self-regulate, instead having a highly conservative attitude towards science regulation. While they are not particularly keen to get involved in decision-making on science and technology, they would like the Government and scientists to listen to the public's opinions on science issues, so would be interested in knowing how the public is already involved.

Television is a more important source of science information for Disengaged Sceptics than the internet, which they are less likely to have access to than average. They are also more likely to read tabloid newspapers than average.

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