RESEARCH COUNCILS UK

Public Attitudes to Science 2008 A Survey

Report prepared for Research Councils UK and the Department for Innovation, Universities and Skills by People Science & Policy Ltd/TNS, March 2008

Department for **Innovation, Universities** & **Skills**

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Foreword

We are pleased to present this survey of Public Attitudes to Science 2008, the third in a series of similar national surveys since 2000.

The survey has been commissioned by Research Councils UK and the Department for Innovation, Universities and Skills, and its primary purpose is to update information about what the public thinks about science, scientists and science policy in the UK. The questionnaire in 2008 has been designed to track views relative to previous versions, and has been reviewed to ensure that these surveys continue to address new and important issues. For instance, the involvement of the Economic and Social Research Council has given us an important opportunity to explore attitudes towards social science for the first time, and, when engagement with Science Technology, Engineering and Maths (STEM) among younger people remains a priority, a particular focus on their views has been included.

The research presents some key findings and suggests that, in many respects, we remain a nation that views science as enriching our daily lives. Public interest in science and engineering is, if anything, more widespread than in previous surveys, and the findings indicate that the UK population overall has a positive view of both.

At a time when Research Councils UK, the UK higher education funding councils and the Wellcome Trust have just launched a £multi-million network of Beacons for Public Engagement, it is particularly interesting to note that people feel that there is a genuine need for scientists to communicate their processes and research at an earlier stage than is happening currently. The appetite for public engagement with scientific research and research processes is obviously there, and we must continue to work to maintain and develop access to that engagement in different ways across the board.

It is interesting in this context to see that another survey finding is an expressed lack of knowledge and sometimes cynicism about the governance of science. These findings should provide food for thought for everyone involved in the funding and delivery of research, and underline the importance of exploring ever better ways of ensuring that science policy development processes engage with public priorities and concerns.

If we are to continue moving toward a future where science is viewed increasingly as part of culture, it is important to continue to assess whether and how public attitudes are evolving. We hope that this survey will make interesting reading for everyone, and be useful to policy makers and public engagement practitioners alike in helping target STEM initiatives and engagement activities more effectively.

Ian Pearson MP
Minister of State for Science and Innovation

Professor Alan Thorpe
RCUK Science in Society Champion

1 Introduction

Background

Public Attitudes to Science 2008 has been commissioned by the Research Councils UK (RCUK[1]) and funded by the Department for Innovation, Universities and Skills (DIUS).

As well as developing and promoting world-leading research, RCUK aims to raise public awareness of science and innovation, and to encourage public involvement. It is hoped that fostering a climate of trust between researchers, members of the public and policy-makers involved in science will benefit all these groups.

The RCUK Science in Society programme aims to:

- Find out what people think;
- Reach young people and teachers;
- Encourage researchers to engage with the public, and;
- Keep people informed and up-to-date.

Research into public attitudes is also important to the UK Government's ten year Framework for Science and Innovation[2], which stipulates the need to track public attitudes towards key issues in Science, Technology, Engineering and Maths (STEM), as well as public confidence in policy making and regulation in these areas.

Public Attitudes to Science 2008 is the third survey in a series. The first survey was reported in 2000 as "Science and the Public" (OST/Wellcome Trust) and the second in 2005 as "Science in Society" (OST/MORI).

[1] RCUK is the partnership formed by the seven UK Research Councils, Non-Departmental Public Bodies which were established by Royal Charter. The Councils are collectively the biggest public funders of cutting edge research in the UK, spending around £3bn every year across a range of disciplines: AHRC (Arts & Humanities Research Council), BBSRC (Biotechnology & Biological Sciences Research Council), EPSRC (Engineering & Physical Sciences Research Council), ESRC (Economic & Social Research Council), MRC (Medical Research Council), NERC (Natural Environment Research Council), STFC (Science and Technology Facilities Council)

[2] Science and Innovation Investment Framework 2004-2014 (www.hm-treasury.gov.uk/ spending_review/spend_sr04/associated_documents/ spending_sr04_science.cfm)

Survey context

Public engagement is increasingly seen as central to the development of science policy. The Science and Technology Committee of the House of Lords report "Science and Society", published in February 2000, was the first time that the importance of engaging the public in the development of science policy was formally recognised. Importantly the report said that:

- *"… direct dialogue with the public should move from being an optional add-on to science-based policy making and to the activities of research organisations and learned institutions, and should become a normal and integral part of the process."*

At the Royal Society in May 2002, the then Prime Minister, Tony Blair, said: "The benefits of science will only be realised through a renewed compact between science and society." Then in 2004, Chapter 7 of the 'Science & Innovation Investment Framework 2004 – 2014' highlighted:

- *"… the importance the Government attaches to taking action to achieve greater public confidence and improved engagement in science and technology. This includes intelligent regulation of research, openness, dialogue, effective communication with the public and responsiveness to public priorities and concerns."*

The ten year Science & Innovation Investment Framework set as an objective the intention to demonstrate improvement against a variety of measures, such as trends in public attitudes, public confidence, media coverage, and acknowledgements and responsiveness to public concerns by policy-makers and scientists. "Science and the Public" provided an early baseline of public attitudes and public confidence; "Science in Society" provided a benchmark of opinion in 2004.This research updates policymakers and science communicators on public attitudes in 2007/08.

This survey comes at a time when scientific bodies have been putting in place infrastructure to enable more researchers to engage directly with the public. DIUS has funded Sciencewise, a programme with several strands designed to bring scientists, government and the public together to explore the impact of science and technology on life today. The Beacons for Public Engagement initiative has recently been launched (January 2008) providing £9.2 million in funding from RCUK, the UK HE funding Councils and the Wellcome Trust for a

network of university-based collaborative centres to help support, recognise, reward and build capacity for public engagement work across the UK.

In addition, a range of organisations hold events that allow the public to discuss scientific developments with scientists and other experts in towns around the UK.

The Economic and Social Research Council's research programme *Science in Society*, launched in 2002, produced a series of final reports in 2007. Readers interested in delving deeper into some of the issues highlighted by this survey may also be interested in these reports or the individual projects

The 2008 survey

1.1
Public Attitudes to Science 2008 aims to build upon findings from the two previous surveys carried out in 2000 and 2005.

This Report presents the main findings of the research. An additional shorter publication *Public Attitudes to Science 2008 – A Guide*, has been designed specifically for policy-makers and science communicators and draws out the main implications for both groups, and is available both as hard copy or online at www.rcuk.ac.uk.

1.2
Public attitudes towards science encompass a very wide range of issues. The content of this survey was developed in conjunction with a Project Steering Group[3] and the main issues selected for inclusion were:

- Public interest in science
- Public involvement in science
- Public consultation
- Communication of science
- Regulation of science
- Public attitudes towards social science

Social science was included for the first time in 2008 (it was not covered by the surveys in 2000 and 2005). Relatively little is known about the UK population's attitudes towards and knowledge of social science and this study was seen as a potential opportunity to assess the situation.

[3] A list of organisations represented on the Public Attitudes 2008 Steering Group:
• The British Association for the Advancement of Science
• The Department for Innovation, Universities and Skills
• The Government Social Research Unit
• Research Councils UK
• The Royal Academy of Engineering
• The Royal Society
• The Wellcome Trust

Public Attitudes to Science 2008 also includes a booster sample of young people to enable the views of those aged 16-24 to be explored in detail.

Previous research

1.3
The current research *Public Attitudes to Science* is referred to as the 2008 survey throughout this report due to the publication date. Fieldwork was however conducted in 2007. Similarly, the previous *Science in Society* survey (OST/Wellcome Trust, 2005) is referred to as the 2005 survey while fieldwork was carried out in 2004. Fieldwork for the 2000 *Science and the Public* survey (OST/MORI, 2000) was carried out in 2000.

1.4
Where possible, the report makes comparisons between the findings of the 2000, 2005 and 2008 surveys. Comparisons are only possible when the same question was asked across more than one of the surveys. Due to time constraints it was not possible to ask every question from the 2000 and 2005 surveys and so comparative data is not always available.

1.5
Readers should note that in 2005 the survey focused strongly on issues relating to the communication of science and scientific research. It is well documented that respondents' answers are affected by the order of questions in a survey, specifically by the focus of preceding questions, so it is possible that respondents to the 2005 survey may have answered with a slightly different mind-set as a result.

International comparisons

1.6
This report also provides comparisons between the UK and other countries in Europe and the US. Where possible, comparisons are made between the 2008 survey and with Eurobarometer (European Commission, 2005) and research by the National Science Foundation (NSF, 2006). International comparisons are fairly limited and are not available for every section of the report. Further detail on these and other UK studies looking at attitudes to science are presented in the literature review (Appendix 3)

Method

1.7
The project comprised five elements:

1) An omnibus survey of c.1,000 members of the UK public including two questions about scientific issues people were most concerned about
2) A literature review of relevant research in the UK, Europe and Worldwide
3) Six discussion groups with a cross section of the general public – specifically to explore knowledge and familiarity with *social science* among the general public
4) A quantitative survey of c.2,000 members of the UK public (including boost samples of young people and ethnic minorities)
5) Six qualitative workshops with a cross section of the public – to explore issues arising from the main quantitative survey

1.8
Where survey results for different groups are compared in this report, these have been tested for statistical significance. Further details on statistical significance are contained in the Technical Appendix.

1.9
The report concentrates on the findings from the main quantitative survey using the other elements of the research to illustrate and support the main findings. Where appropriate, quotations from the qualitative research are provided to add colour and depth to the survey findings. The qualitative research for this project was designed to look at very specific areas of public attitudes, so qualitative findings are not available in every section of the report.

Structure of the report

1.10
The report is divided into four main chapters:

- Chapter 3 looks at public attitudes towards science in the adult population of the UK
- Chapter 4 looks at public attitudes towards social science
- Chapter 5 looks specifically at the attitudes of younger people (aged 16-24) towards science
- Chapter 6 looks specifically at the attitudes of ethnic minorities towards science
- Chapter 7 presents the results of cluster analysis which has been used to identify different attitudinal groups in the UK population

The Appendices include a Technical Appendix, the survey questionnaire and the literature review.

2 Executive Summary

Introduction

2.1
This survey of public attitudes to science was commissioned by the Research Councils UK (RCUK) and the Department for Innovation, Universities and Skills (DIUS). It is the third survey in a series; the first survey was reported in 2000 as *"Science and the Public"*[4] and the second in 2005 as *"Science in Society"*[5]. This is the first time that a booster sample of young people has been included to enable the views of those aged 16-24 to be looked at in detail and the first time social science has been included.

Methodology

2.2
The project comprised five elements:

1) An omnibus survey of c.1,000 members of the UK public including two questions about scientific issues people were most concerned about
2) A literature review of relevant research in the UK, Europe and Worldwide
3) Six discussion groups with a cross section of the general public – specifically to explore knowledge and familiarity with *social science* among the general public
4) A quantitative survey of c.2,000 members of the UK public (including boost samples of young people and ethnic minorities)
5) Six qualitative workshops with a cross section of the public – to explore issues arising from the main quantitative survey

Key Findings

2.3
The results from the research point to a number of positive changes since 2005 and 2000. The UK population seem more positive about science in terms of their interest in and support for science and engineering. As in previous years attitudes towards science were linked with sex, age and social grade.

Interest in science

2.4
Interest in medical research remained high and more people had become interested in other scientific topics since 2000:

- Almost everyone was interested in health issues
- Nine out of ten were interested in environmental issues
- Nine out ten were interested in medical discoveries
- Eight out of ten were interested in new inventions and technologies
- Nearly eight out of ten were interested in new scientific discoveries
- Seven out of ten were interested in energy and nuclear power issues
- Two-thirds were interested in science and science issues

2.5
Younger women tended to be more interested in health and a range of social science issues, while younger men tended to be more interested in inventions and discoveries.

2.6
Almost all the topical areas of scientific research presented to the public were viewed as beneficial, with only the development of autonomous robots being seen as beneficial by less than half of the population.

Involvement in science

2.7
In terms of visits to scientific attractions, public involvement remains moderate. A fifth of the population claimed to have visited a science museum or science centre in the 12 months prior to the survey and a quarter said they had visited a zoo. Overall, visits to scientific attractions and participation in public events and meetings related to science were at similar levels to those seen in 2000, but down on 2005. However this trend was also seen across non-science related attractions.

Knowledge of science

2.8
Overall the population feels better informed compared with three years ago and feels that the

[4] OST/Wellcome Trust (2000) *"Science and the Public: a review of science communication and public attitudes to science in Britain"*.
[5] OST (2005) *"Science in Society"*, MORI

level of information available about science is better. The biggest change in media use is the rise of the internet. Use of the internet has become a lot more widespread compared with three and seven years ago and this could be a factor influencing the increase in public knowledge. A third of the public had searched the Internet for information about science in the previous 12 months to the survey. The qualitative research suggests that people are getting more used to accessing information on demand; increasingly people feel they can find out almost anything they need to know as long as they can get online.

2.9
Six out of ten members of the public believed 'it is important to know about science in my daily life', however, a similar proportion believed 'there is so much conflicting information about science it is difficult to know what to do' and this had not changed since 2000. Conflicting information was a recurring theme in the group discussions and led some people to disengage with science, especially those aspects of science that impact on their daily lives such as health and nutrition advice.

This is fairly typical with issues such as health and diet, where research findings are often contradictory and there is no consensus on best practice in many areas.

2.10
The proportion of people who said they were very well informed about science and scientific developments had increased significantly since 2005. However, a sizable minority admitted that they just do not understand what is going on in science and this had remained unchanged over the last seven years

2.11
In general, concern about science and the speed of development has reduced considerably since 2000 and 2005. Younger people appeared more comfortable with the speed of scientific development and the complexity of science.

Education and careers

2.12
While younger people were amazed by the achievements of science, science education was perceived to be much less fascinating. In the post survey workshops with younger people, science education was seen as enjoyable if you were good at it; otherwise it was seen as hard, and unrelated to everyday life.

2.13
Fewer younger people aged 16-24 than adults aged 25 and over were of the view that a career in science or engineering is a good career choice for younger people these days. However, younger men were more positive about both science and engineering careers than younger females.

Communication and consultation

2.14
The UK population believes that communication between those who are involved in science and the general public could be improved. There appears to be scope for more active science communication: three out of ten respondents agreed that 'these days I hear and see too little information about science'. Letting the public know about scientific developments at an early stage in the research process was seen as particularly important. People also felt the way that science was communicated often made it inaccessible to the general public.

2.15
Awareness and understanding of what public consultation means is limited. Despite this, people felt that there should be greater public involvement in science and science policy decisions, although there was a belief that not everyone will want to be involved. Many people were sceptical about public consultation. Adults aged 25 and over were more cynical than younger people (16-24) and this was heavily reflected in the group discussions. As observed in previous surveys, many people did not seem interested in *personally* taking part in public consultation events.

Regulation

2.16
Knowledge of how science and engineering are regulated was limited, although the majority of the population appear confident that both sectors are regulated properly. Generally people thought that science and engineering were regulated by the Government. When people were asked who they thought should regulate science and engineering, there was a shift away from the assumed involvement of Government in the regulatory process towards a preference for scientists and engineers themselves and their professional bodies to be involved.

2.17
Trust in scientists has gone up since 2000. Experience and academic credentials were by far the most important factors that lead people to trust

scientists and engineers. However, concern about the influence of funders has also increased.

Attitudinal Groups

2.18
Statistical techniques were used to examine the 52 attitude statements which were reduced to 12 factors by combining the statements based on how respondents answered them. Each factor essentially measures the same attitude. The 12 factors accounted for 54% of the variance in respondents' attitudes. The first three factors accounted for around 21% of the variance; hence it can be said that these factors most affect the public's attitude to science:

- appreciated the benefits and/or importance of science;
- understood science; and
- were concerned about the control and direction of science.

Cluster analysis was then used to assign each respondent to a 'cluster'. This was done based on their score on each of the 12 factors. Cluster analysis aims to allocate respondents to clusters so that people within each cluster are more similar to each other than to respondents in other clusters. The five cluster solution produced five clear attitudinal groups distinct in terms of the demographic profiles and their answers to the whole range of statements about science.

The Confident

2.19
The Confident were the most positive about science of all the attitudinal groups, defined by their high level of interest in science and confidence that scientific research is carried out properly and with appropriate regulation. This group were better informed about science than any other. Unsurprisingly, they were the most highly educated of all the attitudinal groups and a large proportion were from social grades AB. The Confident make up around a quarter of the British public. They are confident in their own knowledge and believe that their views will be heard.

The Sceptical Enthusiasts

2.20
The Sceptical Enthusiasts were the smallest of the five groups making up one in eight of the population. The group had a very positive outlook on life, relishing new challenges and placing a high value on learning new skills. They had a wide range of interests especially in social science and entertainment. While positive about science, they were sceptical about authority. They tended not to think that their opinions made any difference to the Government and expressed concerns about the independence of science and scientists. Of all the attitudinal groups they were the most likely to think more could and should be done to communicate with, and involve, the public in decisions about science.

The Less Confident

2.21
The Less Confident was the largest of the attitudinal groups, accounting for around a quarter of the UK population. They were defined by their demographic characteristics; nearly a half of the group were aged 60 or over, they had the lowest level of education of any group and nearly half were from social grades DE. Their outlook on life was cautious and they were concerned about change and their ability to cope with new challenges. While the group was not opposed to science per se, they were very concerned that science and scientific development was out of control. The group also felt poorly informed about science and that science is too complicated for people like themselves to understand.

The Distrustful

2.22
The Distrustful attitudinal group was one of the smallest, accounting for less than a fifth of the population. The group was defined by their lack of trust in Government and authority generally. They were considerably younger than the general population but were defined most strongly by the high proportion of women who fall into this group. The group was not really interested in science and science issues and did not think that science was particularly beneficial. They also expressed a high level of worry about some areas of scientific research, including the use of animals in medical research.

The Indifferent

2.23
Accounting for a fifth of the UK population the Indifferent are the second most female cluster after the Distrustful group. The group also contained the highest proportion of parents with children aged under-16, a high proportion of social grades DE and a small proportion of people educated to degree level or higher. They had limited understanding about science and were not concerned about how science is controlled and regulated. Overall, their attitudes suggest an indifference towards science – they saw it as something which was necessary but did not understand it and did not have strong feelings towards it.

Conclusions

2.24
This research shows that the UK population has a positive view of science and engineering and sees both as benefiting society. The results suggest that the UK population see science as more important compared with 2000 and 2005.

2.25
Not everyone wants to engage with science themselves but in general people feel that they know how to find information if they want it, the main driver for information being personal circumstances. The Internet is an increasingly important source for those actively seeking information.

2.26
There is a demand for more consultation and communication with the public on scientific issues and many see benefits to themselves personally, as well as to the consulting organisation, from taking part in public consultations.

3 Public Attitudes towards Science

Introduction

3.1
This chapter looks at the findings in relation to the UK population's attitudes towards science, focusing on the attitudes of respondents aged 16 and over. The majority of findings are taken from the quantitative survey which was carried out between August and September 2007. Where appropriate, findings from the qualitative workshops and the literature review are presented to illustrate and provide insight into the key findings. The attitudes of younger people and minority ethnic groups are discussed in more detail in Chapters 5 and 6.

Findings are presented under six main headings:

- Public interest in science
- Benefits of science
- Involvement in science
- Knowledge of science and access to information
- Communication and consultation
- Regulation of science and engineering

Public Interest in Science

3.2
Overall attitudes towards science are positive. Public interest in science is high and appears to have increased since 2000. As shown in Table 3.1, a greater proportion of the UK population agreed that:

- Science is such a big part of our lives that we should take an interest; and
- It is important to know about science in my daily life

3.3
With interest levels so high among the UK population it is difficult to comment on differences in interest by sub-group. Overall, men were slightly more interested in science than women, as were people aged 25 and over compared with younger people aged 16-24. However, there was little difference in interest by social grade or newspaper readership.

3.4
Interest levels have increased since 2000 with more people in 2008 agreeing that 'It is important to know about science in my daily life' and that 'science is such a big part of our lives we should take an interest'.

Table 3.1: Agreement with statements relating to interest in science

	Agree (Strongly agree)	
	2000 %	2008 %
Science is such a big part of our lives that we should take an interest	74 (16)	79 (18)
It is important to know about science in my daily life	59 (10)	62 (12)

Base: All respondents – 2000, 2008 (1,839, 1,831, 2,137)

3.5
These findings are supported by the results relating to interest in specific topics. Table 3.2 summarises interest levels in the 22 different areas covered by the survey. Compared with seven years ago, the UK population seems to be more interested in a wide range of areas, including many science-related topics. Where comparisons are possible, the proportion who said they were 'very' or 'moderately' interested has increased in all topics, apart from new films. In particular the proportion who said they were 'very' interested has increased, including in a number of scientific topics. The population showed greater levels of interest in topical issues compared with 2000.

3.6
In 2000, greatest interest in scientific topics was reported in relation to health and medical research. This remains the case in 2008 but the gap between interest in health and medical research and other scientific topics has narrowed considerably. The largest increases were seen in interest in environmental issues and energy/nuclear power issues. This probably reflects an increase in media coverage of these specific issues over the last seven years.

Table 3.2 Public interest in issues and topics						
	Very interested				Not interested	
	2000 %	2008 %	2000 %	2008 %	2000 %	2008 %
Health issues	52	57	39	37	9	5
Crime/anti-social behaviour	-	54	-	37	-	9
Environmental issues	35	46	47	43	17	11
Medical discoveries	46	47	41	42	13	12
Music	41	46	43	40	16	13
Education	40	50	39	35	21	15
Terrorism	-	46	-	40	-	14
Welfare and social exclusion	32	37	46	46	21	18
New inventions and technologies	24	37	50	42	26	21
Housing	-	30	-	48	-	22
Immigration	-	34	-	43	-	23
New scientific discoveries	22	32	49	45	28	23
Employment	-	34	-	42	-	25
Transport/congestion	-	32	-	42	-	26
Economics and finance/state of the economy	17	26	41	44	40	30
Energy/nuclear power issues	12	23	36	46	51	30
Science and science issues	-	24	-	43	-	33
International current affairs	16	21	45	46	38	34
New films	25	26	42	36	32	38
Sport	32	31	28	31	39	31
UK politics	15	16	40	44	45	40
Religion/faith	-	17	-	35	-	47

Base: All respondents – 2000, 2008 (1,839, 2,137)

3.7
Level of interest in science-related topics was related to gender. Women tended to be more interested than men in scientific topics which related to health and medicine including:

- Medical discoveries
- Health issues

In contrast men tended to be more interested than women in:

- New inventions and technologies
- New scientific discoveries
- Science and science issues

Public interest in the UK in science-related topics is comparable with public interest in Europe more widely. The Eurobarometer survey (European Commission, 2005a) indicates that a similar proportion of respondents in the 25 EU Member States were 'very' or 'moderately' interested in:

- New medical discoveries (83%, 33% being 'very' interested)
- New inventions and technologies (78%, 30% being 'very' interested)
- New scientific discoveries (78%, 30% being 'very' interested)

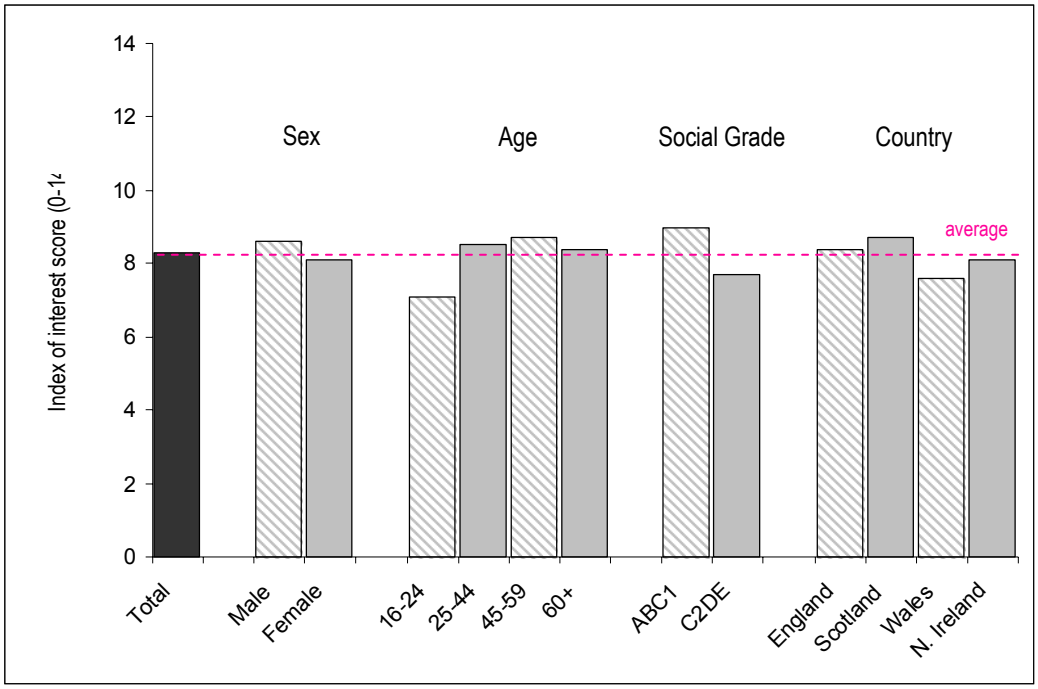
Public interest in social science topics is discussed in Chapter 4.

3.8
The questionnaire covered interest in seven different scientific topics:

- Health issues
- Environmental issues
- Medical discoveries
- New inventions and technologies
- New scientific discoveries
- Energy/nuclear power issues
- Science and science issues

Respondents were asked to indicate whether they were 'very interested', 'moderately interested' or 'not interested'. The scores from these seven questions can be combined to create an index score of general interest in science. Respondents who were 'very interested' in any of seven topics were assigned a score of two for that topic, those who were 'moderately interested' a score of one, respondents who were 'not interested' received a score of zero. This leads to a combined score ranging from zero (not interested in any of the topics) to fourteen (very interested in all of the topics). Overall interest in scientific topics is summarised in Figure 3.1.

Figure 3.1: Index of interest in scientific topics by socio-demographic factors



Base: All respondents (2,137). Note: The dotted lines denotes the average level of interest in scientific topics

3.9
Based on the index scores as shown in Figure 3.1, levels of interest in scientific topics were related to sex, age and social grade:

- Men tended to be more interested overall than women
- Adults aged 25 and over tended to be more interested than younger people (16-24)
- ABC1s tended to be more interested than C2DEs[6]

3.10
Level of interest in scientific topics also varied by geographic region. The population in Wales were less interested in scientific topics than the population in England, Scotland and Northern Ireland; with Northern Ireland also scoring below average.

Benefits of Science

3.11
There is a widespread view that science is beneficial and over 80% of people agreed that

- I am amazed by the achievements of science

Furthermore 85% also agreed that:

- Young people's interest in science is essential for our future prosperity

This is broadly in line with findings in the EU where 82% of respondents in the 25 Member States agreed with the latter statement (European Commission, 2005a).

Table 3.3: Agreement with statements relating to interest in science

	Agree (Strongly agree)		
	2000 %	2005 %	2008 %
I am amazed by the achievements of science	75 (19)	-	82 (24)

Base: All respondents – 2000, 2005, 2008 (1,839, 1,831, 2,137)

3.12
To explore perceptions of science further, respondents were asked to rate the extent to which they considered a pre-determined range of topical areas of scientific research beneficial. Responses are summarised in Table 3.4.

[6] ABC1C2DE are social grades determined by the occupation of the Chief Income Earner in the respondents' household, with additional criteria such as the size of the organisation, and the number of people for which the individual is responsible, used to refine the code allocated to individuals.

Table 3.4 Public interest in issues and topics			
	Very beneficial %	Fairly beneficial %	Not beneficial %
Research into new drugs to cure human diseases	82	16	2
Research into new sources of energy	73	22	3
Understanding the causes of climate change	66	27	6
Research using stem cells, that is cells that can grow into different parts of the body, as a way of curing diseases	61	24	8
Understanding how people learn	59	32	6
Research into storing radioactive waste	58	27	10
Understanding the causes of obesity	56	34	8
The use of technology for surveillance (for example CCTV)	51	36	11
The impact of globalisation on developing countries	40	39	13
Wi-Fi networks that allow computers to access the Internet and the world wide web from anywhere using technology similar to that used by mobile phones	33	37	16
Nanotechnology – using tiny particles (a millionth of the thickness of a human hair) in manufacturing different sorts of products	29	36	14
The impact of immigration on the UK	36	35	25
Developing faster methods of transport	29	38	30
The use of animals in research that aims to cure diseases	27	41	28
Understanding more about space, planets and stars	26	42	27
The development of robots that can think for themselves	12	31	51

Base: All respondents (2,137)

3.13
'Research into new drugs to cure human diseases' was rated as the most beneficial type of research, with 82% of the UK population rating this as 'very beneficial'. 'Research into new sources of energy' was rated 'very beneficial' by 73% of the population and 'understanding the causes of climate change' was rated as 'very beneficial' by 66% of the population.

Areas which were less likely to be rated as 'very beneficial' and more likely to be rated as 'not beneficial' included 'faster methods of transport', 'understanding more about space, planets and stars', 'the use of animals in research that aims to cure human diseases' and developing 'robots that can think for themselves'. However, it is only for the last of these that more than half of the population regarded the research as not beneficial.

3.14
These findings are, to an extent, in line with recent research conducted across the European Union (European Commission, 2005), in which they concluded that 'people are more interested in how science ultimately affects them and society, rather than in science which is seen as abstract or of no obvious or immediate benefit.'

3.15
How beneficial the public perceived each type of research is discussed further later in the Chapter, in relation to worry about science and scientific research.

Involvement in Science

3.16
This section looks at how involved the UK population is in science and science-related activities. The survey asked people whether they had visited any scientific attractions in the last 12 months (such as science museums) and/or attended science-related meetings or lectures. It also collected their highest qualification in science.

3.17
Official visiting figures from Visit Britain (Visitor Attraction Trends England, 2006) suggest that visits to attractions in Britain increased consistently between 2000 and 2006. Increased levels of visiting applied to a range of attractions including museums, art galleries, country parks, visitor centres and wildlife attractions / zoos.

3.18
Previous research in 2005 also pointed to widespread attendance at science centres and museums and that these were rated highly by those who visit. Due to changes in the questionnaire in 2008 it is not possible to make direct comparisons between the 2005 and 2008 surveys on all measures. However, overall there has been a decline in participation over this period.

3.19
Similar decreases in attendance at sporting events, historic houses and gardens, and art galleries were also observed. The results point to a general decrease in visits to tourist attractions and sites of interest rather than a specific decline in attendance at scientific attractions.

3.20
The survey data indicates that the number of people visiting science museums and centres, zoos, planetaria and laboratories or other similar sites had decreased slightly between 2005 and 2008. Attending science festivals and lectures, talks and public meetings on science-related topics remains a minority activity but there has been no overall decline in these activities over the last three years.

3.21
The overall decreases in participation / attendance may be partly explained by the increasing availability of alternative media over the same period. While participation and attendance have decreased, in the same period, use of the internet has increased substantially as has the use of alternative digital media. How the UK population use media to keep up to date with science is the subject of a later discussion in this chapter.

3.22
Some comparisons are also possible with the 2000 survey, although many of the science-related activities were not covered in the same way. Where comparisons are possible, participation levels in 2008 appear to be similar to 2000. Visits to zoos were actually more common in 2008 compared with 2000. This suggests participation may have declined in the last three years back to levels previously seen in 2000.

3.23
Visits to scientific attractions were more common than average among people with children aged under 16. This suggests visits to sites such as science museums and zoos are often family activities.

3.24
The figures presented in Table 3.5 are based on people's responses from the quantitative survey and do not necessarily match with official recorded attendance figures. It is known that respondents tend to over report levels of attendance in survey research; the figures are therefore of most use when comparing attendance / participation between the three different survey periods. It should also be noted that the survey only included adults aged 16 and over, and therefore only provides data on attendance among the UK *adult* population rather than the whole of the UK population. Some of the activities covered by the survey are primarily aimed at children (for example, science museums and centres) which would commonly be arranged as school activities.

Table 3.5: Summary of attendance at sites of scientific			
	2000 %	2005 %	2008 %
Science museum or centre	-	-	18
Art gallery	18	28	27
Another type of museum (not science or art)	-	-	19
Science festival	-	2	2
Laboratory or similar scientific site	-	8	3
Zoo	21	30	26
Theme park	26	27	29
Planetarium	3	6	3
Been to a lecture/talk on a science-related subject	-	8	8
Been to a public meeting or debate on a science-related subject	-	5	3
Participated in a science-related activity at a school, community centre or university	-	-	7
Sporting event as a spectator	30	32	27
Tourist attraction visitor centre	32	35	31
Historic house or garden	30	39	32
Taken part in a Science Horizons or Sciencewise public event	-	-	1

Base: All respondents – 2000, 2005, 2008 (1,839, 1,831, 2,137)

Knowledge of science and access to information

3.25
This section looks at how well informed the UK population feel about science and the amount of information they feel is available to them about science. Overall the research suggests that the public feel they are better informed compared with 2005. More people in the current survey said they were 'very' or 'fairly' well informed about science and scientific developments. However, the proportion of people who felt that they were *very* well informed was still very small as seen in 2005 (5% of all respondents). Comparisons between 2008 and 2005 are presented in Figure 3.2.

3.26
It is encouraging that the proportion of people who said they were not at all informed about science and scientific developments has nearly halved since 2005 (dropping from 17% to 9%). This is further evidence that the public feel better informed now compared with three years ago.

3.27
Despite an increase in how well informed the public felt, nearly half of all respondents (43%) said they felt either 'not very well' of 'not at all' informed about science and scientific developments. Therefore, we can conclude that a sizeable minority of the population still does not feel well informed about science.

3.28
This view is supported by findings from the workshops - particularly in the views of social grades C2DE. One respondent said that her lack of knowledge about science actually made her panic

- *Because I don't know anything about it…. Because someone is bound to ask you something about something you don't know anything about*
  (Female, Banbury, DE)

3.29
Previous research also suggests that there is a shortfall in the amount of information which is available to the public about science and technology. A report by the European Commission in 2005[7] concluded that:

> '[the] majority of those interviewed would like more information on science and technology and seem[ed] rather dissatisfied at the way in which they are currently informed about research and progress, especially by scientists'

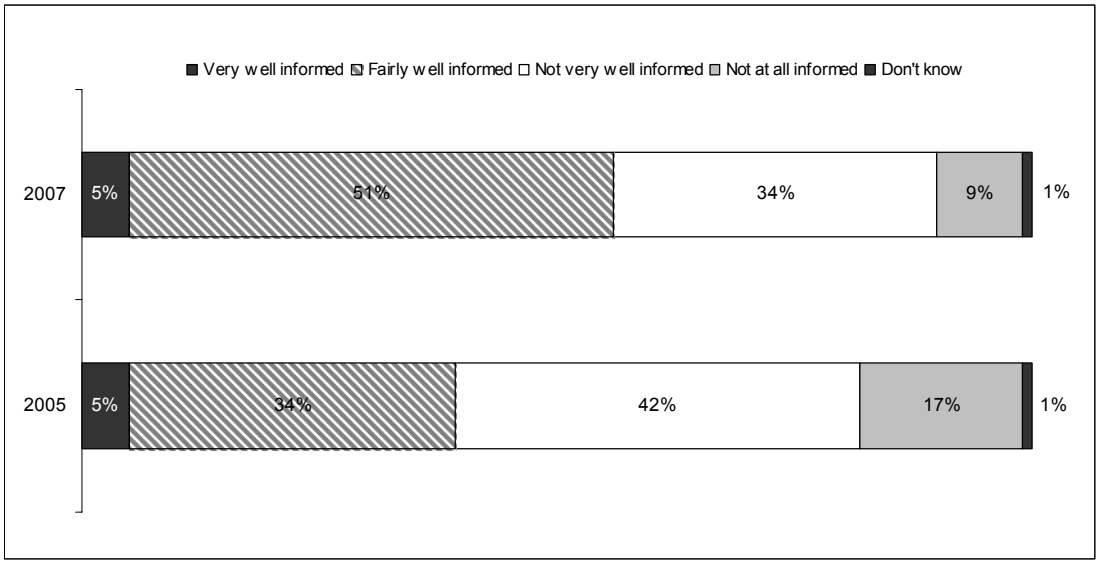
While this is the case, the same report also suggests that the public in the UK feel better informed about science and technology than the public in many other European countries. Respondents in the UK were among the least likely to say they felt 'poorly informed' about each of the following:

- New inventions and technologies
- New scientific discoveries

Nearly half (45%) of respondents in the UK were also judged to have 'very good scientific knowledge'[8]; this is broadly comparable with the EU as a whole (42%).

[7] Europeans, Science and Technology (2005)
[8] Based on responses to a series of 'true' or 'false' statements about science and scientific research

Figure 3.2: How well informed about science and scientific developments



Base: All respondents - 2005, 2008 (1,831, 2,137)

3.30
The survey asked respondents to rate the amount of information about science they saw and heard. People's perceptions are shown in Table 3.6. Half (52%) of respondents said that:

- 'These days I hear and see the right amount of information on science'

While around a third felt said they did not hear or see enough about science.

3.31
Public perceptions of the amount of information available have improved since 2005; in 2008 the UK population were less likely to think that there is too little information about science and more likely to think that there is the right amount of information about science. The results from the three surveys indicate an initial decline in the perceived availability of information between 2000 and 2005 followed by an increase between 2005 and 2008, although not to the levels of 2000.

3.32
The qualitative workshops suggested that the availability of information about science was not viewed simply in terms of the information people see and hear as part of their everyday life. Participants said that they might occasionally read something in a newspaper or see something on the television related to science but it was felt (particularly with the increasing availability of the internet) that information could be found if and when it was needed. In other words, information was available on demand and people would only see and hear it if they needed to.

- *If you really wanted to know more there's the internet (Male, Banbury, DE)*

- *If you're interested in it you go on the internet. But how many people do that? (Male, Cardiff, AB)*

3.33
A number of groups were more likely to feel not very or not at all informed about science and scientific developments:

- Women (50% compared with 36% of men)
- People aged 55 and over (55% compared with 37% of those aged under 55)
- Social grades C2DE (50% compared with 37% of ABC1s)

Table 3.6: Perceptions of the level of information available about science			
	2000 %	2005 %	2008 %
A. These days I hear and see far too much information about science	3	2	3
B. These days I hear and see too much information about science	11	5	6
C. These days I hear and see the right amount of information on science	55	40	52
D. These days I hear and see too little information about science	20	37	29
E. These days I hear and see far too little information about science	4	12	5
Don't know	7	2	6

Base: All respondents – 2000, 2005, 2008 (1,839, 1,831, 2,137)

3.34
People's perceptions of how much information they see and hear about science were closely linked with how well informed they feel about science and scientific developments. Those who feel either 'not very well' or 'not at all' informed were the most likely to think there is not enough information about science (43%).

Table 3.7: Availability of information by how well informed about science		
How much information hear and see about science	Very / Fairly well informed %	Not well informed %
…far too much	2	3
…too much	6	6
…right amount	64	36
…too little	22	37
…far too little	3	7

Base: All respondents (2,137)

Conversely, the majority (64%) of those who felt 'very' or 'fairly' well informed thought that the right amount of information was available. This is unsurprising but is nevertheless interesting. The findings suggest that additional information about science is needed for those who don't feel they know much about the subject. Those who are already comfortable with science don't appear to want additional access to information about science. This finding is supported by the results from the 2005 Eurobarometer survey which pointed to a link between low interest in science and a feeling of lack of information.

3.35
Generally the findings from this section are supported by previous research conducted by MORI on behalf of NESTA (2005). This also found that the public were positive about the need to be informed about new developments in science and technology, although less than half (40%) actually felt sufficiently informed.

Ways of keeping up-to-date with science

3.36
The research looked specifically at the sources of information people used to keep up to date with science. This section looks at newspaper readership, access to the internet and sources of information used to keep informed about science.

Newspapers

3.37
Including regional papers, nearly two thirds (62%) of the UK population read a daily newspaper on a regular basis (i.e. at least three out of every four issues). Around a half (47%) read a national daily tabloid regularly and 14% read a national daily broadsheet newspaper. Readership of Sunday newspapers was slightly less common; 38% of the population read a Sunday tabloid regularly, with 11% reading a Sunday broadsheet regularly.

3.38
While regular readership of newspapers is fairly prevalent, the UK population do not tend to read articles on science and technology often in newspapers. Less than half (43%) of those who regularly read either a daily or Sunday newspaper said that they read articles on science and technology in the paper either 'very' or 'fairly' often. Overall this means that 29% of all respondents said they read newspaper articles on science and technology either 'very' or 'fairly' often.

3.39
Men were more likely than women to read newspaper articles about science, as were social grades ABC1 compared with social grades C2DE. However, reading articles about science and technology was most strongly associated with age. Young people aged 16-24 were far less likely to read newspapers, and far less likely to read newspaper articles on science and technology than adults aged 25 and over. This difference by age group is summarised in Figure 3.3.

3.40
Reading books about science was much less common than reading articles about science in newspapers. Around one in six respondents (17%) had read a book about science (not as part of their work) in the 12 month period prior to the survey. Readership was most prevalent among people from social grades AB and among people who regularly read national broadsheet newspapers.

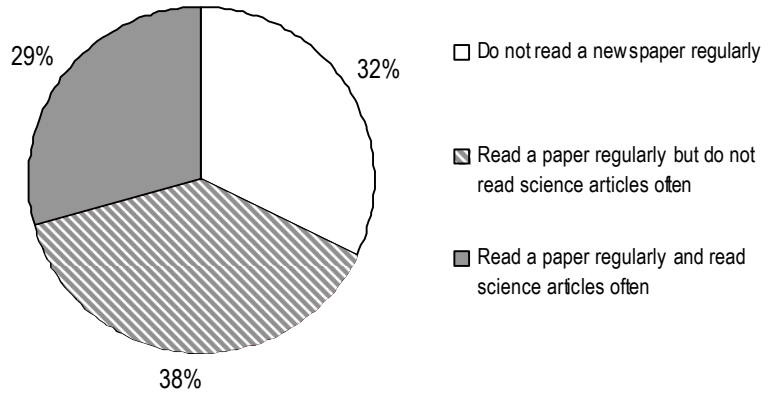
Internet and digital media

3.41
Internet usage has grown among the UK population since the time of the 2000 survey. In 2008 around two thirds (65%) of the population accessed the internet from any location. As might be expected, internet use is strongly associated with age; among young people aged 16-24 internet use is almost universal (90% use it from any location) whereas only a quarter (27%) of people aged 60 and over use it.

3.42
Accessing the internet via a mobile device is relatively uncommon (4% of the population do this) but has increased since 2005. It is likely that accessing the internet via mobile devices will become more common in the future, which may have implications for the way people choose to access information about science; an increasing number of people will have the option to access information about science and technology from wherever they happen to be.

3.43
The proportion of the UK population with digital television in their home has also increased dramatically, even compared with 2005. In the 2008 survey, nearly three quarters (73%) of the population had a digital TV in their home which is almost double the number who had it in 2005 (38%). With the phasing out and planned shut down of the analogue signal in 2012 this figure is set to increase further offering another source of information about science, technology and other topics to the public.

Figure 3.3 – Newspaper readership and reading articles on science and technology



	16-24s	*25+*
Do not read a newspaper regularly	39%	31%
Read a paper regularly but do not read science articles often	40%	38%
Read a paper regularly and read science articles often	21%	31%

Base: All respondents (2,137)

Table 3.8. Activities taken part in to keep up to date with science	
	2008 %
Watched a science documentary e.g. Horizon?	68
Asked friends or family about a scientific topic, including a medical topic	52
Discussed science with a friend or member of your family	50
Searched for information about a scientific topic using the Internet?	35
Listened to a science programme on the radio?	17
Read a science magazine, e.g. New Scientist?	15
Watched or listened to a broadcast about a scientific topic on your computer?	15
Read a blog about science?	9
Have you ever used interactive TV while watching a science programme?	8
Downloaded a podcast on a scientific topic?	3

Base: All respondents (2,137)

Table 3.9: Perceptions of the level of information available about science				
	2000		2008	
	Agree %	Disagree %	Agree %	Disagree %
Science is such a big part of our lives that we should take an interest	74	9	79	7
It is important to know about science in my daily life	59	18	62	20
There is so much conflicting information about science it is difficult to know what to do	58	18	60	15
Science and technology is too specialised for most people to understand it	66	19	56	24
Finding out about new scientific developments is easy these days	37	35	43	31
I cannot follow developments in science and technology because the speed of development is too fast	42	36	42	34
I am not clever enough to understand science and technology	38	42	35	48
I don't understand the point of all the science being done today	28	53	27	56
School put me off science	-	-	21	63

Base: All respondents – 2000, 2008 (1,839, 2,137)

3.44
Television (documentaries) remains the preferred source for keeping up to date with science as was the case in 2000 and 2005. This is closely followed by discussing science with friends and family and/or asking friends and family about science.

3.45
The biggest change is in the use of the internet as a source of information about science, which has increased substantially since 2000 and 2005. This might include searching for information about health and illnesses. A third of the UK population had searched for information about science in the previous 12 months to the survey. Direct comparisons with previous surveys are not possible but in 2000 only 13% of the population said they received information about science via the internet (ever) and in the 2005 survey a quarter (27%) claimed to have looked up scientific information on the internet (ever). This may suggest a shift from traditional media to the internet as a source of information about science, or a trend for people to use the internet as a source of information *in addition* to traditional media.

This change is in keeping with trends in the US as measured by National Science Foundation (NSF, 2006); the proportion of the US population describing the internet as their primary source of science and technology information rose from 44% in 2001 to 53% in 2006).

3.46
A number of people in the qualitative workshops talked about the internet as the most comprehensive and accessible source of information about science. For example, it was mentioned that if you saw something about science on the television which you were interested in then it was possible to go away and look up more about this on the internet at your leisure. The internet does of course require users to be more proactive about finding information compared with watching a documentary or listening to a radio programme. The survey did not ask people to comment on the quality of the various sources of information that they used.

3.47
As part of the survey, respondents were asked how strongly they agreed or disagreed with a number of statements about knowledge and understanding of science:

3.48
Respondents acknowledged the importance of science and the need to take an interest (Table 3.9). A majority agree that:

- Science is such a big part of our lives that we should take an interest
- It is important to know about science in my daily life

The proportion agreeing with these statements has increased slightly since 2000, indicating that the public are more interested in finding out about science.

Nearly half (43%) also thought that it is easy to find out about scientific developments these days. However, a large proportion also felt it was difficult to understand science, the majority agreeing that:

- There is so much conflicting information about science it is difficult to know what to do
- Science and technology is too specialised for most people to understand it

3.49
Previous research in 2005 (by NESTA) concluded that those members of the public who do not think it is important to be kept up-to-date with science believe that developments are either not relevant or too technical/specialised for the general public to understand. The public believed the following to be barriers to a greater of understanding of science and technology:

- a lack of appreciation by the public about how science affects them;
- a lack of public interest;
- scientific jargon/technical language / terminology; and
- lack of education

These barriers were more likely to relate to the abilities of the public themselves rather than to scientists (NESTA 2005).

3.50
Changes in opinion since 2000 are relatively small but the overall picture suggests that in 2008 the UK population feel it is more important to take an interest in science. Comparing the results of the two surveys it also seems that people are less likely agree that:

- Science and technology is too specialised for most people to understand it

And are more likely to agree that:

- Finding out about new scientific developments is easy these days

These are positive findings, showing that the population think that understanding science is more important compared with 2005 and that keeping up to date with science is easier than it used to be. The majority of respondents also disagreed that:

- School put me off science

3.51
While there have been positive changes, significant proportions of the UK population still appear to struggle both with the complexity of science and with the speed at which it develops. For example, four in ten (42%) agreed:

- I cannot follow developments in science and technology because the speed of development is too fast

This remains unchanged since 2000.

Communication and consultation

3.52
The previous section discussed public knowledge of science and access to information about science. One of the main factors which affects public knowledge is how science is communicated by politicians, scientists and the media. This section moves on to discuss the findings which relate to communication of science and scientific research, including a specific discussion of attitudes towards public consultation and what people understand public consultation to be.

3.53
Previous research in 2005 identified problems with the way that science is communicated to the public. The report concluded that one of the main problems was that the public felt they found out about scientific developments too late. As one respondent in 2005 put it:

- *Let the public know what they are experimenting with. You never know until it's actually there*
  (Female, Edinburgh, C2DE)

3.54
This is still the case in 2008, if anything, the UK population feel more strongly that communication with the public could and should be improved. Respondents in the quantitative survey were presented with a series of statements about the communication of science and were asked how strongly they agreed or disagreed with each (see Table 3.10). The majority agreed that there was scope to improve communication significantly.

3.55
The results suggest that communication is most important at an early stage in the research and development process. People felt most strongly that regulators need to communicate with the public, that they should hear about new areas of technology earlier and that scientists should be given help to discuss the implications of research with the public. This implies that people want to hear about research at a stage when it can still be influenced or stopped rather than being told after the research is complete.

3.56
The view that communication could be improved was widely held throughout the population but was strongest among older people; for example, seven in ten (70%) of people aged 60 and over agreed that scientists put too little effort into informing the public about their work. Differing views on communication are discussed further in Section 6 in the context of the five attitudinal groups.

Where comparisons are possible, the views of the UK population appear similar to the public in Europe more widely; Eurobarometer indicates that a similar proportion of respondents in the 25 EU Member States (59%) agreed that:

- Scientists put too little effort into informing the public about their work (59%) (European Commission, 2005a)

3.57
Communication was explored in more detail in the qualitative workshops. Generally it was felt that the communication of scientific developments could be improved and that there were a number of problems with the way scientists communicate with the public. When discussing communication most people were thinking in terms of television (news and documentaries). Some people thought that scientists themselves were poor at communicating.

- *I don't think that scientists are good at communicating and I never think they will be. They are different sort of people with different skills. They might know how to make drugs but they are not always good at putting things across.*
  (Male, Glasgow, C2)

3.58
The language scientists used was regarded as complicated, acting as a barrier to public understanding. It was also felt that too many acronyms and too much technical language were often used:

- *They use too many big words – when a simple one would do.*
  (Male, Glasgow, C2)

Table 3.10: Attitudes towards the communication of science

Agreement with…	2005 %	2008 %
Those who regulate science need to communicate with the public	-	87
We ought to hear about potential new areas of science and technology before they happen, not afterwards	74	78
Funders of scientific research should help scientists to discuss research and its social and ethical implications with the general public	-	77
I would like more scientists to spend more time than they do discussing the implications of their research with the general public	-	73
Scientists put too little effort into informing the public about their work	-	61
Scientists should be rewarded for communicating their research to the public	-	55

Base: All respondents – 2005, 2008 (1,831, 2,137)

3.59
Several participants in the qualitative research also felt that information about science often contained contradictory and opposing messages. This made it hard to understand what was being communicated and led to a degree of suspicion about the motives behind scientific research.

- *One scientist will say something and another one will say something different – you really cannot trust them. They are all saying what they think they want you to believe (Male, Glasgow, C2)*

This is not necessarily a criticism of science and scientist *per se.* It may point to a wider misunderstanding that science should be able to provide definitive answers when in fact scientific research is complex and frequently does generate conflicting results and conclusions.

3.60
It was felt that the message itself was very important in terms of how much attention people would pay to what was being said. Some of the most common types of science communication were seen as very negative in tone. Reports on climate change and health related issues were seen as examples of continuous bad news which led people to disengage with the subject matter.

- *Everything you like is bad for you anyway (Female, Banbury, C1)*

The relevance of the communication was also seen as important; people would pay more attention to what they were being told if they felt it applied to them.

- *It depends what it is – you do take a bit more interest in things that relate to you. (Male, Banbury, DE)*

Some participants in the qualitative workshops also thought there was a bias in a lot of television news coverage, while documentaries were seen as less biased:

- *The more you find out about it, the less faith you have in what they [the news] report. (Female, Cardiff, AB)*

Consultation

3.61
The 2005 survey revealed a lack of awareness of what public consultation was; 88% of respondents said they knew not very much or nothing at all about public consultation in science. However, there was a reasonable level of support for public consultation among those who took part in that survey.

3.62
In 2008 there was still limited knowledge of what public consultation actually is. Respondents were asked:

- When I say 'public consultation' what comes to mind?

Although many people realised that public consultation involves some kind of dialogue or discussion with the public, a quarter (25%) either said they did not know or gave no response to the question. Among those who were able to provide a response, the most common answer was 'Asking/getting public opinion/views' (19% of the population). A further 13% described it simply as 'consulting the public' thereby failing to provide a definition. The most common responses were:

- Asking/getting public opinion/views – 19%
- Consulting the public – 13%
- Discussion/Forum/Talking – 8%
- Public meeting – 7%
- Meeting/Meetings – 7%
- Publishing / making information available (specifics not provided) – 5%
- Government/Government involvement - 5%

Table 3.11 Perceived benefits of public consultation	
What, if any, would you say are the main BENEFITS to society from greater public involvement in decision making about science?	2008 %
Enables the public to make informed decisions about their lives	13
Promotes interest in / understanding of science	13
Better decision-making	12
Enable the public to judge science issues for themselves	11
Improved democracy / accountability	8
More balanced debate	7
Improved public trust in policy-makers and decision-makers	7
Medical benefits	5
More funding for science	5
Nothing	*10*
Don't know	*29*

Base: All respondents (2,137)

3.63
Despite this, a significant minority of respondents did appear to have a good understanding of what public consultation involves. A number of people taking part in the qualitative workshops acknowledged that the groups themselves were a form of public consultation. Even in the quantitative survey, a small number of people were able to provide a sound working definition, for example (describing the types of thing consultation involves):

- *All sorts - public meeting - consumer groups - academic - website feedback (Female, England, AB – survey respondent)*

3.64
As part of the quantitative survey, people were asked what they thought the main benefits to society were from greater public involvement in decision-making about science. Table 3.11 summarises the most common responses. Four in ten people (40%) either said they did not know what the benefits were or that there were no benefits. This could either be interpreted as scepticism towards public consultation or further evidence of limited public knowledge of what public consultation actually is. Those aged 60 and over were more likely than average to say that greater public involvement had no benefits (19% compared with 10% of the population overall).

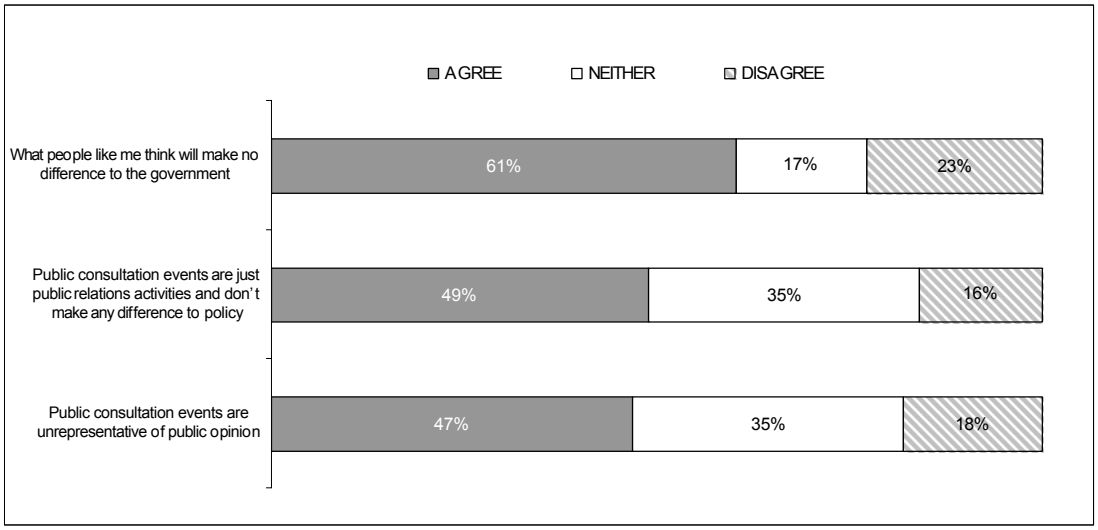
It is interesting that several of the responses given relate to benefits for the public themselves rather than benefits to scientific research or society. The top two answers ('Enables the public to make informed decisions about their lives' and 'Promotes interest in / understanding of science') suggest that public consultation is seen as a tool for keeping the public informed as much as it is seen as a way of involving the public in the decision making process.

3.65
There was a high level of scepticism about the motivation behind public consultation events. People in the qualitative workshops felt that consultation was often commissioned so that the government could be seen to be involving the public; the decisions had already been made and public opinions were not acted on.

- *Really we are quite sceptical about the public getting involved. …. It is lip service and it is doesn't really matter if they do get involved – It doesn't change anything. Their views are not considered because the big agenda has already been agreed. (Male, Glasgow, C2)*

- *They don't actually care what we think (Male, Banbury, C1)*

Figure 3.4 Attitudes towards public consultation – motives and values



Base: All respondents (2,137)

3.66
This is corroborated by the findings from the quantitative research, summarised in Figure 3.4. Around a half of respondents agreed that:

- Public consultation events are just public relations activities and don't make any difference to policy (49% agreed), and;
- Public consultation events are unrepresentative of public opinion (47%)

There was also a high level of agreement that:

- What people like me think will make no difference to the government, and;

3.67
Where comparisons can be made between this and the 2005 survey, the differences are negligible; the UK population is as sceptical now as it was in 2005.

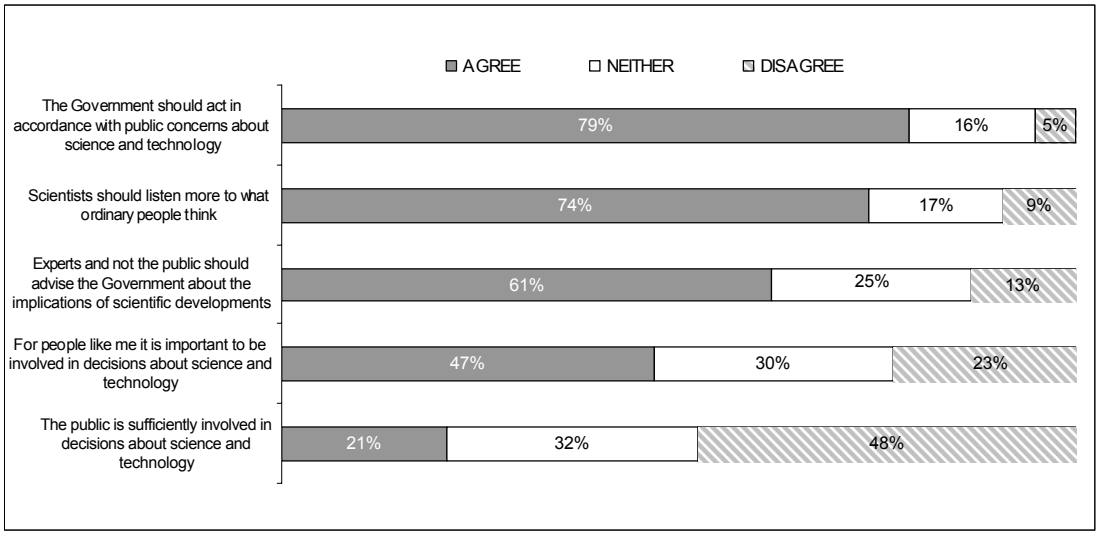
This apparent scepticism towards public consultation is reflected in people's perceptions of Government involvement in public consultation. When asked how much effort the Government makes in terms of public consultation for science people's answers were mixed. On balance, more people felt the Government made not very much / no effort at all than felt the Government made some or a great deal of effort.

Table 3.12 Level of effort in public consultation

How much effort do you think the Government is making to bring together members of the public, scientists and policy makers to discuss new scientific development?	Total %
A great deal of effort	3
Some effort	34
Not very much effort	36
No effort at all	12
Don't know	15

Base: All respondents (2,137)

Figure 3.5 Attitudes towards public consultation – using the public's views



Base: All respondents (2,137)

3.68
Despite a high level of scepticism about public consultation, respondents felt that the public should have greater involvement in science and decisions about scientific developments. A large majority agreed that:

- The Government should act in accordance with public concerns about science and technology (79% agreed compared with 81% in 2005), and

- Scientists should listen more to what ordinary people think (74% compared with 69% in 2000)

3.69
Nearly half (48%) of respondents disagreed that the public is sufficiently involved in decisions about science and technology. This compares with 58% of respondents in the 25 EU Member States as measured by Eurobarometer (European Commission, 2005a).

However, a smaller proportion of the UK population think that it is important for themselves personally to be involved in decisions about science and technology; around a half (47%) of respondents agreed that:

- For people like me it is important to be involved in decisions about science and technology

3.70
This compares favourably with findings from elsewhere in EU as reported by Eurobarometer; 39% of respondents from the 25 Member States agreed with this statement.

And six in ten (61%) agreed that:

- Experts and not the public should advise the Government about the impact of scientific developments

The results suggest that people like the idea of public consultation in theory but are comparatively less interested or willing to be personally involved in it. As one participant in a qualitative workshop put it:

- *I think you really have to be into that kind of stuff – I think you have to want to do it yourself.*
  (Male, Glasgow, Young / Non-aspirational[9])

3.71
This is supported in part by the perceived barriers to public consultation. People were asked to say what, if any, were the main barriers to greater public involvement in decision-making about science. The most common answers all related to the public's willingness and/or ability to be involved. One in five (21%) said that the 'public's lack of understanding of science' was a barrier.

[9] Aspirational younger people included those who were 'planning to go to University or college' and 'should either still be studying or have obtained a qualification'.

Table 3.13 Perceived barriers to public consultation	
What, if any, would you say are the main BARRIERS to greater public involvement in decision making about science?	2008 %
Public's lack of understanding of science	21
Lack of public interest in science	12
Public don't have time to	7
Government policies make it difficult	7
Scientific jargon / technical language / the terminology	6
Lack of awareness among scientists of the public's understanding of science	6
Campaigns by activist groups	5
Mistrust of scientists	5

Base: All respondents (2,137)

3.72
The results are similar to the 2005 survey when the main barriers to public consultation in science were thought to be:

- Lack of knowledge about the facts of science / lack of information (27% cited this as one of the main barriers)
- Lack of public understanding / appreciation (18%)
- Lack of public interest (17%)

Views of respondents taking part in the current survey were echoed by those of one young person taking part in one of the qualitative workshops:

- *A lot of the things would be too difficult to understand – I think it is better that they have experts who understand these things. That would be better. (Male, Glasgow, Young/Non-aspirational)*

3.73
Relatively few people thought that the Government or scientists themselves created barriers to the public becoming involved. So while a large section of the public is sceptical about public consultation, scepticism is probably not the main reason people are unwilling to get involved in public consultation activities.

Regulation of science & engineering

3.74
Trust in regulation of science and engineering was a key issue in the 2000 survey. Attitudes towards regulation was one of the key factors which helped to define the attitudinal groups (see Chapter 7), with some of the groups expressing concerns about how science was controlled and regulated. The previous surveys have shown that attitudes towards regulation are independent of attitudes towards science overall; some people are positive towards science overall but negative about the regulation of science and vice versa. The section looks at:

- Worry about science and scientific research
- Trust in scientists and scientific research
- Attitudes towards regulation of science and engineering

Worry about science and scientific research

3.75
Before discussing people's attitudes towards regulation, this section looks at how worried and concerned the public is about science and scientific research. Previous research for OST (which is now part of the Department for Innovation, Universities and Skills (DIUS)) has shown that opinions about science are not only affected by demographics and level of scientific knowledge but also by the perceived risk associated with scientific advances (MORI, 2005).

3.76
The 2008 survey asked respondents how much they agreed or disagreed with four statements related to worry about science and scientific research. Comparing the results with 2000 and 2005, the UK population seems to be less worried now compared with three and seven years ago (see Table 3.14). People were less likely to agree that:

- The more I know about science the more worried I am
- Science is getting out of control and there is nothing we can do to stop it
- The speed of development in science and technology means that it cannot be properly controlled by Government

Similarly, people were more likely to agree that

- The benefits of science are greater than any harmful effect

While the UK population appears to be less worried compared with 2000, they do appear to be slightly more concerned about the harmful effects of science compared with some other European countries (European Commission, 2005). Just over half (52%) of respondents in the 25 EU Member States agreed that

- The benefits of science are greater than any harmful effect

This compared with 49% of the UK population at the time of the 2005 Eurobarometer survey and 46% at the time of the current survey.

Table 3.14 Changes in attitudes towards science

Agreement with…	2000 %	2005 %	2008 %
The benefits of science are greater than any harmful effect	43	-	46
The more I know about science the more worried I am	32	35	25
Science is getting out of control and there is nothing we can do to stop it	35	-	21
The speed of development in science and technology means that it cannot be properly controlled by Government	41	48	35

Base: All respondents – 2000, 2005, 2008 (1,839, 1,831, 2,137)

Table 3.15 Public worry about science and research		
	WORRIED (very of fairly) %	NOT WORRIED (not very or not at all) %
The use of animals in research that aims to cure diseases	56	42
Research into storing radioactive waste	54	44
The impact of immigration on the UK	49	49
Understanding the causes of climate change	41	57
The impact of globalisation on developing countries	38	56
The development of robots that can think for themselves	37	61
The use of technology for surveillance (for example CCTV)	34	65
Research into new drugs to cure human diseases	34	65
Research using stem cells, that is cells that can grow into different parts of the body, as a way of curing diseases	33	62
Research into new sources of energy	29	69
Understanding the causes of obesity	29	70
Developing faster methods of transport	27	71
Understanding how people learn	25	72
Wi-Fi networks that allow computers to access the Internet and the world wide web from anywhere using technology similar to that used by mobile phones	22	69
Nanotechnology – using tiny particles (a millionth of the thickness of a human hair) in manufacturing different sorts of products	18	69
Understanding more about space, planets and stars	14	84

Base: All respondents (2,137)

3.77
The results suggest a positive shift in public opinion over the last few years with levels of worry about science and scientific research decreasing significantly. Worry about science was linked with a number of demographic factors:

- Sex - Women tend to be more worried than men
- Age – those aged 60 and over are more worried than younger people
- Social Grade – C2DEs were more worried than ABC1s
- Newspaper readership – tabloid readers were more worried than broadsheet readers

These factors are discussed further in relation to the five attitudinal groups identified in Chapter 7. They are the key discriminating factors on a number of measures as discussed in previous sections of this chapter.

3.78
The survey also asked people how worried they were about 16 different types of scientific research on four-point scale ranging from 'very worried' (4), 'fairly worried' (3), 'not very worried' (2) to 'not at all worried' (1). Respondents were also asked to indicate how beneficial they thought each type of research was using a three-point scale, ranging from 'very beneficial' (3), 'fairly beneficial' (2) to 'not beneficial' (1). Levels of worry are summarised in Table 3.15. Levels of worry varied considerably by type of research / area of science. Overall, public worry was highest for:

- The use of animals in research that aims to cure diseases
- Research into storing radioactive waste
- The impact of immigration on the UK
- Understanding the causes of climate change

And lowest for:

- Understanding more about space, planets and stars
- Nanotechnology
- Wi-Fi networks
- Understanding how people learn

-

However, post-survey discussions about these questions have suggested that there are difficulties in interpreting them. Specifically we are unsure whether respondents answered how worried they were about the *research* into a particular issue or how worried they were about *that issue*. For example the survey asked how worried people were about 'Research into understanding the causes of climate change'. It was felt that respondents were not able to answer this in the way it was phrased; people were simply interpreting the question as 'How worried are you about the causes of climate change'. This view was reinforced by the qualitative workshops. People did not know enough about most types of research to comment on how worried they were about them. It seems reasonable to assume that some of the statements were interpreted in this way.

This is a generic hazard with questions of this kind; in reality, many people are unable to divorce their perceptions of research on a particular topic from the actual topic. Nevertheless the survey data is interesting – providing an overview of the types of areas of science which are most worrying (either in terms of the research itself or the products of that research).

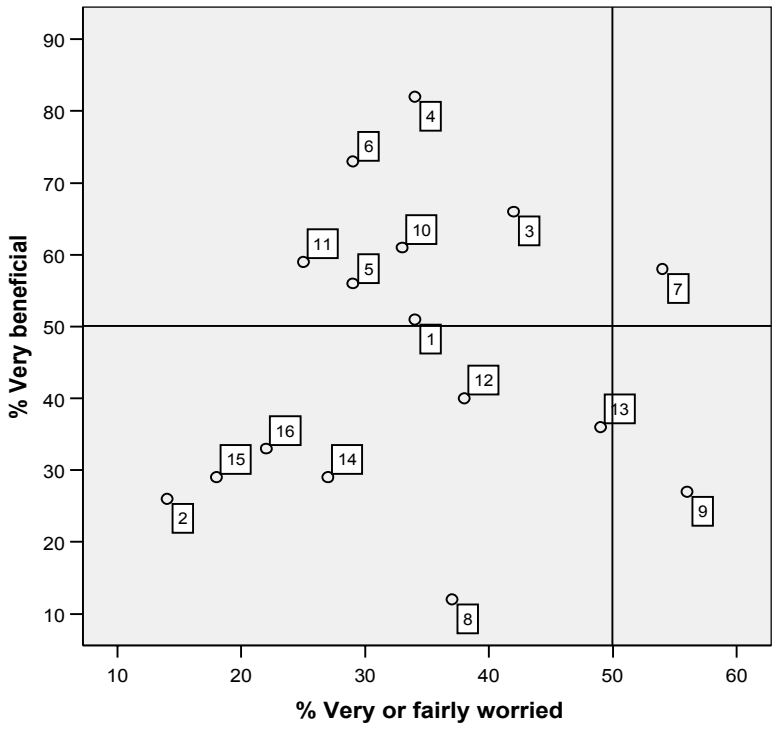
Topics where worry seemed to be higher than might have been expected from the qualitative research were:

- The impact of immigration on the UK
- Understanding the causes of climate change
- The impact of globalisation on developing countries

3.79

The survey also asked respondents to say how beneficial they thought each of these areas of research was. A detailed discussion about perceived benefits can be found earlier in this Chapter. Level of worry can be compared with perceived benefit to each of the different areas of research; for example some areas people were worried about but felt that the research was very beneficial (i.e. was definitely justified). Figure 3.6 plots the proportion of respondents who were either very or fairly worried about that area against the proportion who said they thought it was very beneficial.

Figure 3.6 Worry about and perceived benefit of science and research



Key

1. The use of technology for surveillance (for example CCTV)
2. Understanding more about space, planets and stars
3. Understanding the causes of climate change
4. Research into new drugs to cure human diseases
5. Understanding the causes of obesity
6. Research into new sources of energy
7. Research into storing radioactive waste
8. The development of robots that can think for themselves
9. The use of animals in research that aims to cure diseases
10. Research using stem cells, as a way of curing diseases
11. Understanding how people learn
12. The impact of globalisation on developing countries
13. The impact of immigration on the UK
14. Developing faster methods of transport
15. Nanotechnology
16. Wi-fi networks

Base: All respondents (2,137)

Figure 3.7 Public concern with science and research

POSITIVELY SUPPORTED *(Seen as **very** beneficial and people are not worried)*	SENSITIVE ISSUES *(Seen as **very** beneficial but people are worried)*
• Understanding how people learn • Research into new sources of energy • Understanding the causes of obesity • Research into new drugs to cure human diseases • Research into using stem cells • The use of technology for surveillance • Understanding the causes of climate change	• Research into storing radioactive waste
LACK OF INTEREST *(People are not worried and do not see as beneficial)*	**AREAS OF CONCERN** *(People are worried and they are not seen as **very** beneficial)*
• Development of robots that can think for themselves • Understanding more about space, planets and stars • Nanotechnology • Developing faster methods of transport • Wi-fi networks • Impact of immigration on the UK • Impact of globalisation of developing countries	• Use of animals in research that aims to cure diseases

3.80
The position of a scientific issue within the quadrants in Figure 3.7 will influence the communication strategies used to engage people in the topics. An appreciation of how the public view benefits and concerns about particular areas of research is critical for those charged with communication strategies in these areas.

3.81
Of all the issues explored, people were most worried about the use of animals in research that aims to cure diseases (56% of respondents claimed to be worried). While more than half of respondents said they were worried about the use of animals the qualitative research suggested that people do not generally *oppose* it. Some people felt it was preferable not to use animals in research but that it was necessary; if there were benefits to humans then the research could be justified:

> *While I wouldn't want animals to come to any harm, I'd prefer them to be tested on animals than on humans.*
> *(Female, Banbury, C1)*

> *You've got to try it out on something. Whether it should be an animal, I'm in two minds really. (Male, Banbury, C1)*

3.82
This view is supported by previous research, which suggests the population do not necessarily oppose the use of animals in research but are, to an extent, uneasy about it. Research by MORI on behalf of The Coalition for Medical Progress[10] showed that while a majority (71%) of respondents *dis*agreed that 'It does not bother me if animals are used in experimentation' a similar proportion (75%) agreed that 'I can accept animal experimentation so long as it is for medical research purposes'. As with the current research it is important that researchers and research funders recognise this conditional acceptance. There is certainly strong evidence that research funders should continue to support the "3Rs" (Replacement, Refinement and Reduction) with regard to the use of animals in research.

3.83
The wider issue of medical research and testing new drugs was top-of-mind for a number of participants in the qualitative workshops. People recalled the incident at Northwick Park in March 2006 which led to the hospitalisation of a number of human test subjects. Possibly as a result of this coverage a small number of people thought that animal testing had been stopped and that humans were being used more often as a result.

[10] The Use of Animals in Medical Research – MORI (2002)

Table 3.16 Changes in attitudes towards trust in science and scientists

				2008		
Agreement with…	Agree %	Neither %	Disagree %	Agree %	Neither %	Disagree %
It is important to have some scientists who are not linked to businesses	78	11	5	84	13	3
In general scientists want to make life better for the average person	67	19	8	76	17	6
The independence of scientists is often put at risk by the interests of their funders	-	-	-	72	24	4
Rules will not stop researchers doing what they want behind closed doors	69	13	12	64	22	14
Scientists are too dependent on business and industry for funding	-	-	-	60	31	9
Science is driven by business – at the end of the day it is all about money	61	17	17	55	24	21
We have no option but to trust those governing science	-	-	-	55	19	26
Scientists seem to be trying new things without stopping to think about the risks	56	18	19	42	30	28
Scientific advances tend to benefit the rich more than they benefit the poor	-	-	-	38	30	31

Base: All respondents – 2000, 2008 (1,839, 2,137)

Trust in scientists and scientific research

3.84
Previous survey research carried out by ESRC (Science in Society, 2002)[11] showed that trust in scientific research and scientists varied among the public depending on the funder of the research. People were generally more trusting of scientists working for environmental organisations and universities (and these organisations themselves). In contrast, people were least trusting of scientists working for government and industry (and of government and industry in their own right). There was some concern that the funding of science had become too commercialised and it was felt there should be more public control over science.

Research for CCLRC also suggests that despite generally positive views of science in the UK population, there are a significant minority of people who are concerned about the control of science (with women, older people and those in the C2DE social grades being more likely to be concerned (PSP for CCLRC 2004). Despite these concerns scientists were seen as rather special, but slightly detached people, dedicated to their work with the intent to make life better for the average person.

The current research is broadly in agreement with these findings.

3.85
The current survey asked respondents how much they agreed with a number of statements about trust and belief in scientists / scientific research. Where possible the results are compared with the 2000 survey in Table 3.16.

The UK population seemed to be more trusting of scientists and scientific research in 2008 compared with 2000. Fewer people agreed that:

- Rules will not stop researchers doing what they want behind closed doors
- Science is driven by business – at the end of the day it is all about money
- Scientists seem to be trying new things without stopping to think about the risks

This is supported by the results of an ongoing study by MORI which shows that the public are more trusting of scientists compared with ten years ago. This survey showed that the proportion of people who thought that scientists 'tell the truth had increased from 63% in 1997 to 72% in 2006 (Opinion of Professions, 2006).

Despite this positive shift in opinion, more people agreed with each of these three statements than disagreed, showing that *on balance* the population is still distrustful of the way that science is done. This appears to be related to the need for independence in research and science which is not primarily about making money. Six in ten people (60%) agreed that:

[11] http://www.esrcscoietytoday.ac.uk

- Scientists are too dependent on business and industry for funding

A further 84% agree that:

- It is important to have some scientists who are not linked to businesses

This represents an increase from 2000. Research by Poortinga & Pidgeon (2003) highlighted that there is concern that the funding of science has become too commercialised and that there is support for more public control over science.

3.86
Respondents in the qualitative workshops also highlighted the need for independence in science and research which is not primarily about making money:

- *… you can't take the research at face value, it has to be tested…by other researchers checking up on them. All this research is published, papers are published…it feeds on itself and the boundaries of knowledge are pushed forward. The problem is, if someone pays you to do a particular piece of research and those people manipulate the results for political or whatever reasons, then that becomes dodgy research.*
  (Male, Cardiff, AB)

3.87
Although the current study shows that people are sceptical about the regulation of science; the great majority of respondents felt that scientists' motives were generally good. Three quarters (76%) agreed that:

- In general scientists want to make life better for the average person

This represents an increase of 11% in agreement since 2000; further evidence that the UK population were more trusting of scientists and scientific research compared with 2000.

3.88
The survey also asked respondents directly whether they personally trusted scientists more or less compared with three years ago. While a large majority (79%) said they trusted scientists about the same compared with three years ago, 11% said they trusted them 'a little' or 'much' more. A smaller proportion (7%) said they trusted scientists less. On balance this suggests that trust in scientist is increasing.

3.89
Levels of trust were lowest among a number of different sub-groups. For example, people were more likely to agree that 'Rules will not stop researchers doing what they want behind closed doors' if they were:

- Older (aged 60 and over)
- From social grades C2DE
- Tabloid readers
- Educated to a level no higher than the equivalent of GCSE

3.90
The survey asked what factors were most important when determining whether or not scientists and engineers could be trusted. The most important factors in determining whether scientists could be trusted were related to competence:

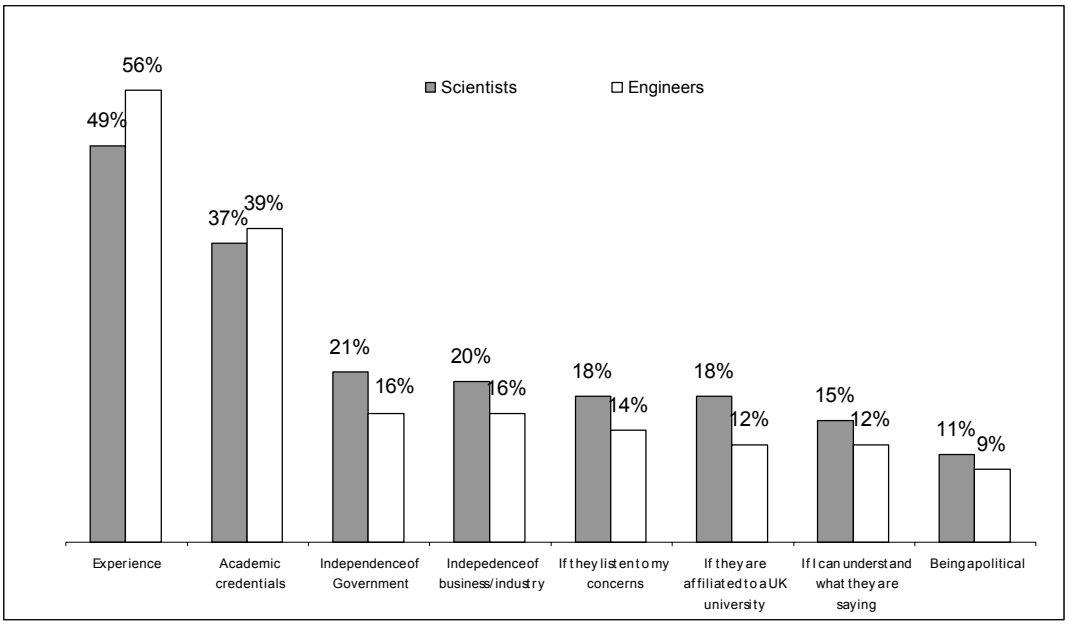
- Experience (49%)
- Academic credentials (37%)

People were also more likely to trust scientists if they were seen as independent. Around one in five respondents said that the most important factors in determining whether they would trust a scientist were:

- If they are independent of Government (20%)
- If they are independent of business / industry (20%)

3.91
Respondents considered the same factors to be important when determining whether they could trust engineers. Experience and academic credentials were the most important factors followed by the independence of the engineer. These findings are in line with the 2005 survey which concluded that scientists' credentials, competence and experience were the most important factors when determining whether or not they could be trusted.

Figure 3.8 Most important factors when determining trust in scientists and engineers



Base: All respondents (2,137)

Attitudes towards regulation of science and engineering

3.92
The UK population view regulation of science and technology as important and are quite conservative; wanting new technologies and products to be delayed until the science behind them is fully understood. The vast majority of respondents agreed that:

- Government should delay…new products until scientists are completely certain there are no bad side effects
- New technologies should not be used until the relevant experts are sure that there are no risks to people; and
- Industry should wait until scientists are completely certain that there is no danger to their workers to use new methods of production

3.93
Where comparisons are possible, attitudes towards regulation have changed very little between 2000 and 2008.

Levels of confidence in the regulation of both science and engineering are split in the UK population. More people had a 'great deal' or 'a fair amount' of confidence than had 'not very much' or 'none at all'. However, the biggest group within the population said they had 'a fair amount', suggesting that public confidence could be improved considerably.

Similarly, around half of people agreed that:

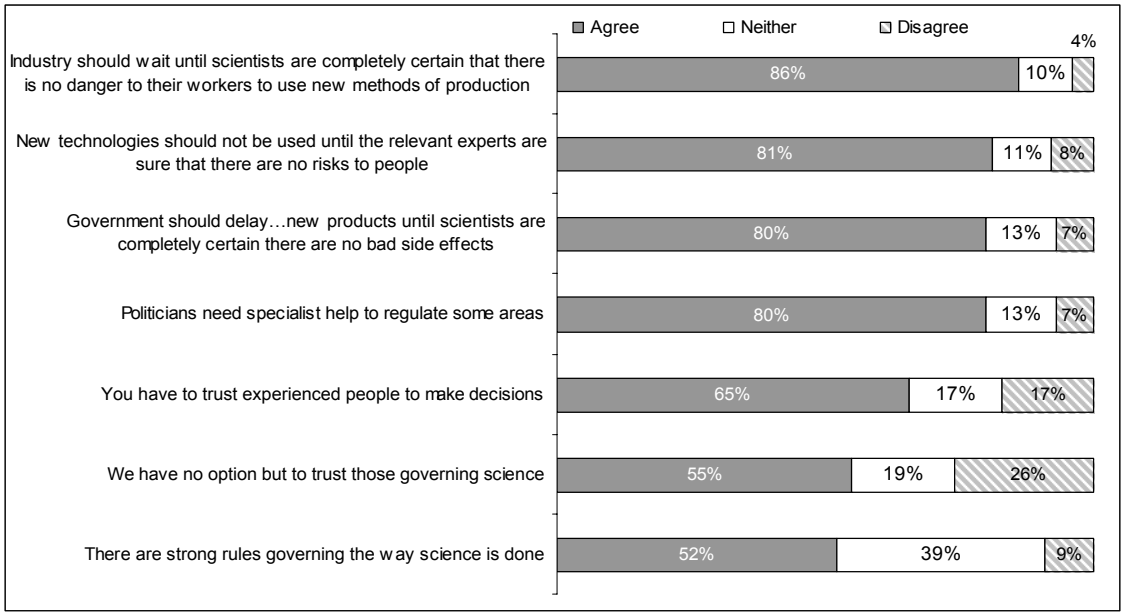
- There are strong rules governing the way science is done

However, more than a third (39%) said they neither agreed nor disagreed with this statement. This suggests public knowledge of oversight and regulation is limited. The research shows that, on balance, people assume that there are rules that govern science.

3.94
The survey also suggests that people feel that they have limited influence in the area of regulation. A majority agree that:

- You have to trust experienced people to make decisions (65%), and;
- We have no option but to trust those governing science (55%)

Figure 3.9 Attitudes towards regulation



Base: All respondents (2,137)

Table 3.17 Confidence in regulation of science and engineering

How much confidence do you have in the way … is regulated			Engineering	
	2005 %	2008 %	2005 %	2008 %
A great deal	3	4	-	5
A fair amount	48	49	-	52
Not very much	31	26	-	18
None at all	4	4	-	3
Don't know	13	17	-	22

Base: All respondents – 2005, 2008 (1,831, 2,137)

3.95
Confidence in the way science is regulated has changed little since 2005, as shown in Table 3.17. Both in 2005 and 2008, roughly half of the UK population said they had a 'great deal' or a 'fair amount' of confidence in the way science is regulated (51% and 53% respectively). The proportion of people saying they had 'not very much' or 'none at all' had decreased from 35% to 30% in the same period of time. However, any increase in confidence is very small and is accompanied by an increase in the proportion of people who said they did not know how confident they were.

3.96
The survey respondents acknowledge that the government cannot regulate in all areas without assistance from other bodies. Eight in ten people agreed that:

- Politicians need specialist help to regulate some areas

This fits with the views of participants in the qualitative workshops who acknowledged the difficulties that regulation in some areas posed. The complexity of the issues involved and the nature of big business were said to make regulation difficult in some cases:

- *It's pretty hard to regulate a multinational company*
  (Male, Cardiff, Young/Aspirational)

3.97
Knowledge of how science and engineering are currently regulated is fairly mixed. A third (33%) said they didn't know who regulates the way science is done, with a similar proportion (38%) saying they didn't know who regulates the way engineering is conducted. It was most common for respondents to say that science and engineering were regulated by:

- The Government
- Scientists / Engineers themselves; or
- Scientific / Engineering professional bodies

Previous research has also shown that the public lack of knowledge of regulation and scientific scrutiny (e.g. MORI 2003a, Wellcome Trust 2005a)

3.98
Qualitative workshops also indicated a lack of public awareness of regulation of science and engineering. At the same time people assumed that the Government or another body must be actively involved:

- *I don't know how we can be happy with it if we don't know anything about it. (Male, Cardiff, AB)*

- *There are all these institutes and they all get a lot of money – but you don't know what they are doing. (Male, Glasgow, Young/Non-aspirational)*

- *I think there must be government restrictions – they can't just go about making a Frankenstein. They have to get permission from the government (Female, Glasgow, Young/Non-aspirational)*

3.99
As well as asking people about who does regulate science and engineering, the survey also asked who they thought *should* regulate science and engineering. As shown in Table 3.18, the discrepancies between who does and who should regulate the two sectors were relatively small. On balance, people felt that the Government should be slightly less involved in the regulation of both sectors than they currently are. Conversely, people felt that scientists / engineers themselves, professional bodies and the general public should be more involved in regulation. This view was supported by the workshops; it was felt that people who were involved in research were best placed to regulate what was going on.

- *The whole human race has a vested interest in regulating research but the only people who can understand it are the scientists….they have the ethical responsibility to control where science is going. (Male, Cardiff, AB)*

This is further evidence that the UK population do generally trust scientists and engineers. Despite the differences in response, most people said that the Government did and should regulate both sectors.

3.100
The qualitative workshops were used to explore what types of activities people thought were involved in regulation. Awareness was fairly poor; people understood that regulation involved controlling and monitoring the activities of scientists and their research but did not generally know how this was achieved. Some people mentioned that regulation involved 'guidelines' and 'codes of conduct' but concepts such as peer review were not understood. In some instances there was confusion as to whether regulatory guidelines were compulsory and legally binding or whether they were advisory.

- *I'm not clear on whether its [regulation] advisory or legal and in what context it would be legal. (Female, Cardiff, AB)*

Table 3.18 Who do you think regulates / should regulate science and engineering

How regulates / should regulate…			Engineering	
	regulates %	should regulate %	regulates %	should regulate %
The Government	49	37	32	28
Scientists / Engineers themselves	10	20	12	18
Scientific / Engineering professional bodies	8	15	13	20
Universities	7	7	4	4
Business / Industry	6	5	11	10
The public	1	7	1	4
Don't know	32	26	38	30

Base: All respondents (2,137). Note: Percentages do not add to 100% as questions were multi-coded

Conclusions

3.101
The results from the survey point to a number of positive changes since 2005 and 2000. The UK population seem more positive about science in terms of their interest in and support for science and engineering. However public opinions towards consultation, regulation and communication are mixed (as shown in previous years). As in previous years attitudes towards science were linked with sex, age and social grade.

3.102
The results suggest that the UK population see science as more important compared with 2000 and 2005. Levels of interest have increased across a wide range of topics but the largest increases in interest were seen in relation to environmental issues and energy sources.

3.103
In terms of visits to scientific attractions, public involvement remains moderate. Visits to scientific attractions and participation in public events and meetings related to science were at similar levels to those seen in 2000.

3.104
Overall the population feels better informed in 2008 compared with three years ago and feels that the level of information available about science is better. The biggest change in media use between this and other surveys is in the use of the internet. Use of the internet has become a lot more widespread compared with three and seven years ago and this could be a factor influencing the increase in public knowledge. Qualitative research suggests that people are getting more used to accessing information on demand; increasingly people feel they can find out almost anything they need to know as long as they can get online.

3.105
The UK population believes that communication between those who are involved in science and the general public could be improved. Letting the public know about scientific developments at an early stage in the research process was seen as particularly important. People also felt the way that science was communicated often made it inaccessible to the general public.

3.106
Views on public consultation were rather mixed. People felt that consultation related to science was important and that more could be done to involve the public in decisions about scientific developments. However, many people were sceptical about public consultation and did not really understand what public consultation involves. As observed in previous surveys, many people did not seem interested in *personally* taking part in public consultation events.

3.107
Knowledge of how science and engineering are regulated was limited among the UK population, although the majority appear confident that both sectors are regulated properly. Generally people thought that the science and engineering were regulated by the Government.

4 Public Attitudes to Social Science

Introduction

4.1
This chapter reports on the quantitative and qualitative research that looked specifically at the public's views about social science. Prior to finalising the questionnaire, six focus groups were conducted in May 2007 which were designed to explore public awareness and understanding of social science. These groups were carried out to explore the issues in their own right *and* to inform the design of the quantitative survey. The qualitative groups suggested that the public's understanding of social science was limited and as a result, the main survey included just three questions to examine the public's views about social science. In addition, the workshops that followed the survey (focusing mainly on science) specifically looked at three social science topics: 'how people learn', 'immigration' and 'globalisation'.

This was the first time that social science topics were covered in the survey. Relatively little is known about the UK population's attitudes towards and knowledge of social science. As social science is part of the remit of the Research Councils (through ESRC) it was felt that the inclusion of social science was important.

Knowledge about social science

4.2
The discussions in the initial focus groups began by brainstorming the phrase 'social science'. Reactions ranged from no familiarity or comprehension of the term to something close to a definition. Importantly, many people were guessing and even those who had studied social science subjects, such as sociology and geography, at university level were not necessarily confident in their response.

- *I haven't got a clue. (Female, London)*
- *I've never heard the term before. (Male, Birmingham)*
- *The study of people in a social environment, not at work. (Male, London)*
- *The study of behaviour. (Female, London)*
- *The study of anything that happens in society. (Male, Birmingham)*

4.3
Lack of knowledge and understanding was a problem particularly among participants in the lower social grade workshops; there was considerable confusion about who actually studies these areas and what their qualifications would be. Many participants felt that social workers were the main professional group that was trained to study crime/anti-social behaviour, welfare and social exclusion, housing, and immigration.

4.4
The apparent lack of social science subjects taught at school was a major stumbling block to wider understanding.

- *I don't recall social science from school. (Male, London)*

4.5
Some however were able to suggest some social science subjects with psychology, sociology and social work being the most commonly listed. Many took their cue from the word 'social' but when presented with a list of the disciplines covered by ESRC. A common response to most of the subjects was:

- *I've never thought of it as social science. (Female, Birmingham)*

The list of disciplines was supplied by the Economic and Social Research Council and used as a prompt during the discussions to scope out the subjects included under the heading 'social science'. The disciplines included were Area Studies, Demography, Economic and Social History, Economics, Education, Environmental Planning/Planning, Human Geography, Linguistics, Management and Business Studies, Political Science and International Relations, Psychology, Science and Technology Studies, Social Anthropology, Social Policy, Social Work, Socio-legal Studies, Sociology, Statistics, Computing and Methodology. A common response to most of the subjects on was:

The breadth of social science confounded some.

- *It's just so broad. (Male, Birmingham)*

Many participants found it strange to group linguistics with economics, for example or did not think of 'finance' as social. Not everyone knew what sociology covered.

4.6
At the end of the survey respondents were asked if they thought they had taken part in a social science research project. Overall 69% thought they had. Differences in responding were largely a function of social grade – with the ABs being more likely to agree (75%) than those from social grade DE (62%). Similarly those who had taken part in the workshops considered that they had been part of a social science research project

Comparing Science with Social Science

4.7
The task of comparing and contrasting science and social science was an unfamiliar one for participants. For some putting 'social' and 'science' together was to put two almost opposite words together. Overall, the word 'social' was a key to the issues and the word 'science' was a key to the idea of studying something. Participants had a much stronger impression of science based on school experiences, although this led them to exclude mathematics from their definition.

- *Science is what went on in the science block* [at school].*(Female, London)*

4.8
From their school experiences, science involves *'research and experimentation'* and their view of scientific research was a picture of scientists sitting in a laboratory doing experiments. This image created difficulties when trying to understand social science.

- *I'm struggling to picture a group of people sitting in a room at a university studying all these different subjects. (Female, Birmingham)*

And

- *I can't see them setting up tests on people. (Male, Birmingham)*

4.9
The ability to be objective about data was thought to be intrinsic to being 'scientific'. For some, social science, was not seen as an objective because it was more open to interpretation and did not provide clear cut answers, whereas the natural and physical sciences were thought to generate right or wrong answers. Others however, were aware that scientists also interpret their data and that science is not always so clear cut.

- *I suppose a hard science is physics where there is literally right or wrong, whereas social science it's more up for discussion. It's more subjective … it's not like a science from that point of view, because there isn't a right answer in every circumstance. You can get several different answers to one question … it's different to our normal understanding of science, which has very definitive answers to every question. (Male, Leeds)*

And while one person in this group therefore thought:

- *It's a misnomer to call it a science. (Male, Leeds)*

Another understood that:

- *I've been working within the scientific community for a while … and everything can be thrown out by a slightly different element, so there's no definite answers in science.*
  (Male, Leeds)

4.10
Science was also seen as being about measurement and proof.

- *You have to be able to measure it and I suppose for it to be a scientific truth it has to be proven. (Male, Leeds)*

- *Or… maybe the science is actually the solving of problems. (Male, Leeds)*

4.11
A scientific approach would be a 'logical approach', '*methodical*', '*consistent*' and '*researchers would go to extraordinary lengths to try to remain as neutral as possible*'.

4.12
Some groups came to see a difference between *science* and *being scientific*. While science as a term was intrinsically linked to physics, chemistry and biology because these are the subjects badged at school as 'science', it emerged during the discussions that for some participants at least, research is collecting data; science is the analysis and interpretation of that data. Hence social science is the study or analysis, leading to understanding of social issues. In the main, participants understood the concept of social science once it had been explained by the facilitator, although many found it hard to articulate.

4.13
Analysis of national statistics, questionnaire data, conversations and observation could all, it was thought, be analysed scientifically. From these discussions it became clear that participants' knowledge and understanding of academics and academic research was very limited, if not non-existent. This is as true for many graduates as for non-graduates. Following an explanation of academic research from the facilitator, the following response articulates what others expressed more mutedly.

- *I'm surprised. I would have thought it would be independent bodies with more expertise. I would have thought that it would have been someone whose whole job it was, not for a lecturer who is also giving lessons.*
  (Male, Birmingham)

Others had been aware that universities *'do research'* but had *'never put two and two together'*.

Images of Social Scientists

4.14
Participants were reluctant to provide an image of a 'social scientist' but then they were also reluctant to describe 'a scientist'. Several voiced concern that while there is a stereotype, *'you're aware that it is a stereotype and you're aware that there are other types of people as well'*. Nevertheless, a common theme emerged, that social scientists were *'more down to earth', 'more practical', 'not so serious', 'someone you might meet' 'not as scatty or mad'* as scientists. Some participants had visions of *'lefties', 'a man with a beard'* and '*someone with patches on the elbows of their jacket*'. There was tendency to see social scientists as male but others thought that they would be more likely to be women because *'they'd have to have an interest in people'*. Overall, however, there was no strong gender specific view and the women in London were quite definite that *'women are represented in all professions these days'*.

4.15
While considered to be *'normal', 'not weird'* and possibly someone with whom participants might have contact, social scientists were still thought to be slightly different from the average person. It was thought that they would be *'studying people's behaviour, watching and analysing'*. They would have a *'passionate interest'* in their chosen topic and *'want to change things'*. Like scientists, it was said, they would *'look to improve things'*.

4.16
While not thought to be badly paid, it was thought that both scientists and social scientists could earn more in the commercial sector and that they did academic research because of their interest in the subject.

Value of Social Science

Interest in Social Science topics

4.17
Findings from the survey revealed that interest in a range of social science topics was relatively high, with at least two-thirds of the public indicating an interest in all of the topics.

Table 4.1: Interest in social science topics

Very or moderately interested in…	2008 %
Crime/anti-social behaviour	91
Terrorism	86
Education	85
Welfare and social exclusion: for example, drugs and poverty	82
Housing	78
Immigration	77
Employment	75
Transport/congestion	74
Economics and finance/state of the economy	70
International current affairs	66

Base: All respondents (2,137)

4.18
However, participants at the workshops indicated that although many of the topics were of interest – it was largely from the point of view of discussing different views about what government and society should do to address these issues. Their interest was mainly concerned with whether the government was doing enough in these areas. In general there was a view that the topics were of interest because they allowed people to develop an argument or a political stance, and therefore had more to do with subjective views, knowledge and beliefs. Most were unaware that each topic would draw on social science disciplines. The exception to this was some participants in the AB social grade group.

- *I'd like to think that research into learning is a positive thing….To develop the brain, to empower the individual for a better life.*
  (Male, AB)

4.19
The disciplines covered by social science[12] were thought to be important by participants because '*they affect our lives'*. They felt that there was a need to study these issues because:

- *Every academic discipline is of relevance to everybody, whether they appreciate it or not.*
  (Male, Leeds)

4.20
However, the caveat was that any research should be new and non-obvious.

- *They research ridiculous things; things we know anyway. (Female, Birmingham)*

- *We all know that playing on a play station all day…or eating too many chips…is bad for you. We don't need research to tell us that. (Female, Birmingham)*

4.21
Some participants thought that social scientists would study the causes of social problems, others that they would be looking at the effects of behaviour; however, the over-riding rationale for studies was the desire to '*improve things'* and '*solve problems'*.

4.22
A lack of immediately obvious utility raised questions about the point of research in some disciplines:

- *I wouldn't see linguistics as a social science; it's just a basic human activity. You can't particularly change it, why would you want to study it? (Male, Birmingham)*

- *Social science seems to just put together information that's out there and present it to you…you think, 'that's interesting' but what does it tell you? (Male, London)*

[12] As provided by ESRC: Demography, Economic and Social History, Economics, Education, Environmental Planning/Planning, Human Geography, Linguistics, Management and Business Studies, Political Science and International Relations, Psychology, Science and Technology Studies, Social Anthropology, Social Policy, Social Work, Socio-legal Studies, Sociology, Statistics, Computing and Methodology

4.23
The value of social science research however, also depended, for participants, on how the results were used. There was a perception that the Government does not take more notice of research findings and is too driven by political ideology. This led to some disillusionment and a conviction that *'nothing ever changes…they're* [politicians] *all the same'*. Participants were also clear that the balance of expenditure between researching a topic and doing something to cure problems should give priority to action.

4.24
This discussion revealed significant confusion over why research findings are contradictory over time. One rationale for this was that research was conducted *'over and over again until they get the answer they want'*. However, there was support for the need to continually research the same topics: *'there's always the need for new knowledge',* and to have different people doing similar research, *'otherwise it's just one opinion'.* This was thought necessary to find answers and particularly to find cures for diseases.

4.25
Once participants understood that social science is about the study of society, another view emerged:

- *We all do it without realising it. You use it to handle people in different ways…make sure you communicate at the right level. (Male, Leeds)*

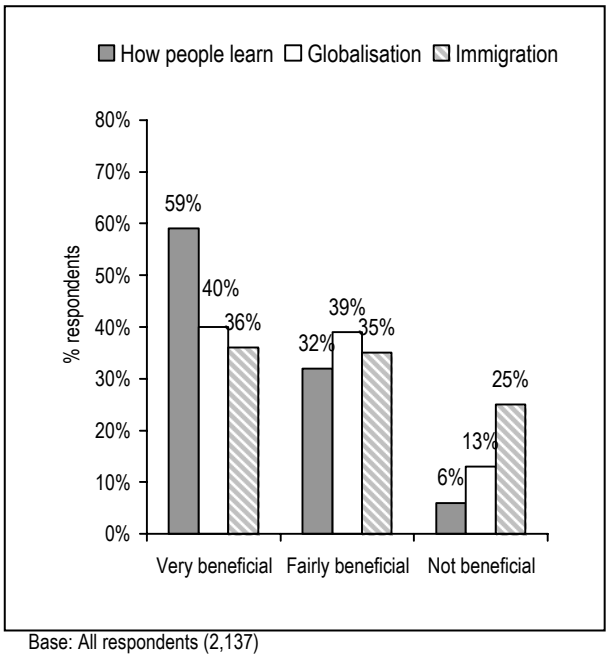
- *Isn't it just general knowledge? (Female, London)*

Benefits of social science

4.26
Findings from the survey indicate that the majority of the public (91%) consider that 'understanding how people learn' is beneficial to society. Similarly 78% consider that the understanding the 'impact of globalisation' is beneficial to society and 71% that 'the impact of immigration on the UK' is beneficial to society. Those most likely to consider the study of each of these topics as 'very beneficial' are more likely to be well-educated and come from the higher social grades.

These three topics were included in the survey based on discussions arising from the media monitor and literature review. They were felt to be areas which were important for society and were agreed with the Steering Group in advance of the survey.

Figure 4.1 – Perceived benefits of research related to social science



Base: All respondents (2,137)

How people learn

4.27
Most participants assumed that this topic concerned how children and young people learn, rather than adults. Across the groups there was recognition that a number of factors could influence learning – including behaviour, motivation and teaching approaches. Most felt that teachers would be the most likely people to study this area, and that they would use this knowledge primarily to explain to parents issues about their children's difficulties in learning or to improve the teachers' own skills.

4.28
Some people also thought that this kind of research would be used for advertising and marketing purposes. Particularly among participants in the AB and young aspirational workshops there was some concern that the research could be misused. However, people were not sufficiently concerned to think that the research should be stopped.

4.29
Social workers were identified as one of the main professional groups that would study this area, but again it was thought that individual social workers would acquire the knowledge through experience rather than formally studying any academic disciplines. Other professional groups who were thought to have some involvement in research into how people learn included neurologists and psychologists (mentioned by participants in the AB and young aspirational groups).

Immigration

4.30
Immigration was seen as the most politicised of the topics discussed in the workshops. Many expressed some reluctance to discuss the area for fear of appearing racist.

4.31
As with the previous topic, there was limited awareness that the topic was an area of social scientific enquiry. Participants in the AB social grade group were able to see that the collection of administrative data (such as immigration figures) was important, but even this group failed to see how the area could be further researched. Some aspirational young people who took part in the workshops also expressed concern that research into immigration could be manipulated for political means.

4.32
In most of the workshops, discussion largely concerned the impact of immigration on society rather than *research into* the impact that immigration has.

Globalisation

4.33
The concept of globalisation was difficult and most of the groups struggled initially to understand it. The AB group were the most able to define the issue:

- *How something in one country can affect quite quickly another part of the world, from financial to climate (Female, Cardiff, AB)*

4.34
Amongst this group of participants, the global connectedness of financial and commercial organisations was discussed in the context of recent problems in the American sub-prime mortgage market affecting the financial standing of UK financial institutions such as the Northern Rock building society. The AB group were also concerned about the misuse and manipulation of statistics generally.

4.35
A number of the participants from across the groups considered that this was an area that economists would study. However, participants did not tend to see economists as social scientists. This was because of the same the reasons previously identified: namely that the term 'social scientist' was unfamiliar and because people considered economists to be practitioners not scientists.

Users

4.36
The primary users of the findings from social science were thought to be the national Government and for some, local government. Journalists also featured as heavy users of social science information and indeed, some participants thought that journalists would be the people doing social science research.

4.37
Commercial uses for this type of information were also identified, in particular in market research and advertising. It was recognised that businesses used this type of information to inform marketing and other commercial decisions. General ignorance of the processes and outputs of social science meant that participants were unable to be very specific.

Regulation

4.38
We asked participants whether they thought that social science should be regulated. Some thought it must already be regulated. Regulation was seen as a way to ensure that the findings from research were not biased. There was concern expressed that regulation could be a form of censorship on the results or indeed, on what is researched.

4.39
With respect to the research process, it was generally felt that there was not very much to regulate because people could just refuse to take part. However, it was thought that the methods must be ethical and not infringe civil liberties but anything that did not fall within these boundaries was thought likely to be illegal. Where researchers were collecting opinions a few participants understood that they must be careful not to lead people into certain answers. Again, participants in general knew so little about social science and the methods employed in its practice that they were unable to give a very informed view.

Validation and verification

4.40
Some participants felt that the source of research funding could influence the findings. Participants said that those in universities were probably less likely to be influenced by their funder than researchers in other institutions. For some, Government research was also seen as credible. Research for commercial companies was felt to be the most likely to be influenced by the funding institution's interests. Nevertheless, verification by someone *'independent'* was thought to be important. Others however, believed that most researchers slant their findings towards what their main user wants to hear, rather than just presenting the 'facts' and some believed that *'some social scientists are known for a certain political stance'.*

Reviewing quality

4.41
There was widespread (but not universal) appreciation that the findings from research are published in specialist journals but no understanding of the peer review process. Nevertheless, something akin to this was expected to take place prior to publication to verify the accuracy of research findings. There was some concern expressed that this approach might stifle publication of *'ground breaking ideas'* because nobody would be able to verify, or agree with, the new idea. Others argued that anything new would be based on previous theories and therefore others would be able to comment. Some however, were unaware of any dissemination process that did not involve feeding results directly to Government.

Conclusions

4.42
This element of the project found that there were very low levels of public awareness of 'social science' as a specific term or type of research. Many of the disciplines contained within social science, whilst familiar terms, were not well understood. However, in general participants believed that research into the societal issues that social scientists cover was important. Independence of the researcher from political influence is important to confidence in the findings.

4.43
There was considerable interest in the range of social science topics which were covered in the survey. Despite this most of the general public fail to understand how issues such as 'how people learn', 'immigration' and 'globalisation' could be researched and which groups of professionals would be involved in research.

4.44
Government and journalists were thought to be the primary users of social science research, although there was an appreciation that businesses also have a use for the methods employed to collect data to support business decisions.

4.45
Some participants were sceptical that social science could not, by its nature, be objective. Others were sceptical about the objectivity of some social scientists. There were concerns about the way that Government would use the findings. Many participants were concerned that policy-makers would ignore information that did not fit preconceived views.

4.46
Social scientists were seen as more accessible than scientists and likely to have more in common with the average person, although there were hints that a stereotype would be middle aged and politically left leaning.

5. Younger people

Introduction

5.1
This chapter looks at the findings in relation to younger people's attitudes towards science, focusing on the attitudes of respondents aged 16 to 24. Throughout comparisons are made with the remainder of the adult population (that is adults aged 25 and over).

5.2
The majority of the findings are taken from the quantitative survey. Where appropriate findings from the qualitative workshops (two of which were conducted with 16-24 year olds) are used to illustrate and support the main findings. One of the workshops was conducted with 'aspirational' younger people (those who have attended or intended to attend Higher Education) and the other with 'non-aspirational' younger people (those who did not intend to go into Higher Education). Relevant findings from the literature review are also presented to illustrate and provide insight into the key findings. Presenting the results for younger people separately is possible as the overall number of younger people taking part was boosted in 2008 by oversampling those aged 16-24 (in total 643 people aged 16-24 were interviewed). As this was not done previously, comparisons with the previous surveys are not possible.

Findings are presented under the following headings:

- Interest in science
- Involvement in science
- Science education
- Careers in science
- Careers in engineering
- Working in science
- Knowledge of science and access to information
- Communication and consultation
- Media
- Regulation of science and engineering
- Trust in Scientists
- Worry about science

Interest in science

5.3
Younger people's overall attitudes towards science are positive and similar to adults aged 25 and over.

Comparable proportions of younger people and adults aged 25 and over agreed that:

- I am amazed by the achievements of science (82% for both younger people and adults aged 25 and over)
- On the whole science makes our lives easier (69% compared with 71%)

Younger people were only slightly less likely to agree that:

- Science is such a big part of our lives that we should take an interest (74% compared with 80% of adults aged 25 and over)

5.4
Slightly more younger people than adults aged 25 and over agreed that:

- It is important to know about science in my daily life (68% compared with 61%)

5.5
For younger people, learning new skills was seen as more important than among adults aged 25 and over (94% indicated this compared with 73% of adults). Younger people were also more likely to say that they enjoy new situations and challenges (90% compared with 73% of adults).

5.6
It is not surprising to find that younger people's interests in the range of topics presented in the survey are different from those of adults aged 25 and over. Younger people put music and new films above health issues (which was the top interest for adults aged 25 and over). Interest in education and employment was also higher up the ranking for younger people than adults (see Table 5.1). While crime and anti-social behaviour was the second-rated topic for adults aged 25 and over, it was only rated seventh equal in terms of interest for younger people. Similarly environmental issues were of interest to proportionally fewer younger people.

5.7
However, when it comes to other scientific issues, there was little difference between younger people and adults aged 25 and over in the relative degree of interest expressed in 'new inventions and technologies', 'new scientific discoveries', and 'science and science issues'.

Table 5.1: Interest in issues (% very interested and moderately interested) – ordered by ranking of younger people's interests.				
	2008 Younger people (16-24) %	2008 Younger people (16-24) Rank	2008 Adults (25+) %	2008 Adults (25+) Rank
Music	95	1	87	5
New films	90	2	63	19
Health issues	86	3=	95	1
Education	86	3=	85	7
Employment	85	5	75	13
Terrorism	83	6	86	6
New inventions and technologies	82	7=	79	9
Crime/anti-social behaviour	82	7=	91	2
Environmental issues	81	9	89	3
Medical discoveries	78	10	88	4
Welfare and social exclusion: for example, drugs and poverty	75	11	82	8
Housing	70	12	78	10
New scientific discoveries	68	13	77	11
Sport	66	14	62	20
Science and science issues	61	15=	67	17
Immigration	61	15=	77	12
Transport/congestion	59	17	74	14
Economics and finance/state of the economy	55	18	70	15
Energy/nuclear power issues	54	19	70	16
International current affairs	52	20	66	18
UK politics	45	21=	60	21
Religion/faith	45	21=	53	22

Base: All respondents (2,137)

5.8
Around half (45%) of younger people expressed an interest in 'religion and faith' and 'UK politics'. This is perhaps to be expected as 60% of younger people compared with 35% of adults aged 25 and over do not regard themselves as belonging to a particular religion.

5.9
Level of interest in science-related topics was related to both age and gender. In general a greater proportion of those aged 20-24 were likely to express an interest in science-related topics compared with those aged 16-19.

5.10
Younger women tended to be more interested than younger men in health and a range of social science issues including:

- Health issues
- Crime/antisocial behaviour
- Education
- Environmental issues
- Housing
- Welfare and Social Exclusion

In contrast younger men tended to be more interested than younger women in:

- New inventions and technologies
- New scientific discoveries
- Science and science issues

Involvement in Science

5.11
This section looks at how involved younger people are in science and science-related activities. The survey asked people whether they had visited a range of venues or events in the last 12 months.

5.12
Younger people were much more likely to have attended a theme park and somewhat more likely to have attended a sporting event as a spectator than adults aged 25 and over. Younger people were also slightly more likely to have attended a science-related activity at school or community centre or university. By contrast adults were more likely to have attended a museum which was neither a science nor art museum.

5.13
The most popular science-related activity for both younger people and adults aged 25 and over was attendance at a science museum / centre. Nearly one in five of all respondents had attended one of these in the last 12 months.

5.14
Combining all the science-related activities, 41% of adults aged 25 and over and 49% of younger people attended at least one science-related activity in the last 12 months.

5.15
Respondents were also asked to indicate which activities they would be interested in attending / visiting. Amongst those who had not taken part in a science related activity in the last 12 months, younger people were no more likely than adults aged 25 and over to say they were interested in attending / visiting a science-related activity. The exception to this was interest in visiting a zoo. A quarter (26%) of younger people who had not visited a zoo said they would be interested in visiting one compared with 17% of adults aged 25 and over.

5.16
In the survey, members of the public were asked to indicate how beneficial they considered a wide range of science areas to be. There was very close agreement between the views of younger people and adults aged 25 and over - although in most areas slightly fewer younger people judged these to be 'very' beneficial. The most significant exceptions to this being development of Wi-fi networks and faster methods of transport. In keeping with the views of adults aged 25 and over, research into new drugs to cure human diseases was rated 'very beneficial' by the greatest proportion of younger people. A majority of young people also rated 'research into new sources of energy', 'understanding the causes of climate change', 'research using stem cells' and 'understanding how people learn' as very beneficial.

Table 5.2: Attendance in the last 12 months

	Younger people (16-24) %	Adults (25+) %
Any science-related activity [1]	**49**	**41**
Theme park	43	26
Sporting event as a spectator	32	26
Art gallery	28	26
Zoo[1]	27	26
Tourist attraction visitor centre	26	32
Historic house or garden	16	34
Science museum/centre[1]	18	19
Science-related lecture or talk[1]	13	7
Science related activity at school or community centre or university[1]	13	6
Another type of museum (not art or science)	11	20
Laboratory or similar scientific site[1]	3	3
Science related public meeting / debate[1]	4	3
Planetarium[1]	3	3
Science festival[1]	2	2
Taken part in a science horizon or Science public event[1]	1	1

Base: All respondents (2,137)
[1] Denotes science-related activities

Table 5.3 – How beneficial scientific research is perceived to be by age		
	Younger people (16-24) 'Very beneficial' %	Adults (25+) 'Very beneficial' %
Research into new drugs to cure human diseases	84	81
Research into new sources of energy	63	75
Understanding the causes of climate change	59	67
Research using stem cells, that is cells that can grow into different parts of the body, as a way of curing diseases	59	61
Understanding how people learn	58	59
Research into storing radioactive waste	48	60
Understanding the causes of obesity	48	57
The use of technology for surveillance (for example CCTV)	53	51
The impact of globalisation on developing countries	39	40
The impact of immigration on the UK	38	36
Wi-Fi networks that allow computers to access the Internet and the world wide web from anywhere using technology similar to that used by mobile phones	42	33
Nanotechnology – using tiny particles (a millionth of the thickness of a human hair) in manufacturing different sorts of products	26	29
Developing faster methods of transport	35	28
The use of animals in research that aims to cure diseases	23	27
Understanding more about space, planets and stars	27	26
The development of robots that can think for themselves	13	11

Base: All respondents (2,137)

5.17

One of the areas which was least likely to be described as beneficial was the use of animals in research. In the qualitative workshops the role of animals in developing medicines was discussed. Many of the young people from the non-aspirational group were of the view that animal research was now much rarer than it had been previously. These young people drew a strong distinction between using animals for research on cosmetics which they felt was unacceptable and drugs which was acceptable.

- *I don't think they should use animals to test cosmetics and shampoos, but I think if it is a new medicine it is OK*
  (Glasgow, Young/Non-aspirational)

In the aspirational young people workshop animal testing was seen as:

- *A necessary evil.*
  (Cardiff, Young/Aspirational)

The general view was that animal testing has to be done.

- *You have to have it if you want to invent new medicines.*
  (Glasgow , Young/Non-aspirational)

Overall young people felt that there were sufficient safeguards in place to ensure appropriate use of animals in research.

Young people compared the use of animals with the morality of using human volunteers to test drugs, and there were reservations about this in both groups. Young people were uncomfortable that human testing could take advantage of poor people in this country as well as those from developing countries.

5.18
The use of robots and intelligent systems was also discussed in the workshops. Young people were generally supportive of the use of the robots – but felt they also had the potential to do harm. In particular they were concerned that this could make people lazy and could put people's jobs at risk.

- *You need less people to do things – so what would they do for work.*
  (Glasgow, Young/Non-aspirational)

There were also concerns about robots working properly, and the risks of things going wrong:

- *You would worry about it going wrong – and you not being able to control it. Or people who are corrupt programming it to do things.*
  (Glasgow, Young/Non-aspirational)

5.19
In general young people were more comfortable with robots that could do practical things rather than with artificial intelligence. Young people were concerned about who controlled artificial intelligence systems and whether artificial intelligence could be controlled.

Science education

5.20
At the time of the survey, more than four in ten (44%) of those aged 16-24 were still in school or full time education. A third (35%) of those were studying any science subjects and 44% were studying any social science subjects. Three-quarters (77%) of those studying science and 90% of those studying a social science said they were very or fairly interested in having a job that means you have to have a qualification in one of these subjects.

5.21
Research in 2003[13] found that pupils tended to distinguish between 'school science' which was perceived as theoretical and 'science in society' which was perceived as being linked to technology such as television and mobile phones. The current study appears to support this distinction. While young people were amazed by the achievements of science, science education was perceived to be much less fascinating. In the qualitative workshops with young people, science education was seen as enjoyable if you were good at it; otherwise it was seen as hard, and unrelated to everyday life:

- *I enjoyed It […] I was good at it.*
  (Cardiff, Young/Aspirational)
- *Science at school is boring. It is hard. Too much learning facts. Too much to remember. A lot to learn.*
  (Glasgow, Young/Non-aspirational)

5.22
Young people from the aspirational group tended to like science, but for different reasons:

- *With science there is a right and wrong answer. (Glasgow, Young/Aspirational)*

- *I found it interesting…I like to find out how everything is working and how they relate to each other, going back to first causes.*
  (Cardiff, Young/Aspirational)

- *Because I'm quite a sporty person, it was interesting finding out how the body works and under different strains.*
  (Cardiff, Young/Aspirational)

Those in the non-aspirational group had all experienced difficulties learning science:

- *Science is one of the hardest subjects at school. I gave it up because it was too difficult. It involves maths – and I hate that.*
  (Glasgow, Young/Non-aspirational)

- *I wanted to be a physio and I had to do some science subjects. Science is hard but there is harder – maths!*
  (Glasgow, Young/Non-aspirational)

- *I did biology but there is too much book work. I had difficulty remembering things. There was too much to learn.*
  (Glasgow, Young/Non-aspirational)

[13] Bennett (2003) Teaching and learning science.

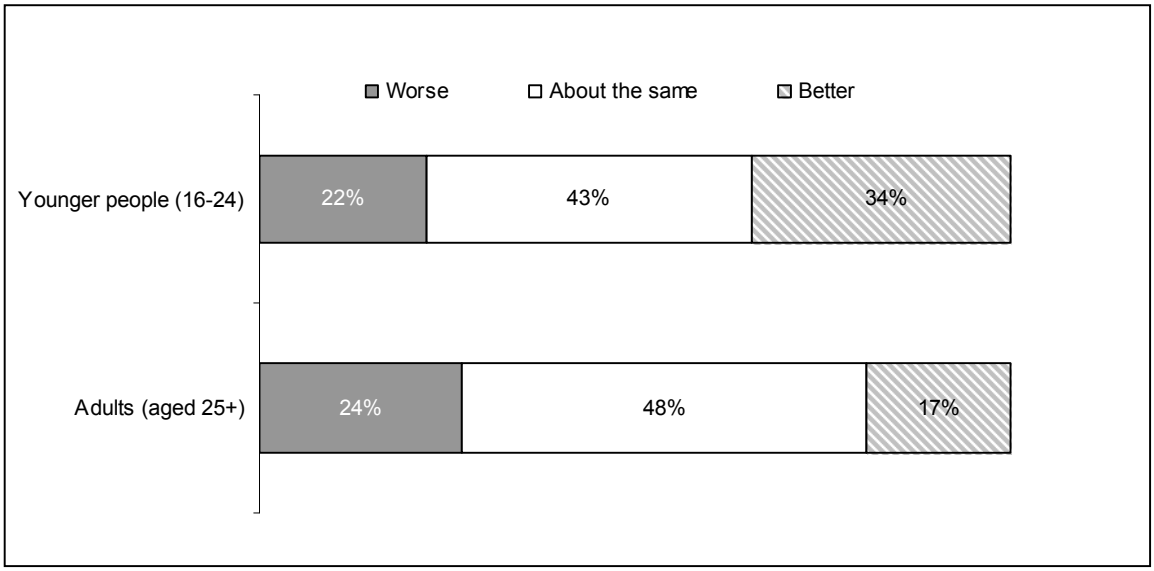
5.23
Adults aged 25 and over were divided about how good their science education was at secondary school compared with education in other subjects – 48% considered it was 'about the same', 17% considered it 'better' and 24% considered it 'worse'. By contrast younger people were more positive – 43% considered it was 'about the same', 34% considered it better and only 22% considered it 'worse'. Younger men were more positive than younger women: 40% of younger men and only 27% of younger women considered it 'better' than their education in other subjects.

5.24
While younger people tended to rate their science education more highly than adults aged 25 and over, a substantial number claimed that school education had a detrimental effect on their interest in science. A quarter (27%) of younger people compared with 20% of adults aged 25 and over agreed that:

- School put me off science

Adults aged 25 and over were more likely than younger people to say that maths was useful in their day-to-day life and in their job. In contrast, younger people were more likely to say that maths was useful for other subjects they studied and were also more likely than adults aged 25 and over to say that maths was boring.

Figure.5.1 Perceptions of science education at secondary school compared with other subjects



Base: All respondents (2,137)

Table 5.4. How useful maths is perceived to be in everyday life

	Younger people (16-24) %	Adults (25+) %
Useful in my day-to-day life	43	58
Interesting	26	24
Boring	24	14
Useful in my job	-	32
Useful for other subjects I studied	20	13
Not at all useful	9	9

Base: All respondents (2,137)

5.25
Other sources of information about attitudes towards science education include PISA (Science Competencies for Tomorrow's World, 2006) and ROSE (The Relevance of Science Education Project (ROSE) in England, 2006). These studies provide a comprehensive overview of attitudes towards science education both in the UK and throughout Europe. These two studies are limited to school-aged children (up to the age of 15-16) so direct comparisons with the current survey are not possible.

Careers in Science

5.26
Fewer younger people aged 16-24 were of the view that a career in science or engineering is a good career choice for younger people these days – compared with any other age group (Table 5.6). However, younger men were more positive about both science and engineering than younger females. These gender differences were no longer apparent amongst those aged 25 and over.

5.27
Around a quarter of those younger people who considered science a good choice of career cited that this was because it was:

- interesting (28%)
- well paid (24%)
- had good prospects (24%)

Similar proportions said that science was a good choice because the country needs scientists (23%), that it makes a good contribution to society (22%), and that there are many job opportunities in science (20%).

One in ten felt that a career in science was a good choice because it would be personally satisfying (11%). Small numbers said that science was a good career choice because it was a good background for another career, that it was secure, or that there were opportunities to work abroad or to travel.

5.28
Adults aged 25 and over focused on a smaller range of reasons. The top three reasons cited by adults were good prospects (31%), that the country needs scientists (30%) and that scientists make a good contribution to society (28%).

5.29
Non-aspirational younger people in the qualitative workshop were asked to consider the reasons for the difference in views between younger people and adults aged 25 and over. Participants felt that older people were more positive about science because they were less aware of the current job market for young people, relying on their perceptions of what was a good career choice when they made choices many years previously.

- *Older people push science and engineering jobs because it is something from their era. It was one of the big areas when they were looking for a job. I don't really think they know about jobs now.*
  (Glasgow, Young/Non-aspirational)

Table 5.5 Science / Engineering is a good career choice for younger people these days

	Science is a good career choice %	Engineering is a good career choice %
All respondents	***63***	***64***
16-24	47	51
25-34	64	62
35-44	64	64
45-54	66	66
55-59	67	64
60-69	61	64
70+	77	77

Base: All respondents (2,137)

Careers in Engineering

5.30
Among younger people who considered engineering to be a good career choice, this was most often because:

- it has good prospects (30%)
- the country needs engineers (28%)
- it is well paid (27%)
- there are many job opportunities in engineering (24%)

One in five (20%) indicated that it was a good choice because engineering is 'interesting'. Adults aged 25 and over were more likely to express the view that the country needs engineers (40%), there are good prospects (31%), and that there are many job opportunities in engineering (21%).

Table 5.6 Perceptions of why science and engineering are good career choices				
	Science		Engineering	
	Younger people (16-24) %	Adults (25+) %	Younger people (16-24) %	Adults (25+) %
Base: All who think science/engineering is a good career choice	334	1319	346	1323
Interesting	28	19	20	14
Good prospects	24	31	30	31
Well paid	24	17	27	19
Country needs scientists/engineers	23	30	28	40
Good contribution to society	22	28	16	21
Many job opportunities in science/engineering	20	17	24	21
Personally satisfying	11	12	10	11
Science / engineering career is a good background for another career	6	9	6	8
Opportunities to work abroad	2	3	6	4
Secure	4	5	4	10
Opportunities to travel	2	3	4	3

Working in science

5.31
The survey also explored more general views towards working in science asking respondents to indicate how much they agreed or disagreed with three attitude statements. This included the suitability of science as a career choice for women. The results from these statements are shown in Table 5.6.

There was little difference in the proportions of younger (79%) and adults aged 25 and over (77%) who agreed that:

- because of science and technology there will be more opportunities for the next generation

Similarly there was little difference in the proportions of younger (54%) and adults aged 25 and over (55%) expressing the view that:

- compared with other professions, engineering offers a well paid career

Adults (86%) were however more likely than younger people (74%) to agree that:

- young people's interest in science is essential for our future prosperity

Furthermore, younger males were more likely than younger females to support this view (78% compared with 70%).

5.32
The survey included a number of questions to gauge people's opinions of women's roles in science. Interestingly the UK population are slightly conflicted in their views about women and careers in science. While the vast majority of the UK population (87%) disagree that:

- Science is not a suitable career for women

There was little difference between younger people and adults aged 25 and over on this measure. Around a quarter of all respondents (23%) also agreed that:

- Women don't tend to think scientifically

A further third (34%) agreed that

- Women have different priorities for science to men

This suggests that while people support the idea of women working in science, a significant minority don't think that women are perhaps as 'scientific' as men.

5.33
The survey and the qualitative workshops suggest that younger people are more positive than adults aged 25 and over towards women working in science. As shown in Figure 5.2, fewer younger people agreed that:

- Women don't tend to think scientifically (16% compared with 24% of adults)

And, half the number of younger people agree that:

- Women have different priorities for science to men – (18% compared with 36% of adults)

5.34
Both younger people and adults aged 25 and over were almost unanimous in their rejection of the view that 'science is not a suitable career for women' – 88% of adults aged 25 and over and 84% of younger people disagreed with this statement. Unsurprisingly women, irrespective of age, were more likely to disagree with this statement compared with men.

5.35
These findings are consistent with discussions during the qualitative workshops. Participants in the two youth groups were particularly supportive of equal opportunities in science and engineering and saw no reasons why a career in science should be unsuitable for women.

Knowledge of science and access to information

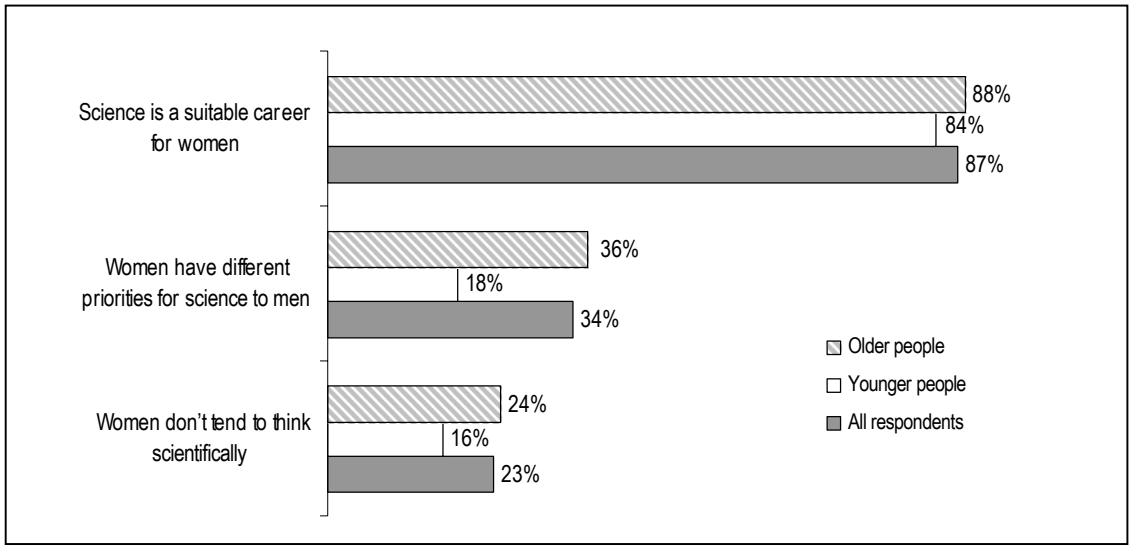
5.36
Members of the public in their middle years (aged 35-44) tended to feel the most well informed about science and scientific research and developments – 67% of those aged 35-44 said they were 'very well' or 'fairly well' informed about science and scientific developments, compared with 56% of everyone and 59% of younger people.

5.37
Differences between younger and adults aged 25 and over were at most minimal – 58% of younger people felt 'very well' or 'fairly well' informed compared with 55% of adults aged 25 and over (see Table 5.7).

It would appear that there is a stronger desire for more information about science particularly among younger people. Four in ten younger people (40%) and 34% of adults aged 25 and over considered that these days they hear and see too little or far too little information about science – only 9% of both younger and adults felt they

- hear and see too much or far too much about science.

Figure 5.2 Perceptions of science and gender



Base: All respondents (2,137)

Table 5.7. How well informed about science		
	'Very well' or 'fairly well' informed %	Mean score
All	56	2.52
16-24	59	2.57
25-34	61	2.61
35-44	67	2.67
45-54	60	2.60
55-59	50	2.48
60-69	49	2.46
70+	32	2.15

Base: All respondents (2,137)

5.38
Compared with adults aged 25 and over, a smaller proportion of younger people expressed the view that:

- It is important that younger people have a grasp of science and technology (87% compared with 93% of adults)
- Scientists make a valuable contribution to society (79% compared with 86%), and;
- Even if it brings no immediate benefits, scientific research which advances knowledge is necessary and should be supported by government (76% compared with 82%)

5.39
However, the vast majority of younger people agreed with these three statements suggesting a high level of appreciation for the need to advance scientific knowledge.

5.40
The majority of younger people also agreed that:

- Britain needs to develop science and technology in order to enhance its international competitiveness

Although younger were people were less likely than adults aged 25 and over to agree with this view (59% compared with 78%).

5.41
Younger people also seemed to understand that the development of science might involve scientists arguing different positions:

- It is normal for scientists to disagree (69% compared with 78%)

5.42
Perhaps as a result of scientific debate, five out of ten younger people (51%) compared with six out of ten adults aged 25 and over (61%) expressed concerns that:

- There is so much conflicting information about science it is difficult to know what to do

5.43
The complexity and speed of development was an issue for fewer younger people than adults aged 25 and over:

- I don't understand the point of all the science being done today (22% compared with 28%)
- I am not clever enough to understand science and technology (22% compared with 37%)
- I cannot follow developments in science and technology because the speed of development is too fast (23% compared with 45%)
- Science and technology is too specialised for most people to understand it (40% compared with 58%)
- The more I know about science the more worried I am (19% compared with 26%)
- The speed of development in science and technology means it cannot be properly controlled by government (27% compared with 37%.

Communication and consultation

5.44
This section discusses the findings which relate to the communication of science and scientific research. This includes a specific discussion of attitudes towards public consultation, including what people understand public consultation to be.

Communication

5.45
In general younger people tended to share the views of adults aged 25 and over that communications on science could be improved. They were as likely to agree that:

- We ought to hear about potential new areas of science and technology before they happen, not afterwards (77% compared with 78% of adults aged 25 and over)
- Scientists put too little effort into informing the public about their work (63% compared with 61%)

5.46
Within the qualitative workshops the non-aspirational young people were concerned that scientists seemed to receive very large grants but that they didn't then go on to explain how their research would make a difference to people.

- *Scientist get all this money for research – but they don't tell you what their doing. They don't say what they going do to change things. (Glasgow, Young/Non-aspirational)*

5.47
Younger people were also in agreement with adults aged 25 and over that scientists should spend more time helping the public to understand the implications of their research and that funders of research should play their part in supporting scientists. The majority agreed that:

- I would like scientists to spend more time than they currently do discussing the implications of their research with the general public (70% compared with 74% of adults aged 25 and over)
- Funders of scientific research should help scientists to discuss research and its social and ethical implications with the general public (72% compared with 78%)

5.48
Younger people were slightly more supportive of the idea that 'Scientists should be rewarded for communicating their research to the public' – 61% agreed with this compared with only 54% of adults aged 25 and over.

5.49
Younger people were considerably less critical of the way the media communicates science, compared with adults aged 25 and over – only 55% agreed that 'The media sensationalises science' compared with 71% of adults aged 25 and over. However similar proportions of both groups agreed that:

- Politicians are too easily swayed by the media's reaction to scientific issues (66% compared with 61%)

Consultation

5.50
In general younger people's attitudes towards consultation were quite similar to the population as a whole, although there were some subtle differences between younger people and adults aged 25 and over.

Overall younger people appeared to be less sceptical about public consultation than adults. Fewer younger people expressed agreement that:

- Public consultation events are just public relations activities and don't make any difference to policy (33% compared with 52%)
- Public consultation events are unrepresentative of public opinion (34% compared with 49%)

5.51
Younger people were also more likely than adults aged 25 and over to say that the Government makes at least some effort to bring together members of the public, scientists and policy-makers to discuss new scientific developments than adults aged 25 and over (44% and 36% respectively). Yet, a significant minority of both younger people and adults expressed dissatisfaction with the current level of public involvement. Around a quarter agreed:

- The public is sufficiently involved in decisions about science and technology (26% compared with 20%)

5.52
The workshops with young people suggested that they had concerns that young people didn't really get involved in consultation and that young people's opinions might not be valued. Prior to the workshops, no one felt that they had been asked their views about science issues and they were unsure how they would be invited to a public consultation event:

- *I don't think young people get invited – I never have.*
  (Glasgow, Young/Non-aspirational)

- *I think you really have to be into that kind of stuff – I think you have to want to do it yourself. (Glasgow, Young/Aspirational)*

- *They should start at school – ask your opinion about things then – you might take more of an interest later. (Glasgow, Young/Non-aspirational)*

- *I honestly don't think they'll take any notice of our opinions, even if they did ask. (Cardiff, Young/Aspirational)*

Aspirational younger people highlighted the need for the public to be provided with information so that they are more fully informed prior to being consulted.

5.53
Fewer younger people (48%) than adults aged 25 and over (63%) agreed that

- What people like me think will make no difference to the Government

And, younger people were almost as likely as adults aged 25 and over to agree that:

- For people like me it is important to be involved in decisions about science and technology (46% of younger people and 48% of adults)

5.54
The survey also asked a number of questions about balancing public involvement in decision-making with the need for expert advice. Younger people's views were different to adult's views in this area; younger people were less likely to agree that:

- Politicians need specialist help to regulate some areas (69% of younger people compared with 82% of adults)
- You have to trust experienced people to make decisions (60% of younger people compared with 66% of adults)

5.55
This suggests younger people are slightly less positive than adults aged 25 and over about the ability of 'experts' to regulate complex areas. This view is supported by findings elsewhere, with younger people less likely than adults to agree that:

- Experts and not the public should advise the Government about the implications of scientific developments (51% compared with 63%)
- We have no option but to trust those governing science (48% compared with 56%)

Media

5.56
Young people tended to make less use of newspapers – but more use of the internet than adults aged 25 and over. Furthermore, younger people who *do* read newspapers were less likely than readers aged 25 and over to read articles on science in papers. Around two thirds (63%) of adults aged 25 and over claimed to read a daily newspaper regularly compared with 58% of younger people. Of these regular readers, 32% of younger people and 43% of adults aged 25 and over claimed they read articles on science and technology in these newspapers.

Similarly, 49% of adults aged 25 and over claimed to read a Sunday newspaper regularly compared with 37% of younger people. Among regular readers of Sunday newspapers, 25% of younger people and 43% of adults claimed they read articles on science and technology in these newspapers.

5.57
However, younger people were no less likely to say that they had read a book about science in the last 12 months than adults aged 25 and over. In contrast, access to the internet was much higher amongst younger people: 38% of adults said they did not use the internet at all compared with only 10% of younger people. Younger people also tended to access the internet from a wider range of locations. Amongst younger people the most common points of access were at home, followed by college and a number used other access routes (including using a mobile device). Younger people were three times as likely as adults aged 25 and over to use the internet in a library. Adults aged 25 and over were more restricted in their access to the internet, being less likely to access it from all locations except from at work (Table 5.8).

Table 5.8. Places currently use the internet		
	Younger people (16-24) %	Adults (25+) %
At home	75	54
At college	34	2
Via friends	19	2
At work	17	26
Via the library	13	3
Mobile device	11	3
Via internet cafes	5	1

Base: All respondents (2,137)

Table 5.9 Activities involved with in last 12 months		
	Younger people (16-24) %	Adults (25+) %
Watched a science documentary e.g. Horizon	58	70
Discussed science with a friend or member of your family	56	49
Asked friends or family about a scientific topic, including a medical topic	53	52
Searched for information about a scientific topic using the Internet	47	33
Read a blog about science	16	8
Read a science magazine, e.g. New Scientist	15	15
Watched or listened to a broadcast about a scientific topic on your computer	20	14
Have you ever used interactive TV while watching a science programme	11	7
Listened to a science programme on the radio	8	18
Downloaded a podcast on a scientific topic	3	3

Base: All respondents (2,137)

5.58
The differences in the way younger people and adults aged 25 and over keep informed about science were not only restricted to Internet use. Compared with adults aged 25 and over, younger people were more likely to have discussed science with a friend or member of their family, searched for information about a scientific topic including a medical topic using the internet, and read a blog about science. In contrast, adults aged 25 and over were more likely to have watched a science documentary on TV and to have listened to a science programme on the radio. These differences are detailed in Table 5.9.

5.59
Despite the different patterns of media access for younger and adults aged 25 and over – there was virtually no difference in the proportions of both groups who agreed that:

- Finding out about new scientific developments is easy these days (42% of younger people compared with 43% of adults aged 25 and over)

5.60
In the qualitative workshops, younger people were asked how they would like information on science communicated to them. In the aspirational group, the younger people preferred to hear about science in TV documentaries and the news. In the non-aspirational group they indicated that they rarely watched news or documentary programmes and that they were concerned about the way science information was communicated.

- *I trust pop stars more than I trust journalists. I think they only tell part of the story. Journalist put things in the paper just to sell papers – it's their job – so you can't trust them. Pop stars don't get paid for telling you things – they do it because they are interested in it – and so you can believe what they say. They don't make a profit. (Glasgow, Young/Non-aspirational)*

It is worth noting here that the workshops with younger people were carried out in October 2007 (around three months after the Live Earth concert on 8 July 2007); this type of response might be expected.

Young people in this group also felt that scientists generally communicated in a very dry way that was full of complicated terminology, and that pop stars were able to distil the key message and present it in a simple accessible way:

- *With scientists it is global warming, global warming, global warming. But pop stars just say 'turn off your lights' it is better – because you don't know what to do with the things scientists tell you – they never make it simple like 'turn off the lights.*
  (Glasgow, Young/Non-aspirational)

Regulation of science and engineering

5.61
Young people's attitudes towards regulation were broadly in line with those of the general population. There were equal levels of agreement among both younger people and adults aged 25 and over that:

- Scientists should listen more to what ordinary people think (76% compared with 74%)
- Those who regulate science need to communicate with the public (83% compared with 88%)

Younger people were slightly more likely to agree that:

- There are strong rules governing the way science is done (57% compared with 51% of the adults)

That said, younger people were more likely to say they did not know who regulates science (43%) than adults aged 25 and over (31%). For those that did claim to know, the pattern of responses for both younger people and adults aged 25 and over was broadly similar; the Government was the most frequently cited organisation responsible for regulation (39% for younger people and 50% for adults aged 25 and over) followed by scientists themselves (9% for younger people and 10% for adults).

5.62
When asked who *should* regulate science younger people were less sure than adults aged 25 and over – 35% of younger people said they did not know compared with 25% of adults aged 25 and over. Among those who were able to provide a response, the Government was again the most commonly cited organisation – with 28% of younger people saying that the Government should regulate science compared with 38% of adults aged 25 and over.

5.63
Younger people were also more likely to say they did not know who regulates engineering (43%) than adults aged 25 and over (38%). Again, the pattern of responses for both age groups is broadly similar with the Government being the most frequently cited organisation (30% for younger people and 32% for adults) followed by engineers themselves (15% for younger people and 11% for adults).

5.64
When asked who *should* regulate engineering - 35% of younger people said they did not know compared with 30% of adults aged 25 and over. Again the Government was the most commonly cited organisation – with 25% of younger people and 28% of adults aged 25 and over saying this. Younger people were slightly more likely to say that engineers should regulate themselves (23% compared with 17% of adults).

5.65
Overall, younger people tended to express slightly more confidence in the way science is regulated compared with the other age groups; 59% said they had a 'great deal' or a 'fair amount' of confidence in the way it was regulated compared with 52% of adults aged 25 and over (Table 5.10).

However, younger people were largely in agreement with adults aged 25 and over about the regulation of engineering; six in ten expressed a great deal or a fair amount of confidence in the way engineering is regulated.

Table 5.10 Confidence in the regulation of science and engineering

	Science A 'great deal' or a 'fair amount' %	Engineering A 'great deal' or a 'fair amount' %
All	53	57
16-24	59	59
25-34	54	59
35-44	55	60
45-54	57	57
55-59	51	58
60-69	55	61
70+	41	44

Base: All respondents (2,137)

Trust in scientists

5.66
The survey also examined trust in scientists and engineers. As discussed in Chapter 3, the public overall tended to think that the motives of scientists were honourable. This was also the case among younger people. Similar proportions of younger people and adults aged 25 and over expressed the view that:

- In general scientists want to make life better for the average person (73% of younger people compared with 77% of adults)

5.67
Similar factors were seen as important for both scientists and engineers. Experience and academic credentials were viewed by the public as a whole as the most important factors when determining whether scientists could be trusted. However, experience was seen as much more important among younger people (65%) compared with adults aged 25 and over (46%). There was much closer agreement on academic credentials 34% of young people and 38% of adults aged 25 and over said these were important.

5.68
In contrast, independence was seen as more important by adults aged 25 and over (being independent from government was mentioned by 23% of adults aged 25 and over and only 12% of younger people – and being independent from business/industry was mentioned by 22% of adults aged 25 and over and only 8% of younger people.

5.69
Similar factors were seen as important in determining trust in engineers. Again experience was seen as much more important for younger people (67%) than adults aged 25 and over (54%). Similarly, independence was seen as more important by adults aged 25 and over although the difference was less marked than in relation to trust in scientists (independence from government was mentioned by 17% of adults aged 25 and over compared with 10% of younger people; independence from business/industry was mentioned by 16% of adults aged 25 and over compared with 9% of younger people). There was a slightly wider discrepancy in the perceived importance of academic credentials (32% of younger people said that these were important when determining whether to trust an engineer compared with 41% of adults aged 25 and over).

5.70
The need for scientists to be independent of business and industry was covered by the survey in more detail. While the majority of young people agreed that there needed to be independence, younger people were less likely to agree that:

- It is important to have scientists who are not linked to business (76% of younger people compared with 85% of adults)
- The independence of scientists is often put at risk by the interests of the funders (60% compared with 74%)
- Science is driven by business – at the end of the day it is all about money (41% compared with 57%)
- Scientists are too dependent on business and industry for funding (49% compared with 62%)
- When publishing the results of research scientists should always state how they were funded (66% compared with 81%)

5.71
While the majority of respondents claimed that their personal trust in scientists had not changed in the last three years, younger people were more likely than adults aged 25 and over to say that they trusted scientists *more* compared with three years ago (21% compared with 9%). Similarly, a large majority of respondents said their trust in engineers had not changed in the last three years, but again younger people were more likely than adults aged 25 and over to say that they trusted engineers *more* (17% compared with 8%).

Worry about science

5.72
Overall, younger people were worried about the same types of research as adults aged 25 and over. Of all the topics covered in the survey, worry was highest for the use of animals in research that aims to cure diseases (56% of both younger people and adults aged 25 and over expressed worry about this). Younger people were less likely than adults aged 25 and over to view the use of primates in research as acceptable. Less than a third agreed that:

- Scientists should be allowed to experiment on monkeys, if this can help resolve human health problems (30% compared with 41% of adults)

Younger people were also more concerned about balancing the benefits that science brings with its potentially harmful effects. Fewer young people than adults aged 25 and over agreed that:

- The benefits of science are greater than any harmful effect (40% and 47% respectively)

5.73
Both younger people and adults aged 25 and over tended to be conservative about how they thought decisions on technical / complex areas should be made. Younger people's views with regard to managing risks associated with new products, technologies and production processes, were in accord with adults aged 25 and over – four fifths agreed that:

- Government should delay the introduction of new products until scientists are completely certain there are no bad side effects (78% of younger people compared with 81% of adults)
- Industry should wait until scientists are completely certain that there is no danger to their workers to use new methods of production (84% compared with 87%)
- New technologies should not be used until the relevant experts are sure there are no risks to people (79% compared with 81%)

5.74
As previously mentioned, although trust in scientists appears to have improved compared with the 2000 survey, similar proportions of both younger people and adults aged 25 and over expressed concerns about:

- Science is getting out of control and there is nothing we can do to stop it (19% compared with 21% of the adults)
- Scientists seem to be trying new things without stopping to think about the risks (40% compared with 42%)
- Rules will not stop scientists doing what they want behind closed doors (60% compared with 65%)

5.75
In the qualitative workshops some younger people expressed the view that research should have very practical outputs and that some of the things scientists did seemed difficult to understand, and pointless.

- *You think there should be more research on things that affect us – like cancer. Yet you see Dolly the Sheep. Why do they clone sheep? What is the point of it? (Glasgow, Young/Non-aspirational)*

5.76
On balance, younger people were less concerned than adults aged 25 and over about the dependence of society on science. Only around a quarter agreed that:

- We depend too much on science and not enough on faith (28% compared with 35% of adults)

This could be linked to the finding that 60% of younger people (versus 35% of adults aged 25 and over) do not regard themselves as belonging to a religion.

Conclusions

5.77
This element of the project found that while younger people tend to have different priorities and interests in a range of issues, compared with adults aged 25 and over there was relatively little difference between them when it came to scientific issues. Similarly both groups tended to share similar views about how beneficial various scientific areas were.

5.78
Younger people were more positive about their science education at secondary school than adults aged 25 and over. However a substantial number of younger people still claim that school had a detrimental affect on their interest in science.

5.79
Both science and engineering were seen as good career choices by younger people in that they offer a wide range of personal benefits and opportunities. Younger people were more positive about women working in science than adults aged 25 and over.

5.80

Younger people were interested in having more access to information about science, and shared the views of adults aged 25 and over that communications could be improved. However they had very different patterns of media use, indicating the need for communication strategies that reflect their use of different channels. There was also some clear evidence that the message has to be adapted for the younger audience and presented in a different way.

5.81

Younger people indicated that they have a strong interest in participating in consultation, and that they often felt excluded. Younger people also tended to be less sceptical about how consultations will be used compared with adults aged 25 and over.

6. Ethnic minority groups and science

Introduction

6.1
This chapter looks at the research findings specifically relating to ethnic minorities. The survey included a boost sample of ethnic minorities to ensure the overall number of Asian, Black and other minorities was sufficient to allow comparisons between these groups and the population overall. In total 600 people from ethnic minorities were interviewed (323 Asian people, 191 Black people and 86 people from other ethnic backgrounds). This sample size supports analysis of Black and Asian people separately as well as ethnic minorities overall.

Previous research into attitudes towards science among ethnic minorities is limited; the 2005 survey included an ethnic boost but the analysis was limited to very specific issues, primarily attitudes towards trust and consultation in science. This chapter provides an overview of the main issues among different ethnic groups in the UK; it does not claim to be either exhaustive or definitive. It should be seen as broad overview of some of the main issues and a starting point for future research.

6.2
Previous research has consistently shown that the views of Black and Asian people differ considerably from those of the White population as well as from each other. In general Asian people tend to be very positive about science and technology; more so than White people, Black people, and people from other ethnic minorities. Additionally, proportionately more younger people from Asian backgrounds and fewer from Afro-Caribbean backgrounds are likely to continue their studies in science and engineering (Osborne et al 1997[14]).

6.3
Unlike Chapters 3 and 4, the discussion relates almost solely to the quantitative research. Although the qualitative research did include people from ethnic minorities there were no workshops specifically with Black and Asian people and the workshops did not focus on any issues related to science and ethnic origin. The chapter does however draw on the literature review to illustrate the survey findings. Similar to Chapter 4, the discussion focuses on key differences by ethnic origin rather than presenting all the survey results by ethnic group.

[14] Osborne J et al (1997) Attitudes to science, mathematics and technology: a review of research.

Notes on interpretation

Before discussing the main findings by ethnic group this section presents some contextual information which is important for the reader. Differences between ethnic groups are likely to be driven by a range of factors not simply by ethnicity. The profiles of White, Asian and Black people differ significantly in a number of ways including:

- Demographically
- Culturally
- Religious belief

As a result of this complexity it is not possible in the present study to draw definitive conclusions about the reasons for any differences between groups. Considerable caution should be exercised when interpreting the findings. The area of ethnic minority groups and science requires further research to more clearly understand the differences in attitudes between the different ethnic groups in the UK.

Sections 6.4 and 6.5 describe some of the demographic and cultural differences between the White, Asian and Black population of the UK.

Differing age profiles

6.4
It is important to note throughout that the age profiles of the White, Asian and Black groups vary considerably. These differences relate to variations in the population of the UK rather than the sample selected for the survey. Both the Asian and Black populations of the UK are considerably younger than the White population. In particular the proportion of older people (aged 60 and over) is much higher among the White population compared with the Asian and Black populations. In contrast the proportion of people aged under 45 is much higher among minority ethnic groups. These differences reflect past immigration and fertility patterns[15]. As discussed in Chapter 3, attitudes towards science vary with age so it is important throughout the chapter to consider whether some differences by ethnic group may in fact be driven by age. Due to sample size limitations it is not possible to determine the relative importance of age and ethnic / cultural differences.

[15] Social Focus in Brief – Ethnicity (Census 2001)

Education

6.5
Level of education also varies considerably by and within ethnic group. Partly as a reflection of the younger age profile, the Asian and Black groups described in this chapter tend to be educated to a higher level and their views are indicative of a younger population, compared with the White population. However, the relationship between ethnicity and level of education is by no means simple. For instance, within the Asian population, a relatively high proportion of Indian people hold a degree compared with the average for the UK, whereas a relatively low proportion of Bangladeshi people hold a degree. Similarly, within the Black population, a much higher proportion of Black-Africans hold a degree compared with Black-Caribbeans (SET and the UK's ethnic minority population, Royal Society, 2003). As discussed in Chapter 7, level of education is one of the key discriminating factors among attitudinal groups in the UK, so it is likely that some of the differences between ethnic groups are associated with level of education.

Again, due to the sample size for the survey it is not possible to determine the relative importance of level of education and ethnic / cultural differences.

Science and religion / faith

6.6
It is also important to understand that the White, Asian and Black populations in the UK differ in terms of religious beliefs and faith. The survey data shows that a much higher proportion of Black and Asian people describe themselves as 'religious'. In fact, around three-quarters (75%) of Black and Asian people regard themselves as very or somewhat religious compared with just over half (58%) of White people. Asian and Black people are also more likely than White people to belong to a specific religion. White people were the most likely ethnic group to say they did not belong to any religion (41% compared with 12% Black and 2% Asian).

As discussed in Chapter 3, worry about science was linked to how religious people considered themselves to be. Those who described themselves as 'religious' were generally more worried about the pace and direction of science than people who described themselves as 'non-religious'. It is important to consider the extent to which the attitudes of different ethnic groups are driven by religious belief. Age and religious belief by ethnicity are summarised in Table 6.1.

Table 6.1. Age and religious belief by ethnicity

	UK	White	Asian	Black
Age *(Source (BARB))*	%	%	%	%
16-24	14	14	20	17
25-34	16	15	29	24
35-44	17	17	20	28
45-54	18	18	16	15
55-59	8	8	5	3
60+	26	28	11	12
Religion belong to …	%	%	%	%
Bases	*2137*	*1537*	*323*	*191*
Christian	50	52	4	66
Muslim	3	1	56	14
Hindu	1	-	19	-
Jewish	1	1	*	-
Sikh	*	-	12	-
Other	1	1	-	6
None	38	41	2	12
Refused to say	5	5	5	7

Note: * indicates less than 1%. – indicates no cases in this condition

Table 6.2. Attitudes towards science, religion and faith by religious belief within ethnic group

Agreement with…	UK %	White %	Asian %	Black %	Asian & Black: Religious %	Asian & Black: NOT religious %	Asian & Black: Religious %	Asian & Black: NOT religious %
Bases	*2137*	*1537*	*323*	*191*	*509*	*356*	*380*	*87*
We depend too much on science and not enough on faith	**34**	32	52	58	47	29	57	50

Bases do not add up to 2,137 due to respondents who did not provide their ethnicity or religious belief
Note: 'religious' includes those who were 'very' or 'somewhat' religious; 'not religious' includes those who were 'neither religious nor non-religious', 'somewhat non-religious' or 'very non-religious'.

6.7
The survey included a statement specifically about science and faith (Table 6.2) and respondents were asked how much they agreed or disagreed with this. Attitudes towards science and faith appear to be related to both ethnicity *and* religious belief, as shown in Table 6.2.

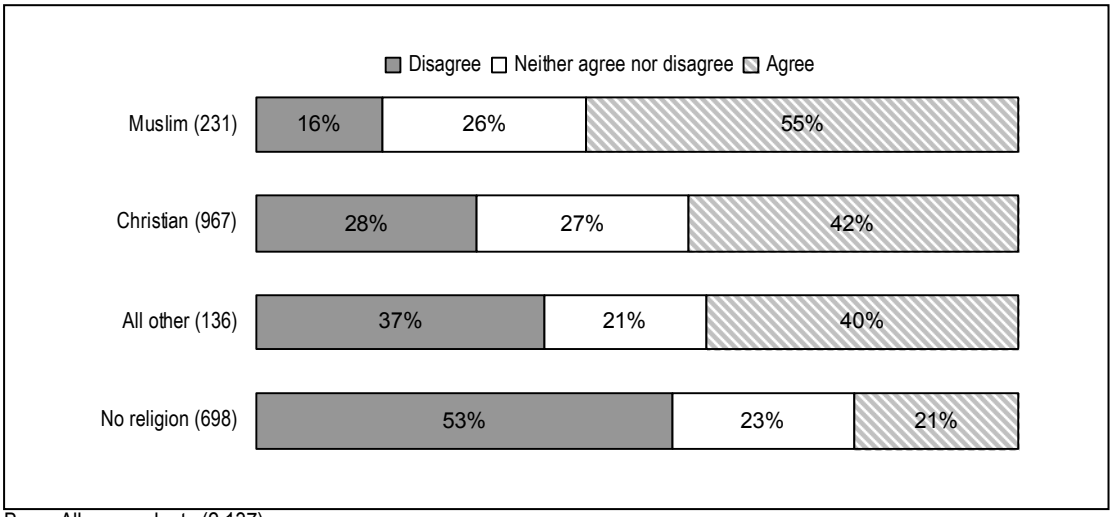
6.8
Asian and Black people tended to be more worried about the balance between science and faith than White people. Regardless of whether they described themselves as 'religious', Asian and Black people were more likely than White people to agree that:

- We depend too much on science and not enough on faith

Furthermore, regardless of ethnicity, those who described themselves as religious were more likely than those who were not religious to agree with the statement. It should be noted that while the base size for the Asian and Black (not religious) group is small (87), the results do suggest that attitudes are linked with religious belief, regardless of ethnic background.

6.9
The survey also asked respondents whether they regarded themselves as belonging to a particular religion. Around two-thirds (62%) said they did belong to a religion, however, the vast majority of these people were either Christian or Muslim; the relatively small number of people from other religions means it is not possible to carry out detailed analysis by religious denomination. However, there are differences in opinion by type of religion as shown in Figure 6.1.

Figure 6.1. Agreement with 'We depend too much on science and not enough on faith' by religion



Base: All respondents (2,137)

Table 6.3. Interest in science, social science and other topics by ethnic group				
Interested in (very or moderately interested)	UK %	White %	Asian %	Black %
Bases	*2137*	*1537*	*323*	*191*
Social Science Issues				
Health issues	95	94	96	98
Crime/anti-social behaviour	91	91	83	90
Terrorism	86	87	70	78
Education	85	85	96	90
Welfare and social exclusion	82	82	84	80
Housing	78	78	86	93
Immigration	77	76	82	83
Employment	75	74	88	93
Transport/congestion	74	74	78	78
Economics and finance/state of the economy	70	69	80	80
International current affairs	66	66	71	83
UK politics	60	60	60	65
Religion/faith	53	50	89	80
Science Issues				
Environmental issues	89	89	88	88
Medical discoveries	88	88	90	88
New inventions and technologies	79	79	88	83
New scientific discoveries	77	77	77	80
Energy/nuclear power issues	70	70	70	70
Science and science issues	67	66	78	75
Entertainment				
Music	87	87	75	85
New films	63	62	76	68
Sport	62	61	78	80

6.10
Of all the groups shown in Figure 6.1, people who regarded themselves as Muslim were the most concerned about science and faith – over a half agreed that 'we depend too much on science and not enough on faith'. Christians were the next most likely group to agree with this view. Those who said they did not belong to any religion tended to *disagree* with the statement. This is important in the context of the chapter given that the majority (56%) of Asians in the survey were Muslim, whereas White and Black people were much more likely to be Christian.

6.11
However, this does not indicate that Muslims and other religious groups are negative towards science per se, rather that science is given lower priority than other things (including personal religious beliefs). It should be noted, as an example, although the majority of Muslims agree that 'we depend too much on science and not enough on faith' the majority were also interested in:

- Medical discoveries (92%)
- Environmental issues (83%)
- New scientific discoveries (73%)
- Science and science issues (67%)

More than half (58%) also agreed that 'the benefits of science are greater than any harmful effect'.

6.12
Due to the complexity of the cultural and demographic differences between ethnic groups and the limited sample size of the survey it is not possible to look at ethnicity as an issue in isolation. For instance, the sample size does not support comparisons between young people in each of the three main ethnic groups. Nor are we able to compare, for example, the views of Asian Muslims and Asian Hindus.

Where it is known the difference between two ethnic groups is attributable to the different age profiles this is highlighted within the body of the report. Differences were tested for statistical significance after weighting all ethnic groups to a common age profile (that of the UK population). While some differences between White, Asian and Black people are attributable to age it is no less important to understand these differences in attitudes. The survey data in this report is nationally representative of the UK population.

6.13
Despite differences in attitudes by ethnicity, the UK population appear less concerned about depending too much on science and not enough on faith compared with many other European countries (European Commission, 2005). Eurobarometer findings show that respondents in the UK were among the least likely of any of the 25 EU Member States to agree that:

- We depend too much on science and not enough on faith

Only respondents in The Netherlands, Denmark, Slovenia, France and Belgium were less likely to agree with this statement.

Public Interest in Science

6.14
Level of interest in different topics varies considerably by ethnicity. Both Asian and Black people were more interested in a wider range of topics than White people, including social science, science and entertainment. The only topics White people were more interested in than both Asian and Black people were crime and anti-social behaviour, and terrorism. Public interest in a range of topics is summarised in Table 6.3 on the previous page.

6.15
In terms of rank order, people were generally most interested in the same topics regardless of ethnicity. For example, health issues was the most interesting topic for White, Asian and Black respondents alike. However, Asian and Black people showed higher levels of interest in a number of areas, most particularly in relation to social science:

- Education
- Housing
- Employment
- Religion and faith
- Economics and finance/state of the nation

6.16
Asian people showed the highest levels of interest in science topics, particularly in relation to 'science and science issues'. However there was very little variation in interest in science issues overall. Black people were at least as interested as White people in the range of science issues covered in the survey and were in fact, more interested in 'science and science issues' (although this difference is attributable to the younger age profile of the group).

6.17
Asian people were also more likely than White and Black people to think that a range of different types of scientific research were 'beneficial'. Of the 12 areas covered in the survey, Asian people were the most likely to say that six of these were very or fairly beneficial. These are shown in Table 6.4 below. It should be noted that all these differences are attributable to the age profile of the group – except for:

- Developing faster methods of transport

Both Black and Asian people were more likely than white people to describe this as beneficial.

6.18
In contrast, White people were more likely than Asian and Black people to describe two of the areas as beneficial:

- Research into new drugs to cure human diseases
- Research into radioactive waste

Despite these differences by ethnicity, overall the areas which were perceived as most beneficial tended to be the same regardless of ethnic background. Interest in science among the general public is discussed in greater detail in Chapter 3.

6.19
Levels of interest in science issues were, to some extent, linked with likelihood of having visited scientific attractions and participation in science events. The survey asked about participation in ten different science-related events (including for example, visits to science museums, zoos and attendance at public meetings about science). Participation in *any* science activity was most common among Asian people (46% had taken part) followed by White people (42%) and Black people (28%). This is a further indication that Asian people are the most positive towards and the most engaged in science.

6.20
Asian people were also the most highly educated of all the ethnic groups, both generally and in terms of science qualifications. Around three in ten Asian people (29%) held the equivalent of a first degree or higher, while 14% held the equivalent of a first degree or higher in science or engineering. This compared with 19% and 10% respectively among White people, and 21% and 12% respectively among Black people.

Table 6.4. Perceived benefit of research by ethnicity

Interested in (very or moderately interested)	UK %	White %	Asian %	Black %
Bases	*2137*	*1537*	*323*	*191*
Research into new drugs to cure human diseases	98	98	92	95
Research into new sources of energy	96	96	94	95
Understanding more about the causes of climate change	93	93	95	95
Understanding the causes of obesity	90	90	88	90
Understanding how people learn	91	91	94	93
Research into using stem cells, as a way of curing diseases	85	85	84	83
Research into storing radioactive waste	85	86	75	80
Wi-fi networks	69	69	77	75
Understanding more about space, planets and stars	68	68	77	75
The use of animals in research that aims to cure diseases	68	68	76	73
Developing faster methods of transport	67	66	88	88
Nanotechnology	65	64	72	60
The development of robots that can think for themselves	43	42	55	50

6.21
Respondents' attitudes towards their science education at secondary school also differed by ethnic group. Asian and Black respondents were more likely than White respondents to describe the secondary science education as 'a lot' or 'a little' better compared with other subjects. More than two-thirds (38%) of Black respondents said that this was better, compared with 29% of Asian respondents and 18% of White people.

6.22
Of all three ethnic groups covered in this chapter, Asian people were the most likely to think that science was a good career choice for young people these days. Seven in ten (75%) Asian respondents said that science was a good career choice compared with 66% of White and 63% of Black respondents. However, there were no differences in attitudes towards careers in engineering by ethnicity; regardless of ethnic background around six in ten respondents thought that engineering was a good career choice for young people these days.

6.23
While Asian people appeared to be more interested in science than both White and Black people, differences by ethnicity were not always consistent. For instance both Asian and Black people were less likely than White people to agree that:

- I am amazed by the achievements of science (73%, 76% and 82% agreed respectively)

It is possible that with higher levels of qualification in science, Asian people are slightly less likely to feel amazed simply because they feel more familiar with science as a subject area.

Level of knowledge and perceived access to information

6.24
Chapter 3 provides evidence that the UK population tend to feel better informed in 2008 when compared with previous surveys. We are not able to compare the results by ethnicity between this and previous surveys. However, level of knowledge about science and how well informed people feel about science do vary considerably by ethnicity. As shown in Figure 6.2, Asian people were more likely than White and Black people to:

- Feel 'very' or 'fairly well' informed about science and scientific research and developments, and;

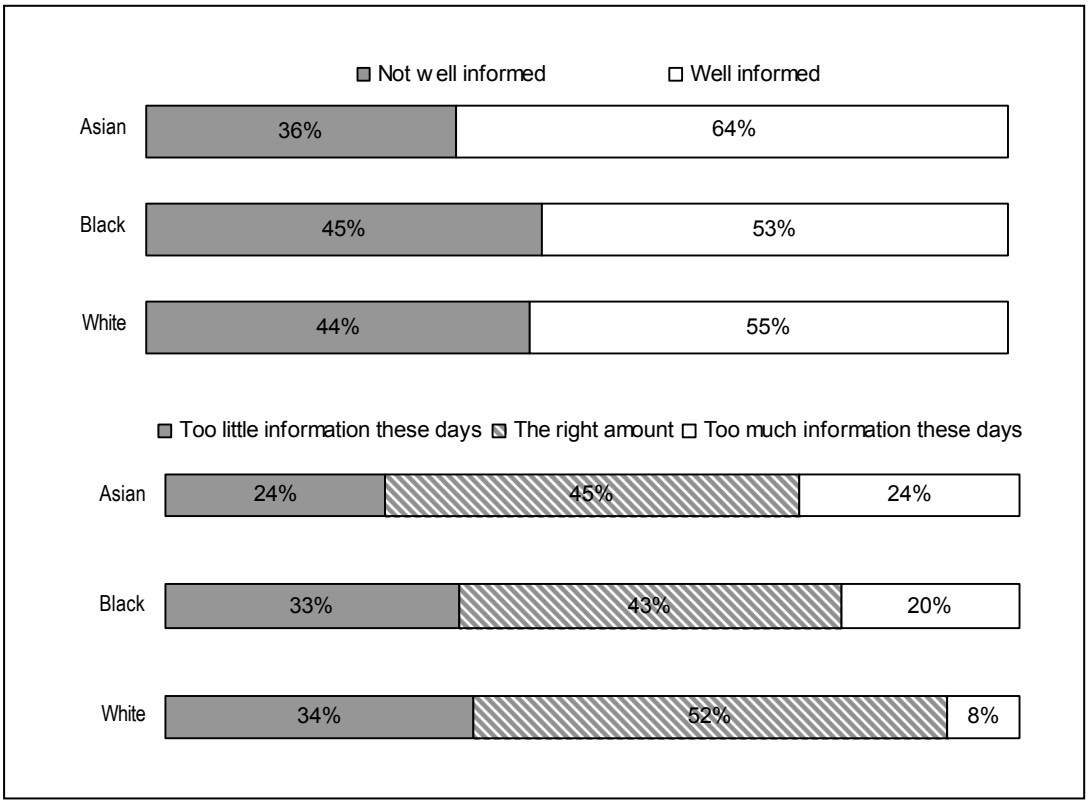
Asian people were also the most likely of any ethnic group to agree that:

- It is important to know about science in my life

Black and Asian people were also more likely than White people to say:

- These day I hear and see *too much* information about science

Figure 6.2. Keeping informed about science by ethnicity



Base: All respondents (2,137)

6.25
In other respects the views of Black and White people were similar; the same proportion of Black and White people felt very or fairly well informed about science and the same proportion felt that they heard or saw too little information about science these days.

6.26
However differences by ethnicity are by no means simple. For instance, although Black people were the least likely of the three ethnic groups to say they felt well informed about science they were the most likely to agree that:

- Finding out about new scientific developments is easy these days

Black and White people were also less likely than Asian people to agree that:

- I cannot follow developments in science and technology because the speed of development is too fast

And, although Asian people appear to be better informed about science than people from other ethnic backgrounds they were the most likely to agree with this statement

6.27
It is difficult to conclude why this might be the case, although it is possible that with higher levels of qualifications in science, Asian people are more likely to understand how complicated and diverse science is as a subject area.

Ways of keeping up to date

6.28
There are a number of interesting differences in media consumption and the way people keep up to date with science by ethnicity. These are summarised in Table 6.5.

6.29
Regardless of ethnicity the majority of all respondents used the internet from any location and at home. However, Internet use is more common for Black and Asian people than for White people. Asian people were more likely than other ethnic groups to use the Internet at home.

6.30
Newspaper readership is very similar among Black and White people, with around half regularly reading a national daily tabloid newspaper regularly and one in seven regularly reading a national daily broadsheet paper. Asian people were less likely to regularly read tabloid titles but more likely to regularly read broadsheet titles.

6.31
The way people choose to keep informed about science varied by ethnic group. White people were more likely than Asian and Black people to have:

- Watched science documentaries
- Searched of information about a scientific topic using the internet
- Asked friends or family about a scientific topic, and;
- Discussed science with friends or family

6.32
However, regardless of ethnicity these four activities were the most common ways of keeping up to date with science. There were no differences in the use of newspapers, podcasts, books, and the radio to keep up to date about science. All ethnic groups used these media in equal measure.

6.33
In contrast, Asian people were the most likely to use more specialised media to keep up to date about science. They were the more likely than White people to have:

- Read a science magazine
- Read a blog about science

Due to the small base size, differences between Black and other ethnic groups are not significant.

Table 6.5. Media consumption / keeping informed about science by ethnicity

	UK %	White %	Asian %	Black %
Bases	*2137*	*1537*	*323*	*191*
Media Consumption				
Use the internet (any location)	65	64	72	75
Use the internet **at home**	57	56	64	61
Regular **tabloid** national newspaper reader	47	47	35	45
Regular broadsheet national newspaper reader	14	14	20	15
Keeping informed about science				
Often read articles about science in a newspaper (Daily or Sunday paper)	29	30	27	25
In last 12 months…				
Watched science documentary	68	70	47	53
Searched for information about a scientific topic using the internet	53	54	43	42
Asked friends or family about a scientific topic	52	52	46	45
Discussed science with friends / family	49	50	40	46
Watched or listened to a broadcast about a scientific topic on your computer	23	23	23	21
Read a book about science	17	16	15	17
Listened to a science programme on the radio	17	17	14	17
Read a science magazine	15	15	18	19
Read a blog about science	15	14	20	20
Used interactive TV while watching a science programme	8	8	11	13
Downloaded a podcast on a scientific topic	5	5	7	6

6.34
This is probably part of the reason why Asian people were less likely than White people to have watched science documentaries and discussed science with friends and relatives – they were accessing information about science from different sources. It may also explain why Asian people tended to feel better informed about science than other ethnic groups.

Black people were also more likely than White people to have:

- Read a blog about science, and;
- Used interactive TV while watching a science programme

Communication and consultation

Communication

6.35
Attitudes towards the communication of science and scientific developments did vary by ethnic group, although the differences were generally quite small (Table 6.6). Overall, White and Asian people were more likely than Black people to suggest that communication was important and could be improved.

6.36
Asian people were the most likely of the three groups to agree that:

- Scientists should be rewarded for communicating their research to the public

However, they were the least likely to think that people who regulate and fund science should be involved in the communication process. They were the least likely of the three groups to agree that:

- Those who regulate science need to communicate with the public, and;

- Funders of scientific research should help scientists to discuss research and its social and ethical implications with the general public

On other measures there was little or no difference by ethnicity.

Table 6.6. Attitudes towards communication and science by ethnicity

Agreement with…	UK %	White %	Asian %	Black %
Bases	*2137*	*1537*	*323*	*191*
Those who regulate science need to communicate with the public	87	88	77	82
We ought to hear about potential new areas of science and technology before they happen, not afterwards	78	78	75	73
Funders of scientific research should help scientists to discuss research and its social and ethical implications with the general public	77	77	68	74
I would like more scientists to spend more time than they do discussing the implications of their research with the public	73	73	72	67
Scientists put too little effort into informing the public about their work	61	61	69	66
Scientists should be rewarded for communicating their research to the public	55	54	67	54

Consultation

6.37
All respondents were asked 'When I say public consultation, what comes to mind?' Asian respondents seem to have the least knowledge of public consultation; a third (29%) said they didn't know or that nothing came to mind. This compared with 22% of White people and 25% of Black people. Asian and Black people however, were more positive than White people about how much effort the Government made in terms of bringing together members of the public, scientists and policy-makers to discuss scientific developments. Attitudes towards public consultation are shown in Table 6.7.

6.38
Asian people were also more likely than both White and Black people to agree that:

- The public is sufficiently involved in decisions about science and technology

6.39
In fact, Asian people were the only ethnic group where a greater proportion of respondents agreed than disagreed with this statement. Despite this, there does seem to be a slightly higher degree of cynicism towards public consultation among Asian and Black people on other measures. Asian people were, for example, more likely than White people to agree:

- What people like me think will make no difference to the Government

However, the difference between the groups is attributable to the younger age profile of the Asian population.

6.40
On other measures relating to public consultation there was little or no difference by ethnicity – on balance all ethnic groups were more likely to agree than disagree that:

- Public consultation events are just public relations activities and don't make any difference to policy
- Public consultation events are not representative of public opinion
- Scientists should listen more to what ordinary people think, and;
- The Government should act in accordance with public concerns about science and technology

Table 6.7. Attitudes towards consultation and science by ethnicity

Agreement with…	UK %	White %	Asian %	Black %
Bases	*2137*	*1537*	*323*	*191*
The Government should act in accordance with public concerns about science and technology	79	80	71	75
Scientists should listen more to what ordinary people think	74	74	74	78
Experts and not the public should advise the Government about the implications of scientific developments	61	62	58	55
What people like me will make no difference to the Government	61	61	52	61
Public consultation events are just public relations activities and don't make any difference to policy	49	49	47	51
Public consultation events are not representative of public opinion	47	47	49	47
For people like me it is important to be involved in decisions about science technology	47	47	52	53
The Government makes a great deal of effort / some effort to bring together members of the public, scientists and policy-makers to discuss scientific developments	36	36	49	45
The public is sufficiently involved in decisions about science and technology	21	20	34	22

Regulation of Science and Engineering

Worry about science

6.41
Worry about science and scientific developments varied by ethnicity. Asian and Black people were more likely than White people to agree that:

- The benefits of science are greater than any harmful effect (58%, 53% and 45% respectively)

Although the difference between Black and White people is attributable to the younger age profile of the Black population.

6.42
This suggests initially that people from ethnic minorities are less worried about science overall. Given previous discussions on science, religion and faith this is perhaps surprising. However, Asian and Black people do appear more worried than White people in many other respects; they are more likely, for example, to agree that:

- The more I know about science the more worried I am (38%, 35% and 24% respectively)
- Science is getting out of control and there is nothing we can do to stop it (32%, 33% and 20% respectively)

Black people were also the group most likely to agree that:

- The speed of development in science and technology means that it cannot be properly controlled (47% compared with 40% Asian and 35% White)

6.43
Worry about specific areas of science and research is covered in Chapter 3 in detail, but levels of worry in five specific areas of science are presented in Table 6.8 below split by ethnicity. Asian and Black people were more likely than White people to say they were very or fairly worried about:

- Research into using stem cells, that is cells that can grow into different parts of the body, as a way of curing disease
- Research into nanotechnology - using tiny particles in manufacturing different sorts of products

Asian people were also more likely than White and Asian people to be worried about:

- Research into new drugs to cure human diseases

And Black people were the group most worried about:

- Research into the development of robots that can think for themselves

6.44
This is further evidence that people from ethnic minorities are more worried about science. In general the differences in worry between Asian and Black people were quite small and due to the relatively small sizes of the two groups, comparisons are tentative. However, Black people do seem to be the most worried of all ethnic groups about 'research into the development of robots that can think for themselves' and the least worried about 'the use of animals in research that aims to cure diseases'.

6.45
White and Asian people were actually more likely than Black people to be very or fairly worried about:

- The use of animals in research that aims to cure diseases

Table 6.8. Worry about areas of scientific research by ethnicity

Worried about…	UK %	White %	Asian %	Black %
Bases	*2137*	*1537*	*323*	*191*
The use of animals in research that aims to cure diseases	56	56	53	47
Research into the development of robots that can think for themselves	37	36	41	51
Research into new drugs to cure human diseases	34	33	45	44
Research into using stem cells, that is cells that can grow into different parts of the body, as a way of curing disease	33	32	44	46
Research into nanotechnology - using tiny particles in manufacturing different sorts of products	18	17	27	29

Trust in scientists and scientific research

6.46
Before going on to discuss attitudes towards the regulation of science and engineering, this section looks generally at trust in scientists and scientific research (Table 6.9).

In general Black and Asian people held similar views on trust. Both Asian and Black people tended to trust scientists more than they did three years ago. Looking at the UK resident population overall, just 11% of respondents said they trusted scientists more than three years ago and 9% trusted engineers more than three years ago. One in five (20%) Asian and Black people trusted scientists *and* engineers more than three years ago.

6.47
Differences in attitudes towards trust were fairly small – but Black and Asian people tended to be less concerned than White people about the independence of scientists. They were less likely than White people to agree that:

- It is important to have some scientists who are not linked to businesses

And Asian respondents were the most likely of any ethnic group to agree that:

- Scientists are too dependent on business for their funding

Although it is worth bearing in mind that the majority of all respondents, regardless of ethnicity, did agree with all of these statements.

6.48
People from ethnic minorities are slightly more cynical about whether science benefits the whole population; there is a suggestion that scientific developments disproportionately benefit specific groups of people. Unlike White people, the majority of Black and Asian respondents agreed that:

- Scientific advances tend to benefit the rich more than they benefit the poor

Black and Asian respondents were also slightly less likely than White respondents to agree that:

- In general scientists want to make life better for the average person

And more likely to agree that:

- Scientists seem to be trying new things without stopping to think about the risks

On other measures there was little or no difference between White, Asian and Black respondents.

Attitudes towards regulation of science and engineering

6.49
Chapter 3 concludes that while knowledge of regulatory systems is limited, the majority of respondents were at least fairly confident that science and engineering are regulated properly. These overall conclusions hold true for each of the ethnic groups covered in the survey.

Table 6.9. Trust in scientists and scientific research by ethnicity

Agreement with…	UK %	White %	Asian %	Black %
Bases	*2137*	*1537*	*323*	*191*
It is important to have some scientists who are not linked to businesses	84	85	66	73
In general scientists want to make life better for the average person	76	77	66	69
The independence of scientists is often put at risk by the interests of their funders	72	73	61	64
Rules will not stop researchers doing what they want behind closed doors	64	64	62	68
Scientists are too dependent on business for their funding	60	60	65	53
Science is driven by business – at the end of the day it is all about money	55	55	55	57
We have no option but to trust those who govern science	55	55	54	49
Scientists seem to be trying new things without stopping to think about the risks	42	41	55	51
Scientific advances tend to benefit the rich more than they benefit the poor	38	37	52	56

Table 6.10. Attitudes towards regulation by ethnicity				
Agreement with…	UK %	White %	Asian %	Black %
Bases	*2137*	*1537*	*323*	*191*
Attitudes towards authority and regulation generally				
You have to trust experienced people to make decisions	65	65	79	66
Politicians need specialist help to regulate some areas	80	81	69	70
Attitudes towards regulation of science and engineering				
New technologies should not be used until the relevant experts are sure that there are no risks to people	81	81	83	84
There are strong rules governing the way science is done	52	52	56	60
Government should delay the introduction of new products until scientists are completely certain there are no bad side effects	80	81	75	82
Industry should wait until scientists are completely certain that there is no danger to their workers to use new methods of production	86	87	79	79
When publishing the results of research, scientist should always state how they were funded	79	80	66	65

6.50
Asian people were the most confident in the way that science is regulated; two thirds (63%) of Asian respondents said they had a 'great deal' or a 'fair amount' of confidence in the way science is regulated compared with half (53%) of Black respondents and half (53%) of White respondents.

6.51
The survey included similar questions in relation to the regulation of engineering but there were no differences by ethnicity in knowledge of and confidence in regulation of engineering.

Table 6.10 summarises responses to a number of attitude statements about regulation; the table shows the proportion of people who agreed with each of these. On a number of measures the attitudes of Asian and Black respondents were very similar. Both Asian and Black respondents were less likely than White respondents to agree that:

- When publishing the results of research, scientist should always state how they were funded
- Politicians need specialist help to regulate some areas

Asian people were less likely than both Black and White people to agree that:

- Industry should wait until scientists are completely certain that there is no danger to their workers to use new methods of production

6.52
This suggests that ethnic minorities are slightly less concerned about regulatory process in general. They are more likely to assume that there are rules in place and are slightly less conservative about holding up the introduction of new developments in science and technology.

6.53
On other measures, Asian respondents showed more positive attitudes towards regulation than both Black and White respondents. They were more likely than either of the other two groups to agree that:

- You have to trust experienced people to make decisions

These views are in keeping with the greater level of confidence that Asian people have in how science is regulated (previously discussed at the start of this section).

Conclusions

6.54
Differences in opinion by ethnicity are driven by demographic, cultural and religious differences. Further research is required to understand how these factors affect attitudes to science.
Regardless of religious belief, ethnic minorities feel more strongly about issues related to science and faith. Black and Asian people are more likely than White people to think that there is too much dependence on science rather than faith.

6.55
Asian people are the most interested in and well informed about a range of scientific topics. They also tend to be the highest educated group in science and are highly positive about careers in science. The survey also suggests that in most respects Black people are at least as interested and engaged with science as White people. Despite differences by ethnicity, all groups were generally positive towards science.

6.56
Respondents from all ethnic groups are involved in a range of activities to keep up to date about science. Asian and Black people were more likely than White people to use specialised forms of science media (such as science magazines) but overall White people were the most likely group to have used any type of science-related media.

6.57
People from ethnic minorities are, on balance, more worried about science and scientific research. They are also more cynical about whether science benefits the whole of the population. However, they are less worried about the regulation of science – and are more confident that people in authority are capable of making correct decisions for the right reasons.

7 Attitudinal Groups

Introduction

7.0.1
Chapter 7 presents the results of a cluster analysis based on 52 attitude statements from the quantitative survey. Multivariate cluster analysis identified five attitudinal groups which are distinct from one another in their attitudes towards science, attitudes towards life and their demographic characteristics:

- Confident
- Sceptical Enthusiasts
- Less Confident
- Distrustful
- Indifferent

7.0.2
Cluster analysis is a statistical technique which can be used to segment a population and understand the range of attitudes and opinions which are held by different types of people.

This section is intended primarily for the use of practitioners and policy makers. The attitudinal groups provide an overview of the UK population in 2008 – and how people's attitudes towards science and technology differ.

7.0.3
Looking at the media use of each group combined with their interests and their demographic characteristics will assist in identifying suitable communication strategies for each of the different groups.

Table 7.3 summarises the proportion of respondents in each group who agreed with each of the statements which were used in the factor analysis.

7.0.4
The design of the study allowed the size of each attitudinal group to be assessed. The five attitudinal clusters each describe between 14% and 26% of the UK population. A breakdown of the five clusters is provided in Tables 7.1 and 7.2. The group sizes quoted in Table 7.1 are the *relative* sizes of each group and indicate the proportion of the population that tend to hold similar (but not completely identical) views. They are presented to illustrate the size of the groups in comparison to one another; the reader should not, for example, think that exactly 17% of the UK population are 'Distrustful'.

7.0.5
While the chapter focuses on the differences between the five groups, the reader should also note a large number of commonalities between them (see Table 7.3); the majority view across the different groups is often the same. For example, regardless of group the majority of respondents among all five groups agreed that:

- Science is such a big part of our lives that we should take an interest
- Scientists make a valuable contribution to society
- Young people's interest in science is essential for our future prosperity
- It is important for me to keep on learning new skills

This should be kept in mind throughout this chapter – where the views of one group are described as negative relative to those of another this does not necessarily imply that their views are negative per se, simply that they are less positive. For example, the Distrustful are the least likely to agree with:

- I am amazed by the achievements of science

Yet the majority do agree with the statement (69% agree compared with 82% overall).

7.0.6
The rest of this chapter describes each of the five attitudinal clusters in detail, looking at the key defining characteristics of each cluster and commenting on the main differences between the five clusters. Tables providing complete survey data for each of the five clusters are provided in the Appendix to the report but to provide context for the reader demographic profiles of the clusters are provided here in Table 7.2.

Table 7.1: Summary of the attitudinal clusters

Cluster Number	Cluster Name	N	%
1	Confident	456	21
2	Sceptical Enthusiasts	301	14
3	Less Confident	544	25
4	Distrustful	365	17
5	Indifferent	472	22

Base: All respondents (2,137)

Table 7.2: Demographic profile of the attitudinal clusters

		(1) Confident %	(2) Sceptical Enthusiasts %	(3) Less Confident %	(4) Distrustful %	(5) Indifferent %
Sex						
Male	49%	58%	63%	46%	38%	42%
Female	51%	42%	38%	54%	62%	58%
Age						
16-24	14%	17%	9%	7%	21%	17%
25-34	16%	21%	16%	12%	12%	20%
35-44	19%	21%	19%	17%	24%	16%
45-54	16%	15%	21%	17%	16%	14%
55-59	8%	10%	9%	6%	12%	6%
60+	26%	16%	26%	41%	16%	27%
Ethnicity						
White	93%	94%	95%	88%	93%	94%
Asian	4%	2%	2%	7%	3%	3%
Black	2%	2%	2%	3%	2%	1%
Country						
England	84%	86%	82%	84%	82%	83%
Scotland	9%	7%	10%	7%	12%	9%
N. Ireland	3%	2%	3%	4%	3%	3%
Wales	5%	5%	5%	6%	4%	5%
Social Grade						
AB	21%	40%	16%	14%	17%	19%
C1	28%	30%	36%	22%	33%	24%
C2	21%	16%	26%	19%	22%	22%
DE	30%	14%	21%	44%	28%	35%
Children aged under 16						
Yes	29%	31%	24%	22%	30%	35%
No	71%	68%	75%	76%	69%	64%

Base: All respondents (2,137)

Table 7.3 – Statements which differentiate between the attitudinal groups

Agreement with…	Total %	Confident %	Sceptical Enthusiasts %	Less Confident %	Distrustful %	Indifferent %
It is important that young people have a grasp of science and technology	92	96	99	90	86	91
Industry should wait until scientists are completely certain that there is no danger to their workers to use new methods of production	86	88	94	82	88	83
Scientists make a valuable contribution to society	85	98	90	84	73	80
Young people's interest in science is essential for our future prosperity	85	96	86	85	73	81
It is important to have some scientists who are not linked to business	84	94	95	77	90	71
I am amazed by the achievements of science	82	90	82	84	69	81
Even if it brings no immediate benefits, scientific research which advances knowledge is necessary and should be supported by the Government	81	92	88	82	60	81
New technologies should not be used until the relevant experts are sure that there are no risks to people	81	73	88	84	79	82
Politicians need specialist help to regulate some areas (by regulate we mean to monitor and control)	80	87	83	81	74	77
Government should delay the introduction of new products until scientists are completely certain there are no bad side effects	80	77	90	74	84	83
Science is such a big part of our lives that we should take an interest	79	91	92	71	59	77
Because of science and technology there will be more opportunities for the next generation	78	86	71	82	65	77
We ought to hear about potential new areas of science and technology before they happen, not afterwards	78	73	93	72	74	84

continued…

Agreement with…	Total %	Confident %	Sceptical Enthusiasts %	Less Confident %	Distrustful %	Indifferent %
Funders of scientific research should help scientists to discuss research and its social and ethical implications with the general public	77	84	94	68	69	75
It's normal for scientists to disagree	77	84	88	69	78	71
In general, scientists want to make life better for the average person	76	92	73	74	56	82
It is important for me to keep on learning new skills	76	91	81	57	80	79
I enjoy new situations and challenges	76	85	79	64	75	77
Britain needs to develop science and technology in order to enhance its international competitiveness	75	89	79	82	50	70
Scientists should listen more to what ordinary people think	74	67	88	75	79	69
I would like more scientists to spend more time than they do discussing the implications of their research with the general public	73	71	92	66	75	71
The independence of scientists is often put at risk by the interests of their funders	72	79	88	67	79	55
On the whole, science will make our lives easier	70	93	68	74	42	68
People shouldn't tamper with nature	70	48	82	74	71	79
The media sensationalises science	69	79	81	66	63	58
You have to trust experienced people to make decisions	65	71	63	80	39	65
Rules will not stop researchers doing what they want behind closed doors	64	55	76	69	73	52
It is important to know about science in my daily life	62	80	74	61	49	49
Politicians are too easily swayed by the media's reaction to scientific issues	62	73	69	60	51	56
Scientists put too little effort into informing the public about their work	61	53	75	58	55	67
What people like me think will make no difference to the Government	61	45	86	68	44	65

continued…

Agreement with…	Total %	Confident %	Sceptical Enthusiasts %	Less Confident %	Distrustful %	Indifferent %
There is so much conflicting information about science it is difficult to know what to do	60	33	73	75	61	60
Science and technology is too specialised for most people to understand it	56	26	56	76	46	68
Scientists should be rewarded for communicating their research to the public	55	64	52	61	39	51
Compared to other professionals, engineering offers a well paid career	55	63	41	68	47	48
Science is driven by business – at the end of the day it's all about money	55	44	80	63	58	37
There are strong rules governing the way science is done	52	76	54	47	39	44
The benefits of science are greater than any harmful effect	46	71	38	53	12	45
Finding out about new scientific developments is easy these days	43	60	61	56	29	10
Scientists seem to be trying new things without stopping to think about the risks	42	24	50	54	53	31
I cannot follow developments in science and technology because the speed of development is too fast	42	12	37	67	33	53
Scientists should be allowed to experiment on monkeys, if this can help resolve human health problems	40	64	25	52	22	25
Scientific advances tend to benefit the rich more than they benefit the poor	38	30	56	46	37	26
The speed of development in science and technology means that it cannot be properly controlled by Government	35	24	28	58	40	21
I am not clever enough to understand science and technology	35	6	28	59	25	48
We depend too much on science and not enough on faith	34	11	45	48	34	33
I don't understand the point of all the science being done today	27	6	28	46	29	23

continued…

Agreement with…	Total %	Confident %	Sceptical Enthusiasts %	Less Confident %	Distrustful %	Indifferent %
The more I know about science the more worried I am	25	7	20	43	32	17
Women don't tend to think scientifically	23	9	27	29	8	36
School put me off science	21	8	14	25	25	31
Science is getting out of control and there is nothing we can do to stop it	21	4	15	43	26	11
Science is not a suitable career for a woman	5	1	2	10	1	7

7.1 Confident

The Confident are the most positive about science of all the groups, defined by their high level of interest in science and confidence that scientific research is carried out properly and with appropriate regulation. This group is better informed about science than any other. Unsurprisingly they are the most highly educated of all the cluster groups and a large proportion of the Confident are social grades AB. The Confident make up 21% of the UK population. They are confident in their own knowledge and believe that their views should be heard.

Attitudes towards life

7.1.1
The Confident are inquisitive in their outlook on life. They are the most likely of all five groups to agree that:

- It is important for me to keep on learning new skills

They also show an above average level of agreement with the statement:

- I enjoy new situations and challenges

7.1.2
The Confident also show an above average level of interest in topical issues, including UK politics but most notably in relation to new inventions and new technologies. Fitting with this view they are educated to a higher level than any of the other four groups, suggesting that the Confident value knowledge and academic qualifications very highly; they are interested in getting the most out of life by educating themselves to a high level.

7.1.3
The Confident appear confident in their own knowledge about science and technology and believe that their views and opinions are important and should be heard. They show the highest level of agreement with:

- For people like me it is important to be involved in decisions about science and technology

Personal Interests

7.1.4
Many of the topics in which the Confident are most interested are similar to the other groups. For example a half or more are 'very' interested in education and crime/anti-social behaviour. However, the group differs from the other attitudinal groups in their interest in science and technology. Of all the five groups the Confident are most likely to be 'very' interested in:

- New inventions and technologies
- Medical discoveries
- New scientific discoveries, and;
- Science and science issues

7.1.5
They also show above average levels of interest in current affairs including UK politics and economics and finance / state of the economy. In conclusion the group seem highly interested in the world around them. Sturgis & Allum (2004) found that those people with a greater knowledge of politics were more likely to respond positively to science when their knowledge of the topic increased as they are 'more familiar with the complex range of circumstances surrounding scientific and technological development within the wider public landscape.'

Attitudes towards science and engineering

7.1.6
The group is very positive towards science and engineering, more so than any of the other four attitudinal groups. A third of the group *strongly* agree that:

- I am amazed by the achievements of science

This is higher than for any other group. The Confident are also strong believers that science is beneficial to society and that its benefits outweigh any harmful effects. They are the most likely of all groups to agree that:

- On the whole science will make our lives easier, and;
- The benefits of science are greater than any harmful effect

7.1.7
The Confident think there are tangible benefits associated with scientific development, and are also supportive of science as a discipline believing that it has value in its own right even if there are no immediate benefits. Around 40% of this group agree *strongly* that:

- Even if it brings no immediate benefits, scientific research which advances knowledge is necessary and should be supported by the Government

7.1.8
The Confident feel they have a good understanding of science. They are twice as likely as the UK population overall to feel 'very well informed' about science and scientific research and developments. They are also the group least likely to agree that:

- I am not clever enough to understand science and technology, and;
- I cannot follow developments in science and technology because the speed of development is too fast

This is as we might expect given the relatively high levels of qualifications in science that the Confident group hold.

7.1.9
The Confident view careers in science and engineering very positively. They are more likely than the UK population overall to say that a career in science or engineering is a good career choice for young people these days. The group is also more likely than UK population overall to strongly agree that:

- It is important for young people to have a grasp of science and technology

Of all the five groups the Confident include the highest proportion of scientists and engineers. More than half of all the respondents in the survey who described themselves as being a scientist or an engineer fall within the Confident group.

7.1.9
As the group is so positive about science and have a good understanding of science and technology it is not surprising that the Confident are not worried about science generally. Over 80% of the group *dis*agree that:

- The more I know about science the more I am worried

They are also the most likely of any group to *dis*agree that:

- Science is getting out of control and there is nothing we can do to stop it

Despite not being worried about science generally, the Confident display average levels of worry about the specific types of research covered by the survey. For example they are no less worried than the UK population overall about research into using stem cells as a way of curing diseases.

Regulation

7.1.10
The Confident are the group most confident in the regulatory systems that govern science and scientific research. Three-quarters have a great deal or a fair amount of confidence in the way science is regulated. More than any other group the Confident agree that:

- There are strong rules governing the way science is done

Given that the group contains a relatively high proportion of scientists and engineers it is natural that they should have a greater knowledge of / trust in the regulatory processes.

7.1.11
The group is also reasonably confident that it is possible to regulate science and is the most likely of all five groups to disagree that:

- The speed of development in science and technology means that it cannot be controlled by Government

7.1.12
As well as expressing positive attitudes towards regulation the Confident are, on balance, the most certain that scientists work in a sensible, responsible way; thereby regulating themselves to an extent. The Confident are the most likely of any group to disagree that:

- Scientists seem to be trying new things without stopping to think about the risks

7.1.13
This group is also probably the most knowledgeable about the regulatory systems that currently exist. The survey asked respondents to say whether it was true or false that 'The law states that all medicines must be tested on animals prior to their use by people'; more people from the Confident group correctly said this was true than from any other group.

Consultation

7.1.14
In line with their attitudes towards life, the Confident are reasonably supportive of public consultation. They are more likely than average to disagree that:

- Public consultation events are just public relations activities and don't make any difference to policy

The group is fairly confident that the Government supports consultation. They are the most likely group to think that the Government is making 'a great deal of' or 'some' effort to bring together members of the public, scientists and policy-makers to discuss new scientific developments.

7.1.15
It is a reasonable assumption that the Confident would be quite likely to take part in a public consultation event if invited. Their attitudes towards consultation are reasonably positive and as discussed earlier in this section, they are the most confident group in terms of their knowledge about science and the belief that their opinions matter.

Demographics

7.1.16
The Confident are strongly defined by social grade with 40% of this group coming from social grades AB (compared with 21% of the UK population overall). The group is also educated to a high level compared with other groups. Around four in ten are educated to degree level or higher, compared with around a quarter of respondents overall. A quarter of the Confident have a degree specifically in science.

7.1.17
The Confident are one of the most male groups; 58% of the group are men. There is a broad representation of ages in the group but the Confident tend to be aged under 45, there are relatively few older people aged 60 and over in the group. With a slightly younger than average profile it is unsurprising that this group contains a large proportion of people in full-time work.

The Confident are broadly representative of the population in terms of ethnicity and country of residence.

Media

7.1.18
The Confident are the biggest consumers of broadsheet newspapers of all of the five groups and are the least likely to read tabloid newspapers on a regular basis. They are the most likely of all groups to read articles about science in newspapers – 63% of this group 'often' read science articles. Despite this, as with the UK population overall, they are most likely to read either the Daily Mail or the Sun during the week. Their preferred national daily newspapers are:

- The Daily Mail (20% read regularly, compared with 17% overall)
- The Sun (16% compared with 19%)
- The Times (8% compared with 5%)
- The Guardian (8% compared with 4%)

7.1.19
The Confident are the most likely of any group to read the Mail on Sunday regularly and the least likely to read the News of the World regularly.

7.1.20
Of all the five groups, the Confident are the largest internet users. Some 86% of the group currently use the Internet compared with around 65% of the UK population overall. Three-quarters (78%) of the group use the internet at home and around one in ten have used a mobile device to access the Internet. Fitting with this profile the Confident are also the most likely to have digital TV at home.

7.1.21
As well as using a wide range of media generally, the Confident are the biggest users of science-related media. A third of the group have read a science magazine (such as Science) in the last 12 months, more than double the average among the UK population overall. Furthermore they are the most likely to hold a subscription for a science magazine or journal. The group are also more likely to have:

- searched for information about a scientific topic using the Internet
- watched science documentaries, and;
- read books about science

Participation

7.1.22
The Confident are the group most likely to take part in activities outside of their homes. Nearly nine out of ten (86%) had taken part in at least one form of activity in the 12 months prior to the survey. They were the most likely to have visited science attractions including:

- Science museums (27% had visited)
- Laboratories or similar scientific sites (9%)
- Science centres (8%)

And the group most likely to have visited / attended:

- Historic houses or gardens (44%)
- Tourist attraction visitor centres (43%)
- Sporting events (40%)
- Art galleries (39%)

Comparison with 2000

7.1.23
The Confident are very similar to the Confident Believers identified in the 2000 survey. Both groups are defined by their positive, self-confident outlook. Both groups are also very positive about science and have a high level of confidence in the regulatory procedures which govern science.

However, the Confident are substantially different to the Confident Believer group in other respects. The Confident are made up of more men than women and have a significantly younger age profile than the Confident Believers of 2000. They also make up a slightly larger percentage of the UK population than the Confident Believers (21% compared with 17%).

We might conclude that the Confident consist of the Confident Believers seen seven years ago *plus* a segment of younger men who are more confident and more positive about science compared with 2000.

Summary

7.1.24
The Confident are the most positive group about science, showing high levels of interest in science and confidence that scientific research is carried out properly. The group is well informed about science and is educated to a high level. Unsurprisingly the Confident tend to come from higher social grades.

7.2 Sceptical Enthusiasts

The Sceptical Enthusiasts are the smallest of the five groups making up just 14% of the population. The group have a very positive outlook on life, relishing new challenges and placing a high value on learning new skills. They have a wide range of interests especially in social science and entertainment. However, they are sceptical about authority. They don't tend to think that their opinions will make any difference to the Government and express concerns about the independence of science and scientists. Of all the groups they are the most likely to think more could and should be done to communicate with and involve the public in decisions about science.

Attitudes towards life

7.2.1
The Sceptical Enthusiasts are probably the most adventurous of all the groups in their outlook on life; they tend to enjoy new challenges and want to push themselves in life. They are the group most likely to *strongly* agree:

- I enjoy new situations and challenges (39% agree strongly)
- It is important for me to keep on learning new skills (48% agree strongly)

7.2.2
This positive outlook is reflected in the group's belief that their opinions are important and they should be involved in decision-making. After the Confident, the Sceptical Enthusiasts are the most likely to agree that:

- For people like me it is important to be involved in decisions about science and technology

The Sceptical Enthusiasts were the most likely of all five groups to strongly agree with this statement (20% *strongly* agreed). Despite their positive outlook on life the Sceptical Enthusiasts are the most likely group to agree that:

- What people like me think will make no difference to the government (86% agree compared with 61% overall)

7.2.3
This suggests that the group is sceptical towards Government and authority; The Sceptical Enthusiasts have the courage of their convictions but do not believe that people will take their views into account.

Personal Interests

7.2.4
The Sceptical Enthusiasts are interested in a wide range of topics, the most diverse range of interests of any of the attitudinal groups. They show greatest interest in social science issues and are the most likely group to be very interested in:

- Crime / anti-social behaviour (67% very interested)
- Health issues (65%)
- Education (59%)
- Terrorism (52%)
- Welfare and social exclusion (42%)
- Immigration (40%)
- Housing (39%)
- Employment (37%)
- UK politics (23%)

The group is also strongly interested in entertainment showing the highest level of interest of any group in:

- Music (54%, very interested)
- Sport (40%)

7.2.5
After the Confident, the Sceptical Enthusiasts show the highest levels of interest in science topics. They are very interested in areas of science which have obvious and immediate benefits to people and society:

- Environmental issues (61%, very interested)
- Medical discoveries (53%)

Attitudes towards science and engineering

7.2.6
In line with their relatively high level of interest in science topics, the Sceptical Enthusiasts are appreciative of science and the importance it plays in their lives. Their appreciation of science is related most strongly to the financial (and other) benefits it can bring to society rather than any intrinsic interest in science. They are the group most likely to *strongly* agree that:

- Britain needs to develop science and technology in order to enhance its international competitiveness (40%)
- Young people's interest in science is essential for our future prosperity (45%)
- Scientists make a valuable contribution to society (42%)

7.2.7
The Sceptical Enthusiasts also show high levels of agreement that:

- Science is such a big part of our lives that we should take an interest (92% 'strongly agree' or 'agree')
- Even if it brings no immediate benefits, scientific research which advances knowledge is necessary and should be supported by the Government (88% 'strongly agree' or 'agree')

7.2.8
The Sceptical Enthusiasts feel they know a reasonable amount about science and technology. After the Confident they are the most likely to believe they are 'fairly' or 'very' well informed about science and scientific research and developments.

However, despite being generally positive about science the group appears concerned about an over-reliance on science. The Sceptical Enthusiasts are the most likely group to agree *strongly* that:

- We depend too much on science and not enough on faith (18% strongly agree)

And the most likely to agree that

- Scientific advances tend to benefit the rich more than they benefit the poor (56% agree)

7.2.9
The Sceptical Enthusiasts were also the most likely of any group to say they were *very* worried about:

- The use of animals in research that aims to cure diseases
- Research into using stem cells as a way of curing diseases

Regulation

7.2.10
The group is typical of the UK population as a whole in terms of confidence that science and engineering are regulated properly. Around a half said they had 'a fair amount' or 'a great deal' of confidence in the way science (52%) and engineering (59%) are regulated. Around half also agreed that:

- There are strong rules governing the way science is done (54%)

This again, is typical of the UK population overall.

7.2.11
The Sceptical Enthusiasts are, however, concerned about the independence of scientists and are very worried that scientific research is influenced by business and the need to make money. They are the most likely of the five attitudinal groups to agree:

- The independence of scientists is often put at risk by the interests of their funders (88% agree)
- Science is driven by business – at the end of the day it is all about money (80% agree)

The Sceptical Enthusiasts are also more than twice as likely as the UK population overall to *strongly* agree that:

- It is important to have some scientists who are not linked to businesses (54% compared with 26% overall)

Consultation

7.2.12
Attitudes towards public consultation are one the group's defining features. The Sceptical Enthusiasts are the most sceptical about public consultation of all the groups. The vast majority of the Sceptical Enthusiasts agree that:

- Public consultation events are just public relations activities and don't make any difference to policy (67%)
- Public consultation events are unrepresentative of public opinion (60%)

7.2.13
The group is also very sceptical of how much effort the Government puts into public consultation. Two thirds (65%) think the Government make 'not vey much' or 'no effort at all' to bring together members of the public, scientists and policy-makers to discuss new scientific developments. Only a quarter (25%) said the Government made 'some' or a 'great deal' of effort, making them the most negative attitudinal group in this respect.

7.2.14
When asked what they thought were the main barriers to greater public involvement in decision-making about science, the Sceptical Enthusiasts mentioned a large number of factors. They were more likely than other groups to cite:

- Government policy
- Lack of trust in scientists
- The level of jargon and technical language in science

7.2.15
The group expressed negative views towards the Government and politicians in other areas, further reinforcing the view that they are sceptical of political involvement in science. More than a quarter agreed *strongly* that:

- Politicians are too easily swayed by the media's reaction to scientific issues (28%)

The Sceptical Enthusiasts were also the most likely of any group to agree:

- What people like me think will make no difference to the Government (86% agreed with this, with 38% agreeing *strongly*)

Demographics

7.2.16
The Sceptical Enthusiasts are the most male of the attitudinal groups. Nearly two-thirds (63%) of the group are men. The group is broadly representative of the population in terms of age, although it does contain slightly fewer younger people (aged 16-24) than the population overall.

7.2.17
Of all the five groups, the Sceptical Enthusiasts include the highest proportion of people from social grades C1 and C2, i.e. people working in skilled manual jobs, white collar workers with limited or no management responsibilities and students. The group also contains a relatively high proportion of people working full-time.

7.2.18
The Sceptical Enthusiasts have a fairly typical level of education, although the group includes the largest proportion of people whose highest qualification (in any subject) is GCSE or equivalent. Given that the group contains relatively few 16-24 year olds, this points to a proportion of Sceptical Enthusiasts who left school before the age of 18.

7.2.19
This group contains the smallest proportion of ethnic minorities and a relatively high proportion of people living in Scotland.

Media

7.2.20
The Sceptical Enthusiasts are one of the biggest consumers of newspapers generally. They are the most likely of all five groups to regularly read a national daily paper and they are above average consumers of Sunday newspapers.

7.2.21
Over half (54%) of the Sceptical Enthusiasts read a national daily tabloid on a regular basis, making them the biggest consumers of tabloid newspapers. They are less likely to read a national daily broadsheet on a regular basis. The group's most popular choices for a daily newspaper are:

- The Daily Mail (22% read regularly compared with 17% overall, making them the biggest consumers of the title)
- The Sun (19%, the same as the UK average)
- The Mirror (12% the same as the UK average)

On Sundays, the Sceptical Enthusiasts' favourite titles are:

- The News of the World (15% read regularly, compared with 14% overall)
- The Mail on Sunday (12% compared with 10%)
- The Sunday Mail (7% compared with 6%)

7.2.22
In terms of their use of the internet, the Sceptical Enthusiasts are fairly unremarkable. The proportion who have access to the internet is typical of the UK population overall and they access the internet from a fairly representative range of locations.

Participation

7.2.23
After the Confident this group were the most likely to take part in leisure activities outside of their homes. Three-quarters (75%) had taken part in at least one form of activity in the 12 months prior to taking part. The most popular attractions among the group were

- Sporting events (34%)
- Historic houses or gardens (32%)
- Tourist attraction visitor centres (31%)
- Theme parks (30%), and;
- Art galleries (25%)

They were slightly more likely than the UK population overall to have visited a science museum (19% compared with 16%)

Comparison with 2000

7.2.24
In many ways this group is similar to the Technophile group identified in 2000, who despite being positive about science also showed a high level of cynicism towards Government.

Summary

7.2.25
The Sceptical Enthusiasts are similar to the Confident in that they feel well informed about science and think that science is important. Their views on science are positive, but they are more focused on the tangible benefits that science can bring, especially the financial benefits.

7.2.26
Despite being positive towards science, the Sceptical Enthusiasts are worried about the independence of science and tend to be sceptical about the role of public consultation in science. The group is worried that scientific research is affected too much by business interests and they do not think that public consultation events are treated seriously.

7.2.27
The Sceptical Enthusiasts are highly interested in social science topics and entertainment, which fits with their positive attitudes towards life more generally. They also enjoy challenges and learning new skills.

7.3 Less Confident

The Less Confident group is the largest of the attitudinal groups accounting for 25% of the UK population. The Less Confident are defined by their demographic characteristics; nearly a half are aged 60 or over, they have the lowest level of education of any group and nearly half are from social grades DE. The Less Confident also include a higher proportion of Asian people than any other cluster. The group's outlook on life is cautious; they are concerned about change and their ability to cope with new challenges. Although the group is not opposed to science per se, it is concerned that science and scientific development is out of control. The Less Confident also feel poorly informed about science and that science is too complicated for people like themselves to understand.

Attitudes towards life

7.3.1
The Less Confident are the most cautious of the five groups in their approach to life. Given that the Less Confident are the oldest of the five groups this is perhaps not surprising. They are the least likely to agree that:

- I enjoy new situations and challenges, and;
- It is important for me to keep on learning new skills

7.3.2
Compared with the UK population overall the Less Confident are less confident that their opinions and views should be heard by those in authority. Instead, they tend to think that important decisions should be made by people in positions of power. Apart from the (highly cynical) Sceptical Enthusiasts, the Less Confident are the most likely to agree:

- What people like me think will make no difference to the government

They are the most likely of all five attitudinal groups to agree:

- You have to trust experienced people to make decisions

Personal Interests

7.3.3
The group is less interested in nearly all topics compared with the UK population. They show relatively low levels of interest in science and social science topics, and in entertainment (music, sport and new films). Fitting with this perspective, the Less Confident were less likely than the UK population overall to have attended sporting events, visited tourist attractions, theme parks, art galleries and museums.

7.3.4
The only areas the Less Confident show above average levels of interest in are:

- Health issues
- Medical discoveries
- Religion and faith

In fact the Less Confident are the most interested of any group in religion and faith; with nearly a quarter (22%) saying they were very interested. In line with this view, the Less Confident are also the most likely of all five groups to describe themselves as 'very religious' (14%).

Attitudes towards science and engineering

7.3.5
The Less Confident are fairly positive towards science on a general level. They are at least as likely as the UK population overall, to agree that:

- Scientists make a valuable contribution to society (84% agree compared with 85% overall)
- I am amazed by the achievements of science (84% compared with 82%)
- On the whole science makes our lives easier (74% compared with 70%)

7.3.6
However, the group tend to be worried about the pace of scientific progress and the direction of some types of scientific research. The Less Confident are the most likely of the five attitudinal groups to agree:

- Science is getting out of control and there is nothing we can do to stop it

7.3.7
The Less Confident are the only group that are more likely to agree than disagree with this statement (43% agree / 21% disagree). They also show a high level of agreement with:

- Scientists seem to be trying new things without stopping to think about the risks

7.3.8
Fitting with this high level of concern about the pace and direction of science, they are slightly more worried than average about a number of different types of scientific research including:

- Research into new drugs to cure human diseases
- Research using stem cells
- The use of animals in research that aims to cure diseases, and;
- Research into nanotechnology

7.3.9
Also, the Less Confident don't generally feel engaged / personally involved with science; they feel unable to cope with the pace and complexity of scientific developments. They are the most likely group to agree that:

- Science and technology is too specialised for most people to understand it (76%)
- I cannot follow developments in science and technology because the speed of development is too fast (67% agree), and
- I am not clever enough to understand science and technology (59%)

7.3.10
The Less Confident are also the least likely of all five attitudinal groups to have visited / attended a place of scientific interest or a science-related event.

7.3.11
The Less Confident admit that they feel badly informed about science. They are more likely than any other group to say they feel 'not very' or 'not at all' informed about science and scientific research and developments.

Regulation

7.3.13
The group's views on the regulation of science are fairly typical of the UK population overall. A half of the group said they had either a 'great deal' or a 'fair amount' of confidence in the way science (48%) and engineering (48%) are regulated (very similar to the population overall).

7.3.14
However, as discussed previously, the Less Confident are worried about the pace of scientific development and consequently think that science is hard to regulate. They are the only group where the majority agree:

- The speed of development in science and technology means that it cannot be controlled by Government (58% compared with 36% overall)

7.3.15
On all other measures related to regulation the group is fairly representative of the UK population overall. If anything the Less Confident are slightly less cautious about the need to control new developments and products. The majority agree:

- Government should delay the introduction of new products until scientists are completely certain there are no bad side effects (74% compared with 80% overall)
- Industry should wait until scientists are completely certain that there is no danger to their workers to use new methods of production (82% compared with 86%)

Overall their attitudes towards regulation are unremarkable.

Consultation

7.3.16
The Less Confident are the least likely of the five attitudinal groups to understand public consultation. Respondents were asked 'When I say 'public consultation' what comes to mind?' A quarter (27%) of the group said they didn't know – a larger proportion than in any of the other four attitudinal groups.

7.3.16
The Less Confident are only slightly more cynical about public consultation than the population overall. The majority agree that:

- Public consultation events are just public relations activities and don't make any difference to policy (51% compared with 49% overall)
- Public consultation events are unrepresentative of public opinion (50% compared with 47%)

7.3.17
The Less Confident also show average levels of agreement with:

- For people like me it is important to be involved in decisions about science and technology, and;
- The public is sufficiently involved in decisions about science and technology
- Experts and not the public should advise the Government about the implications of scientific developments

7.3.18
The Less Confident are also less likely than the wider population to think that the communication of scientific research and developments should be improved. A smaller than average proportion of the Less Confident agreed that:

- I would like more scientists to spend more time than they do discussing the implications of their research with the general public (66% compared with 73% of the UK population overall)
- We ought to hear about potential new areas of science and technology before they happen, not afterwards (72% compared with 78%)
- Funders of scientific research should help scientists to discuss research and its social and ethical implications with the general public (68% compared with 77%)

Demographics

7.3.19
The key defining characteristic of the group is age. Some 41% of the Less Confident are aged 60 or over, compared with around 26% of the UK population. The group also contains the smallest proportion of working people of any of the groups and has the highest proportion of people from social grades DE, both of which reflect the high proportion of older people who are likely to be retired.

7.3.20
Of all the five groups, the Less Confident are the most strongly defined by ethnicity. They are the only group with a higher than average proportion of Asian and Black people; 7% of the group are Asian (compared with 4% of the UK population overall) and 3% are Black (compared with 2%).

7.3.21
The Less Confident tend to be educated to a lower level than the UK population overall. Only one in ten (10%) have a degree or higher, compared with 20% of the population overall, and the group has the highest proportion of people with no formal qualifications.

7.3.22
The Less Confident are typical of the wider UK population in terms of gender and geographical region.

Media

7.3.23
Newspaper readership among the Less Confident is reflective of the wider population. They are average consumers of national daily papers and are only slightly less likely than average to regularly read a Sunday paper. However, the Less Confident are the only group whose preferred national daily paper (jointly with The Sun) is The Mirror (17% of the Less Confident read this regularly, compared with 12% overall). Other popular daily papers include:

- The Sun (17% read regularly compared with 19% overall)
- The Daily Mail (15% compared with 17%)

7.3.24
The Less Confident are the least likely of the five attitudinal groups to read articles specifically about *science* in newspapers. They are also less likely than average to have read a book about science in the 12 months prior to the survey.

7.3.25
The Less Confident are the least heavy users of the internet, being the only group where the majority (52%) do not use the internet from any location. Only 38% of the group use the Internet at home compared with 57% overall.

Participation

7.3.26
The Less Confident were the group least likely to take part in activities outside of their homes. Four in ten (40%) had not taken part in any of the activities covered by the survey in the 12 months prior to taking part. They were also the least likely to have visited any scientific attractions. The most popular attractions among the Less Confident were:

- Historic houses or gardens (24%)
- Theme parks (21%)
- Zoos (20%)
- Tourist attraction visitor centres (19%), and;
- Art galleries (19%)

Comparison with 2000

7.3.27
The Less Confident are very similar to the Not for Me cluster observed in 2000. Both groups are significantly older than the UK population and tend not to be interested in science and topical issues. The biggest difference between the Less Confident and the Not for Me groups is the relative size of the two groups. In 2000, the Not for Me cluster accounted for just 15% of the UK resident population. The Less Confident cluster is a lot larger accounting for 25% of the population. The 2000 cluster was also older, suggesting the Less Confident cluster is made up of the Not for Me group plus a segment of the younger population with similar views.

Summary

7.3.28
The Less Confident are the largest of all five groups, and defined by their older than average age profile. They are cautious in their outlook and are worried about the speed at which science and technology is progressing. Coupled with this the Less Confident don't feel well informed about science and are not generally engaged with science.

7.4 Distrustful

The Distrustful group is one of the smallest of the attitudinal groups accounting for just 17% of the population. The group is considerably younger than the UK population overall and is defined most strongly by the high proportion of women that make up the cluster. The group is not especially interested in science and science issues and don't think that science is particularly beneficial. They also express a high level of worry in some areas of scientific research. The group is strongly defined by a lack of trust in Government and authority generally.

Attitudes towards life

7.4.1
Similar to the UK population overall, the Distrustful are positive in their outlook on life. They are slightly more likely than average to agree that:

- It is important for me to keep on learning new skills (80% agree compared with 76% overall)

And, three quarters (75%) agreed that:

- I enjoy new situations and challenges (compared with 76% overall)

7.4.2
Their positive attitude is likely to be a reflection of the young age profile of the group and the fact that a high proportion of the group are still in education.

7.4.3
The group is fairly anti-authority in its outlook. The Distrustful are the least likely of all groups to agree that:

- You have to trust experienced people to make decisions (39% agreed compared with 65% overall)

7.4.4
The Distrustful are in fact the only group who are more likely to *dis*agree with this statement than they are to agree with it. This view comes across in their attitudes towards public consultation (discussed later). For example, they are the least likely to agree that:

- We have no option but to trust those governing science

Although the Distrustful are negative towards authority they are confident that their views matter and should be heard. They are the most likely of all five groups to disagree that:

- What people like me think will make no difference to the Government (39% disagree compared with 23% overall)

7.4.5
The group's views on gender issues are also interesting. The vast majority of the Distrustful disagree that:

- Women don't tend to think scientifically (82% disagree compared with 57% overall)

Similarly they show very high levels of disagreement with:

- Science is not a suitable career for a woman

These differences are probably explained by the high proportion of women in the Distrustful group (see section 7.4.22).

Personal Interests

7.4.6
The Distrustful are interested in a broad range of social science issues, although they are no more interested in these topics than many of the other groups. They do however, show higher levels of interest than the UK population overall in:

- Employment (42% are very interested compared with 34% overall)

This is probably linked to the group's life stage – a high proportion of the group are aged between 16-24 and will consequently be considering career options and the prospect of a working life.

7.4.7
The Distrustful show considerably *less* interest in scientific topics however, including:

- New scientific discoveries, and;
- Science and science issues

They are also less interested than the UK population overall in UK politics.

Attitudes towards science and engineering

7.4.8
The Distrustful are the least positive about science generally. Unlike some of the other groups, they don't believe that science is necessarily a good thing and tend not to see its benefits so readily as the wider population.

7.4.9
While the majority do agree, they are the least likely to agree that:

- I am amazed by the achievements of science (69% agree compared with 82% overall), and;
- On the whole science will make our lives easier (42% agree compared with 70%)

7.4.10
They are also the most likely to disagree that:

- The benefits of science are greater than any harmful effect (46% compared with 12% overall).

7.4.11
With nearly half of the group disagreeing with this statement; the Distrustful are the only group where a higher proportion actually disagree than agree. These views appear to be connected to concern about science.

7.4.12
The Distrustful are more worried about different types of research than the wider population. More than any other group they are likely to say they are worried about:

- Research into new drugs to cure human diseases (40% are worried compared with 34% overall)
- The use of animals in research that aims to cure diseases (64% compared with 56%)
- Research into using stem cells (39% compared with 33%)

7.4.13
The group's comparatively negative views towards science are not connected to a lack of understanding of science – the Distrustful do not feel that science is too complicated or inaccessible for them. Half of the group say they feel very or fairly well informed about science and they are more likely than the UK population overall to disagree that:

- I am not clever enough to understand science and technology (55% disagree compared with 48% of the population overall) and;
- Science and technology is too specialised for most people to understand it (33% disagree compared with 24%)

7.4.14
The Distrustful are the least likely of the five attitudinal groups to think that science or engineering are good career choices for young people these days

Regulation

7.4.15
After the Sceptical Enthusiasts (who are strongly defined by their cynicism towards authority), this group is the most negative about the regulation of science. The group lacks confidence in the regulation of science, with 43% of the Distrustful saying they have not very much or no confidence at all in the way that science is regulated. This makes the group the least confident in regulation of all the clusters.

7.4.16
They are also the least likely to agree that:

- There are strong rules governing the way science is regulated (39% agreed compared with 52% of the UK population overall)

7.4.17
The Distrustful are also concerned that in some instances regulations may not be adhered to. They are the most likely of all the attitudinal groups to agree that:

- Rules will not stop researchers doing what they want behind closed doors (73% agree compared with 64% overall)

7.4.18
The group's feelings towards regulation are almost certainly linked with their high levels of worry about scientific research (discussed in the previous section) and their negative attitudes towards Government and authority.

Consultation

7.4.19
Given that the Distrustful are negative towards Government and authority it is perhaps surprising that their views on public consultation are fairly representative of the wider population. They show average levels of agreement with:

- Public consultation events are just public relations activities and don't make any difference to policy, and;
- Public consultation events are unrepresentative of public opinion

Around half agreed with these statements (47% and 46% respectively).

7.4.20
The Distrustful think it is important that the public are involved in decisions about science and technology. Apart from the Sceptical Enthusiasts, they are the most likely to disagree that:

- The public is sufficiently involved in decisions about science and technology (55% disagree compared with 48% overall)

7.4.21
The Distrustful are also slightly more likely than the UK population overall to think that Government makes not very much effort or no effort at all in bringing together members of the public, scientists and policy-makers to discuss new scientific developments.

Demographics

7.4.22
The group is the most heavily female of the five attitudinal groups (62% are women). Other than the Confident, the Distrustful are also the youngest of the five groups, with 57% being aged under 45. The proportion of younger people aged 16-24 in the Distrustful cluster is particularly high (21% compared with 14% overall).

7.4.23
Consistent with their age profile, the Distrustful group includes the highest proportion of people who are still in education (12%).

7.4.24
The group includes people from all social grades but has a slight bias towards social grades C1 and C2 indicating a higher than average proportion of people working in skilled manual jobs or white collar workers with limited or no management responsibilities and students.

Otherwise the Distrustful are representative of the wider population.

Media

7.4.25
The Distrustful are the least likely of all the clusters to read a national daily newspaper on a regular basis, although even in this group 51% do read one regularly (compared with 57% overall). They are just as likely as the UK population overall to read a Sunday paper regularly.

7.4.26
Their preferred national daily papers are:

- The Sun (21% read regularly compared with 19% overall)
- The Mirror (11% compared with 12%)
- The Daily Mail (10% compared with 17%)

7.4.27
The Distrustful were marginally less likely than average to 'often' read articles about science in the newspaper. This is possibly a reflection of their newspaper choice – tabloids rather than broadsheets.

7.4.28
Apart from the Confident, the Distrustful are the heaviest users of the internet. Around three-quarters of the group (71%) use the internet from any location with 62% using it at home, indicating a high level of home access. However, the Distrustful do not appear to use the internet to keep up to date with science. Less than half said they had searched for information about a scientific topic using the internet in the last 12 months – considerably fewer than some of the attitudinal groups.

Participation

7.4.29
Levels of participation in leisure activities outside the home among the Distrustful were fairly typical of the UK population. Slightly fewer than three quarters (72%) of the group had taken part in any of the activities covered by the survey in the 12 months prior to taking part. They were no more or less likely than the UK population to have visited scientific attractions. The most popular attractions among the Distrustful were:

- Tourist attraction visitor centres (35%),
- Historic houses or gardens (33%)
- Art galleries (30%)
- Theme parks (25%)
- Sporting events (25%) and;
- Zoos (25%)

Comparison with 2000

7.4.30
Of all the clusters described in 2000, the Distrustful are most similar to the Concerned, who were also sceptical about authority and regulation. However, the Distrustful cluster is considerably younger and less interested in science than the Concerned cluster.

Summary

7.4.31
This relatively small group includes a high proportion of women and younger people. The Distrustful are defined strongly by their lack of interest in science and their lack of appreciation of the benefits that science can bring. They exhibit higher than average levels of worry about scientific research and lack trust in the regulatory processes which apply to science. This lack of trust is linked with a wider negativity towards Government and authority.

7.5 Indifferent

Accounting for a fifth (22%) of the UK resident population this group is the second most female cluster after the Distrustful cluster. The group also contains the highest proportion of parents with children aged under 16, a high proportion of social grades DE and a small proportion of people educated to degree level or higher. The Indifferent have limited understanding about science and aren't concerned about how science is controlled and regulated. Overall, their attitudes suggest an indifference towards science – they see it as something which is necessary, but don't understand it and don't have strong feelings towards it.

Attitudes towards life

7.5.1
The Indifferent are fairly typical of the UK population overall in their approach to life. They are fairly positive generally, tending to agree that:

- I enjoy new situations and challenges, (77% agree compared with 76% overall) and;
- It is important for me to keep on learning new skills (79% agree compared with 76%)

7.5.2
Unlike the Distrustful and Sceptical Enthusiasts, the group isn't particularly cynical towards Government and authority. Like the UK population overall, they tend to agree that:

- You have to trust experienced people to make decisions (65% compared with 65% overall)

Personal Interests

7.5.3
Personal interests among the Indifferent are generally similar to those of UK population overall. The group is most interested in:

- Health issues
- Crime/anti-social behaviour
- Environmental issues
- Medical discoveries
- Education
- Terrorism
- Music
- Welfare and social exclusion

7.5.4
However, the Indifferent are less interested in scientific topics than the UK population overall. They are less likely to be interested in new scientific discoveries (72% compared with 77% overall) and in science and science issues (55% compared with 67% overall). Apart from the Less Confident (who are considerably older) this group is the least likely to have visited places of interest and to participate in events. A third (30%) of the group had not been involved in any of the activities covered in the survey in the 12 months prior to the survey. They were however, more likely than average to have visited theme parks and zoos, which is in keeping with the high proportion of parents in the group.

Attitudes towards science and engineering

7.5.5
Like the older Less Confident cluster, the Indifferent do not feel well informed about science. They are the most likely group to feel not very well or not at all informed about science and scientific research and developments.

7.5.6
The Indifferent are strongly defined by the difficulty they have in keeping up to date with science and scientific developments. Unlike any of the other groups, the majority disagree that:

- Finding out about new scientific developments is easy these days

Compared with the UK population overall, the Indifferent were twice as likely to disagree with this statement (62% compared with 31% overall). Consistent with this view they also tend to say that they hear and see too little information about science these days, rather than too much or about the right amount.

7.5.7
The group's lack of understanding is not simply related to the availability of information about science though – the Indifferent also find the complexity and pace of science challenging. They showed high levels of agreement with:

- I cannot follow developments in science and technology because development is too fast (53% agreed compared with 42% of the UK population overall) and;
- Science and technology is too specialised for most people to understand it (68% agreed compared with 56% overall)

They are also more likely to agree that:

- I am not clever enough to understand science and technology (48% compared with 35%)

7.5.8
On top of this, the group also place limited value on keeping up to date with science. The Indifferent are the least likely of any group to agree that:

- It is important to know about science in my daily life (49% compared with 62%)

7.5.9
The views of the group on science may well be connected to their experiences of science at school. A third (31%) of the group said that school had put them off science. When asked, the Indifferent also rated the quality of their science education at secondary school as poor compared with other subjects. A third (32%) of the group said that their secondary science education was worse than in other subjects compared with just 15% who said it was better. This makes them the most negative of all five attitudinal groups in this respect.

7.5.10
Despite their lack of understanding and lack of engagement with science the Indifferent, like the population overall, are appreciative of the benefits that science can provide. The majority agree that:

- On the whole science will make our lives easier;
- In general, scientists want to make life easier for the average person

7.5.11
A large proportion also agree that:

- I am amazed by the achievements of science (81% agree compared with 82% overall)

Regulation

7.5.12
The Indifferent are not especially worried about the speed or direction of scientific research and developments. They are, for example, less likely than the average to agree that:

- Science is getting out of control and there is nothing we can do to stop it (11% agreed compared with 21% overall)
- The speed of development in science and technology means that it cannot be properly controlled by Government (21% compared with 36%)
- Scientists seem to be trying new things without stopping to think about the risks (31% compared with 42%)

7.5.13
The survey results suggest that the Indifferent don't have strong views on regulation. They know less about the regulation of science than the other groups. When asked how much confidence they had in the way science and engineering are regulated 26% and 31% respectively said they did not know. As with the population overall, the vast majority who were able to answer these questions said they either had a 'fair amount' or 'not very much' confidence.

7.5.14
The Indifferent are also confident that scientists do actually abide by the rules and regulations which already exist. They are the least likely of all the attitudinal groups to agree that:

- Rules will not stop researchers doing what they want behind closed doors (52% compared with 64% of the population overall)

Consultation

7.5.15
Like the Less Confident, the Indifferent have a fairly poor understanding of what public consultation actually is. Roughly one in five (22%) said they didn't know what public consultation was (compared with 16% of the UK population overall).

7.5.16
Despite a possible lack of understanding, the Indifferent are fairly positive about public consultation in the area of science. They are more likely than average to think that: the Government is making 'a great deal' or 'some' effort to bring together members of the public, scientists and policy-makers to discuss new scientific developments.

7.5.17
The group also tend to think that the motives behind public consultation are generally honest and open. The Indifferent are the least likely of all five of the attitudinal groups to agree that:

- Public consultation events are just public relations activities and don't make any difference to policy (37% agree compared with 49% overall), and;
- Public consultation events are unrepresentative of public opinion (34% agree compared with 47%)

7.5.18
However, the differences in attitudes between this group and the wider population are probably due in part to a lack of understanding in this group. The Indifferent were the most likely of all the groups to say that they neither agreed nor disagreed with the above statements. Survey respondents often use the mid-point of an agreement scale (neither agree nor disagree) when then are unsure or don't know about an issue.

7.5.19
Despite generally positive attitudes towards public consultation, it is probable that the Indifferent are the least likely to want to get personally involved in public consultation about science. Only a third (36%) of the group agreed that:

- For people like me it is important to be involved in decisions about science and technology

7.5.20
This compares with 47% of the UK population overall, making the Indifferent least likely of all five clusters to think they have a role to play in decision-making about science.

7.5.21
The Indifferent think that communication between the scientific community and the public could and should be improved. This is consistent with their views on the availability of information about science and the difficulty they find with keeping up to date about science and scientific developments. They show above average levels of agreement with:

- We ought to hear about potential new areas of science and technology before they happen, not afterwards (84% compared with 78%), and;
- Scientists put too little effort into informing the public about their work (67% compared with 61% of the UK population overall)

Demographics

7.5.22
This group is the most female of the clusters after the Distrustful group; with women accounting for 58% of the Indifferent. The Indifferent are also slightly younger than the UK population overall, with a higher than average proportion of people aged under 35. Around a third (37%) of the group are aged between 16 and 34 compared with 30% of the population overall.

7.5.23
Apart from the Less Confident (a group which includes a high proportion of retired people) the Indifferent have the lowest social grade profile and the highest proportion of people who are not working and not in education. Over a third of the Indifferent (35%) are social grades DE and four in ten (42%) are not working and not in education.

7.5.24
This group also contains a higher proportion of parents with children aged 16 and under than any other attitudinal group. Along with information about the group's sex, age and working status, this suggests the cluster contains a relatively high proportion of parents whose main role is to look after their family and / or the household.

Media

7.5.25
After the Less Confident the Indifferent are the least heavy users of the internet. Four in ten (40%) don't use the internet from any location and only a half (54%) use the internet at home, considerably smaller proportions than in the UK population overall.

7.5.26
Newspaper consumption among this group is indicative of the wider population – over half of the Indifferent regularly read a national daily newspaper and around half regularly read a national Sunday newspaper. As with the population generally, their preferred daily titles are:

- The Sun (24% read regularly compared with 19% overall)
- The Daily Mail (18% compared with 17%)
- The Mirror (10% compared with 12%)

7.5.27
Of all the five groups, the Indifferent are the heaviest consumers of the Sun and The News of the World. On Sundays their preferred titles are:

- The News of the World (16% read regularly)
- Mail on Sunday (10%)
- The Sunday Mirror (10%)

Participation

7.5.28
Overall levels of participation among the Indifferent were fairly typical of the UK population, with seven in ten (70%) having taken part in any of the activities covered by the survey in the 12 months prior to taking part. They were however less likely than the UK population to have visited scientific attractions such as science museums and science centres. The most popular attractions among the Indifferent were:

- Zoos (35%)
- Theme parks (34%)
- Tourist attraction visitor centres (31%),
- Historic houses or gardens (27%) and;
- Sporting events (26%)

7.5.29
The Indifferent don't tend to use media specifically to keep informed about science. They are the least likely group to have read a book about science in the 12 months prior to taking part in the survey. They are also less likely than the UK population overall to have:

- Watched a science documentary
- Listened to a science programme on the radio
- Read a science magazine, or;
- Searched for information about a scientific topic using the internet

Comparison with 2000

7.5.30
The Indifferent are similar to the Not Sure group described in the 2000 survey. They have a similar demographic profile; both tend to be poorly educated, under 35, and living with children. The current group's attitudes towards keeping up to date with science are however stronger – they find it very difficult to stay informed about science. They are also, if anything, more positive about the benefits that science can bring.

Summary

7.5.31
This group is defined by its lack of engagement with science and scientific developments. The Indifferent are less interested in science than many of the other attitudinal groups and at the same time are not particularly worried about scientific developments. One of the Indifferent's defining characteristics is how difficult they find it to keep up to date with science. They tend to think that science moves too quickly and is too complicated for them to keep abreast of developments.

7.6 Notes on cluster analysis

7.6.1
Before carrying out the cluster analysis, the 52 attitude statements were reduced into 12 factors using Principle Components Analysis followed by a 'Varimax' rotation of the factors to maximise the efficiency of the solution. Factor analysis is a technique which combines concepts (statements) which, based on the way respondents have answered them, measure the same attitude. Further details of this procedure are provided in the Technical Appendix. The 12 factors produced were:

- Appreciation of benefits / importance of science
- (Lack of) understanding of science
- Concern about the control and direction of science
- Attitude towards public involvement in science
- Attitudes towards risk
- Attitude towards independence in scientific research
- Attitudes towards change and new challenges
- Benefits of science outweigh its harmful effects
- Importance of technology and engineering
- Attitudes towards authority / decision makers
- Disillusionment with science
- Availability of information about science

7.6.2
The factor names were chosen based on the statements which are most strongly associated with each factor. They are selected on a logical basis and are not defined by the factor analysis itself. The Technical Appendix presents a detailed breakdown of the correlations between the 52 attitude statements and the 12 factors.

7.6.3
The 12 factors identified by the analysis account for 54% of the variance in respondents' attitudes. The first three factors…

- Appreciation of benefits / importance of science
- (Lack of) understanding of science
- Concern about the control and direction of science

…accounted for around 21% of the variance. This constitutes a statistically robust factor solution on which to base the attitudinal cluster analysis.

7.6.4
Cluster analysis was then used to assign each respondent to a 'cluster'. This is done based on their score on each of the 12 factors. Cluster analysis aims to allocate respondents to clusters so that people within each cluster are more similar to each other than respondents in other clusters.

7.6.5
With the 12 factors used, a five cluster solution was considered the most coherent of seven solutions which were produced ranging from between three and nine clusters. The five cluster solution produced five clear attitudinal groups based on the answers to the whole range of statements about science. The five groups were also distinct in terms of the demographic profiles. Statistically the five cluster solution is robust with each of the 12 factors contributing significantly to the model.

7.6.6
As with the technique of factor analysis, cluster analysis does not assign titles to the groups. Instead, the characteristics of each cluster in terms of their attitudes towards life and science were used to derive a suitable title for each cluster.

Appendix 1 – Technical Appendix

Overview

The project comprised five elements:

1) An omnibus survey of c.1,000 members of the UK public including two questions about scientific issues people were most concerned about
2) A literature review of relevant research in the UK, Europe and Worldwide
3) Six discussion groups with a cross section of the general public – specifically to explore knowledge and familiarity with *social science* among the general public
4) A quantitative survey of c.2,000 members of the UK public (including boost samples of young people and ethnic minorities)
5) Six qualitative workshops with a cross section of the public – to explore issues arising from the main quantitative survey

This Technical Appendix describes in detail the method for elements 1, 2 and 4 which collectively form the basis of the main report.

Quantitative survey method

Overview of method

The survey comprises 2,137 interviews which were conducted face-to-face in respondents' own homes across the United Kingdom. All interviewing was conducted using Computer Assisted Personal Interviewing (CAPI), to ensure high quality data. Fieldwork was carried out between 1st August and 25th September 2007 and the results were weighted to correct for the over-sampling of some countries and demographic groups. The weighted results were then analysed using cross-tabulations and factor / cluster analysis.

The sample

In total 2,137 interviews were carried out with respondents using 'Census output areas[16]' as sampling units. Census output areas are relatively small, homogeneous areas, comprising about 125 - 150 households and interviewers had to obtain interviews within these designated sampling units. This approach ensures a high quality sample as interviewers are given little choice about where to conduct their interviews, minimising bias which can be introduced by interviewers personally selecting the areas they work in.

Output areas were stratified by socio-economic variables within region, to ensure a representative sample of areas across the UK. In total 294 output areas were selected for the main sample. Interviewers' assignments required five or six interviews per output area.

Quotas were applied to all interviewer assignments to control for likelihood of being at home. These quotas were set on sex, working status and presence of children in the household. Using demographic quotas avoids over-representation of those groups who are more likely to be at home when interviewers call, namely: women; older people (especially retired people) and the unemployed. Interviewers worked between 2pm and 8pm on weekdays and at weekends to further minimise the response bias which is introduced by only working during standard working hours.

This sampling method was comparable to the previous surveys in 2000 and 2005 both of which employed equivalent forms of face-to-face quota sampling.

Over-sampling in Scotland, Wales and Northern Ireland

The sample in Scotland, Wales and Northern Ireland was boosted to ensure a minimum of 150 interviews were achieved in each country. This was achieved by over-sampling the three countries at the point when output areas were being selected for the survey. Weighting was applied to final data to correct for this over-sampling.

[16] These are the smallest units resulting from the 2001 Census, and have replaced enumeration districts

Boost samples

Two boost samples were included in the survey: one among the BME population in the UK and one among younger people aged (16-24). These were included to reflect an ongoing interest in DIUS to engage with more diverse and representative groups in science, and to increase the numbers of younger people choosing STEM subjects beyond a compulsory level.

Ethnic boost sample

The sample was designed to ensure that sufficient interviews were achieved with Black and Asian respondents to facilitate analysis of these groups in their own right. Current estimates suggest that 9% of the UK population might be classified as members of the BME community. A truly representative sample of around 1,800 UK respondents would therefore provide around 160 BME respondents[17]. This would be adequate to look at the views of the BME community as a whole but would not support separate analyses of the Black and Asian communities. An additional ethnic boost sample was therefore included in the survey design with the intention of interviewing a total of 500 BMEs allowing separate analysis of the two main BME groups (Black and Asian).

The boost sample was drawn as a separate exercise to the main survey sample. In total 63 wards were selected based on census data identifying a relatively high proportion of BMEs in these areas. Wards were used for the boost instead of output areas due their relative size. Wards typically comprise c.2000 households compared with c.150 in an output area. Given that only a small proportion of households would qualify to take part in the ethnic boost, the size of the sampling units (assignment areas) was a very important factor.

Only those wards with a minimum of 10% BMEs were included in the selection process for the boost sample. The same approach was used in 2005, as this maximises the efficiency of the interviewing process while ensuring that the majority of ethnic minorities have the opportunity to take part in the survey. Limiting the boost sample to wards with 10% ensured that 75% of all ethnic minorities had the opportunity to be included within the boost sample. Sampling points were then selected from qualifying wards to ensure a correct regional and socio-economic spread.

For the ethnic boost survey, interviewers used a short doorstep screener questionnaire to determine eligibility before carrying out an interview. Respondents were screened using a question based on the 2001 Census which defined BME as all groups other than those who consider themselves to be British, Irish or any other 'white' background.

Younger people boost

A boost sample of younger people was also included in the survey design using a very similar method to the ethnic boost. A truly representative sample of 1800 adults would 'naturally' yield about 200 - 230 younger people aged 16 – 24. A sample of around 200 would have provided little scope for detailed analysis (e.g. a comparison of younger women v. younger men). An additional boost sample of younger people was drawn comprising 55 wards where the local population was known to comprise a minimum of 30% people aged 16-24. As with the ethnic boost sample, this process maximises the efficiency of the interviewing process. Sampling points were selected from qualifying wards to ensure a correct regional and socio-economic spread.

Weighting

Rim weighting was applied to correct for the oversampling of:

- ethnic minorities
- younger people
- people in Scotland, Wales and Northern Ireland

The weighting also helped to correct for minor demographic imbalances within the achieved sample.

Data was weighted to population figures taken from Census and BARB data sources. Weights were applied for gender, age, social grade, working status, presence of children in household, region (GOR) and highest level of education. As the survey was used to compare the attitudes of White, Asian and Black people, weighting for highest level of education was applied *within* ethnic group. Highest level of education was weighted using four different sets of rim weights (White, Asian, Black and other). The percentages of completed interviews before and after weighting are displayed in Tables 3a and 3b at the end of this section.

[17] In fact it would be slightly less, bearing in mind the upweighting of Wales and Northern Ireland within the sample – areas in which there are relatively few members of the BME community

Table 1 - Definition of BME as used for the Ethnic Boost Sample	
Mixed • White and Black Caribbean • White and Black African • White and Asian • Any other	**Asian** • Indian • Pakistani • Bangladeshi • Any other
Black • Caribbean • African • Any other	**Chinese or other ethnic group** • Chinese • Any other

Statistical significance

Where survey results for different groups are compared in this report, these have been tested for statistical significance. This short section describes how reliable the survey findings are and how the results have been checked for statistical significance.

The overall sample of 2,137 provides robust, reliable findings for the UK overall as well as for each of the four individual countries. Boost samples were also used to ensure that robust survey data for younger people (aged 16-24) and for White, Asian and Black people separately. This section summarises the confidence intervals (or tolerances) which are associated with the survey results. As with all survey results, the size of the confidence intervals and therefore the robustness of the findings are determined by the size of the sample and the percentage figure for any given result. Larger confidence intervals are associated with smaller sample sizes and are at their greatest for percentage figures of 50%.

The confidence intervals for the total UK sample; White, Asian and Black respondents; and England, Scotland, Wales and Northern Ireland are summarised in Table 2a. Confidence intervals are provided for results of 50%, 30%/70% and 10%/90%. All the confidence intervals quoted are based on a 95% confidence level – for example:

- If 50% of respondents in England agreed that that 'I am amazed by the achievements of science' then there is a 95 in 100 chance that the real result in the English population lies between 48% and 52% (i.e. +/- 2%).

Unless otherwise stated all the findings are statistically significant at the 95% confidence level. Table 2b provides an overview of the main comparisons which are made throughout the report; providing estimates for the minimum differences required to indicate a statistically significant result.

Table 2a Confidence intervals associated with main base sizes				
	N	50%	30% / 70%	10% / 90%
Total (UK)	2,137	+/- 2	+/- 2	+/- 1
England	1,638	+/- 2	+/- 2	+/- 1
Scotland	171	+/- 7	+/- 7	+/- 4
Wales	165	+/- 8	+/- 7	+/- 5
Northern Ireland	163	+/- 8	+/- 7	+/- 5
White	1,537	+/- 2	+/- 2	+/- 1
Asian	323	+/- 5	+/- 5	+/- 3
Black	191	+/- 7	+/- 6	+/- 4
Younger people (16-24)	643	+/- 4	+/- 4	+/- 2
Adults aged 25+	1,494	+/- 3	+/- 2	+/- 2

Table 2b Minimum differences required to indicate statistically significant differences					
	n^1	n^2	50%	30% / 70%	10% / 90%
Comparisons between 2008 and previous surveys					
1) All respondents (2008) vs. All respondents (2005)	2,137	1,831	3.2	2.9	2.9
2) All respondents (2008) vs. All respondents (2000)	2,137	1,839	3.2	2.9	2.9
Comparisons within 2008					
3) England vs. UK	1,638	2,137	3.3	3.1	3.1
4) Wales vs. UK	165	2,137	7.5	7.5	7.5
5) Scotland vs. UK	171	2,137	7.4	7.4	7.4
6) Northern Ireland vs. UK	163	2,137	7.5	7.5	7.5
7) (Asian & Black) vs. White	514	1,537	4.8	4.8	4.8
8) Asian vs. White	323	1,537	5.7	5.7	5.7
9) Asian vs. Black	323	191	8.5	8.5	8.5
10) Black vs. White	191	1,537	7.2	7.2	7.2
11) Younger people (16-24) vs. Adults (25+)	643	1,494	4.4	4.4	4.4

Table 3a: Impact of weighting

	All respondents	
	Interviews (unweighted)	Target (weighted)
Social Grade		
AB	20.0%	21.4%
C1	28.6%	28.2%
C2	17.8%	20.7%
DE	33.6%	29.7%
Presence of children in household		
Yes	39.5%	28.7%
No	59.8%	70.6%
Refused/Not Stated	0.8%	0.7%
Working status		
30+ hrs week	36.7%	45.6%
8-29 hrs week	12.1%	10.0%
< 8 hrs week	0.6%	0.4%
Full Time Ed/Under school age	14.0%	6.8%
No paid work	34.7%	37.2%
Age & Sex		
Male 16-24	14.7%	7.2%
Male 25-34	6.9%	7.9%
Male 35-44	7.7%	9.5%
Male 45-54	7.4%	8.1%
Male 55-59	2.7%	4.0%
Male 60-69	4.6%	6.1%
Male 70+	5.1%	5.8%
Female 16-24	15.4%	6.9%
Female 25-34	7.3%	8.0%
Female 35-44	10.2%	9.7%
Female 45-54	6.3%	8.3%
Female 55-59	2.4%	4.1%
Female 60-69	4.8%	6.4%
Female 70+	4.6%	8.0%
Region (GOR)		
North East	2.9%	4.2%
North West	10.4%	11.3%
Yorkshire and the Humber	7.5%	8.4%
East Midlands	5.4%	7.2%
West Midlands	8.8%	8.8%
South West	6.2%	8.5%
East of England	6.9%	9.2%
London	18.8%	12.5%
South East	9.8%	13.5%
Wales	7.7%	5.0%
Scotland	8.0%	8.6%
Northern Ireland	7.6%	2.8%

continued…

	All respondents	
	Interviews (unweighted)	Target (weighted)
Highest Level Qualification (within ethnic group)		
White		
Degree or higher	18.1%	18.1%
Level 3	16.2%	8.2%
Level 1 / 2	21.6%	32.7%
None / DK	16.1%	33.5%
Asian		
Degree or higher	5.3%	1.0%
Level 3	2.9%	0.4%
Level 1 / 2	4.1%	1.1%
None / DK	3.0%	1.4%
Black		
Degree or higher	2.3%	0.5%
Level 3	2.2%	0.2%
Level 1 / 2	2.6%	0.7%
None / DK	1.9%	0.5%
Other		
Degree or higher	1.1%	0.6%
Level 3	0.9%	0.2%
Level 1 / 2 or None / DK	1.6%	0.9%

Table 3b: Impact of weighting (highest qualification within ethnic group)

	White		Asian		Black	Other		
	Interviews (unweighted)	Target (weighted)	Interviews (unweighted)	Target (weighted)	Interviews (unweighted)	Target (weighted)	Interviews (unweighted)	Target (weighted)
			%	%	%	%	%	%
Degree or higher	25.2%	19.6%	34.9%	25.6%	25.8%	26.3%	29.5%	35.3%
Level 3	22.6%	8.9%	19.0%	10.3%	24.2%	10.5%	25.7%	11.8%
Level 1 / 2	30.0%	35.4%	26.6%	28.2%	28.9%	36.8%	44.8%	52.9%
None / DK	22.3%	36.2%	19.6%	35.9%	21.1%	26.3%	29.5%	

Analysis
Cross tabulations of survey data are available in separate documents.

Multivariate analysis
Multivariate cluster analysis was also used to identity attitudinal groups which are distinct from one another in their attitudes towards science, attitudes towards life and their demographic characteristics.

Before carrying out the cluster analysis, the 52 attitude statements were reduced into 12 factors using Principle Components Analysis followed by a 'Varimax' rotation of the factors to maximise the efficiency of the solution:

- Appreciation of benefits / importance of science
- (Lack of) understanding of science
- Concern about the control and direction of science
- Attitude towards public involvement in science
- Attitudes towards risk
- Attitude towards independence in scientific research
- Attitudes towards change and new challenges
- Benefits of science outweigh its harmful effects
- Importance of technology and engineering
- Attitudes towards authority / decision makers
- Disillusionment with science
- Availability of information about science

The 12 factors identified by the analysis account for 54% of the variance in respondents' attitudes. The first three factors accounted for around 21% of the variance. This constitutes a statistically robust factor solution on which to base the attitudinal cluster analysis.

K-means cluster analysis was then used to assign each respondent to a 'cluster'. In parallel, survey data was analysed using Latent Class analysis. This is an alternative form of segmentation which uses a probability measures to assign respondents to attitudinal groups. While this form of analysis shows great potential, the cluster solution produced using the K-means technique was chosen based on the coherence of the solution.

A five cluster solution was preferred - the five groups were distinct in terms of the demographic profiles and statistically the five cluster solution is robust with each of the 12 factors contributing significantly to the model. The three and four cluster solutions were less robust statistically and it was felt that representing the British population in terms of three or four attitudinal groups was an over-simplification of the picture. Both the three and four cluster solutions produced groups whose views on science and whose demographic characteristics were less distinct.

Conversely, while solutions with six or more clusters were statistically robust it was decided that these were less coherent than the five factor solution. Increasing the number of clusters complicated the statistical model and the resulting groups were less distinct in terms of their attitudes towards science. In conclusion, the five cluster solution was felt to be the most useful in terms of describing the UK population for practitioners and policy makers.

Questionnaire design
The questionnaire was based heavily on the surveys of 2000 and 2005 to ensure comparability. New questions were added to make sure the survey comprehensively covered the main issues in science at that point in time. A number of inputs were used to design the initial draft questionnaire:

- PSP conducted a review of questions used in relevant surveys published since 2000 to inform the development of the questionnaire.

- To explore the public interests and concerns, a small online omnibus survey was carried out by TNS in March 2007. A nationally representative sample of 1,000 respondents was interviewed to find out: (a) those scientific issues which were of current concern and (b) what areas of science and scientific research people had seen, heard or read about.

- Thirdly, PSP carried out a 'media monitor' for two months during 2007. This involved comprehensively monitoring newspaper and television coverage of issues related to science and engineering (including all the main tabloid and broadsheet papers). The process was used to identify 'hot topics' in science which should be covered in the survey.

- Six focus groups were carried out with a cross-section of the general public (by age, gender and socio-economics) to explore perceptions and knowledge of the social sciences. These groups were used to provide an understanding of public perceptions of social science which was used to judge the extent to which social science might be included in the main questionnaire.

Cognitive testing was used to pilot the final questionnaire, to ensure that new questions were correctly interpreted and that the interview flowed properly. Ten interviews were carried out among a cross section of respondents, with each interview lasting around 40 minutes. Cognitive interviewing is a form of in-depth interviewing which pays explicit attention to the mental processes respondents use to answer survey questions. Each interview was recorded.

A separate 'standard' pilot of the final questionnaire was carried out in addition to the cognitive pilot. This consisted of 20 face-to-face interviews using CAPI technology. The main purpose of this final stage of piloting was to test the CAPI software and to accurately time the length of the questionnaire. The final questionnaire is presented at Appendix 2.

Qualitative Method

Participants for both the science groups and social science workshops were recruited by specialist recruiters from TNS. Recruitment was carried out on-street. Quotas were set to ensure that the groups included a cross-section of the population. All participants were offered a £30 cash incentive for taking part.

People were excluded from taking part in the research if they worked in marketing, research, public relations or other similar industries.

Each group lasted between 90 and 120 minutes and consisted of between eight and ten participants. The groups were facilitated by researchers from TNS and PSP and discussions were based around a topic guide to ensure that discussions covered the range of topics they were designed to include. The groups were recorded to assist with analysis.

Science discussion groups
Groups discussing science were conducted in the following locations:

- Banbury
- Glasgow
- Cardiff

In total six groups were carried out each with a specific demographic group:

- Social grade AB (aged 18+)
- Social grade C1 (aged 18+)
- Social grade C2 (aged 18+)
- Social grade DE (aged 18+)
- Aspirational younger people (16-24)
- Non-aspirational younger people (16-24)

Aspirational younger people included those who were 'planning to go to University or college' and 'should either still be studying or have obtained a qualification'.

Social science workshops
Social science workshops were conducted in:

- London
- Birmingham
- Leeds

In total six groups were carried out with adults (aged 18 and over). All groups were single-sex; comprising either all men or all women.

Learning points from the 2008 research

This section presents some of the key learning points from the 2008 survey and qualitative research. Included in this section are suggestions for further research, areas where the research design could be improved.

Ethnic boost

As discussed in Chapter 6, there are a number of issues and difficulties in interpreting the findings by ethnic group. Differences in attitudes by ethnicity are driven by a number of demographic, cultural and religious differences and the current survey has not been able to unpick the effect of these differences. Specifically differences in attitudes are linked to:

- Age – the BME population in the UK are younger on average than the white population
- Level of education – party a reflection of the younger age profile, the BME population has a higher average level of education than the white population
- Religion – the BME population are more likely to describe themselves as 'religious' and include a wider range of religious denominations than the white population

Although the current research included a BME boost sample this was not large enough to support analyses of each of these factors in their own right. Future survey research aiming to unpick the effect of each of these factors would require a much larger BME sample, structured to provide robust findings among sub-groups within each of the ethnic groups (for example, younger Black and Asian people, and within religious and non-religious sub-groups)

Given that existing research to explore views among different ethnic groups is relatively limited, it is not surprising that the complexity of these issues was not fully understood at the time of the 2008 survey. The current research should be seen as a building block for future research to fully understand attitudes towards science by ethnicity.

It is the view of the research team that the area of attitudes towards science among the BME population warrants further research. Qualitative research among BME groups may be of particular benefit, as this type of research allows researchers to discuss the in depth the driving factors behind people's attitudes.

Limitations of qualitative:

The qualitative research for this project was designed to look at very specific, focused areas of public attitudes. Primarily the qualitative research was used to (a) develop questions for the quantitative survey and (b) to explore public attitudes specifically towards: careers in science, communications, research to develop medicines, public consultation, regulation of science and engineering, robotics, and surveillance technologies.

The research was not intended to explore all aspects of public attitudes towards science which is why the current report focuses mainly on the quantitative findings. It was not within the scope of the study to carry out a full and detailed qualitative analysis of public attitudes towards science.

In order to comprehensively explore public attitudes towards science in a qualitative manner, a larger scale qualitative study would be required. With a larger number of workshops it would be possible to run groups looking at a wide range of areas of science and scientific research and to include the views of all sectors within the UK population. As previously discussed, it would be particularly useful to carry out qualitative research specifically among ethnic minorities.

Worry / benefit questions

As discussed in Chapter 3 there are difficulties in interpreting public concern about specific types of scientific research and the perceived benefits of this research. Both the quantitative and qualitative research suggested that many people do not have sufficient knowledge about what scientific research involves to comment on potential benefits and concerns.

When asked how worried they were about research in a specific area, many people appeared to answer in terms of their worry about that area rather than the research per se. For example, when asked how worried they were about *research into* understanding the causes of climate change, people responded with how worried they were about climate change itself.

This is an important finding in its own right – people do not seem able to divorce their views on scientific research from their views on the issue itself. Future research into public worry about science should consider how best to deal with this issue.

Appendix 2 – Final questionnaire

JOB NUMBER						PUBLIC ATTITUDES TO SCIENCE 2007	SERIAL NUMBER
1	6	1	2	9	5		

We would like to reassure you that all of your answers are completely confidential and your rights under the Data Protection Act, as well as the Market Research Society's Code of Conduct, will be fully observed, including your right not to answer or not to continue with the interview.

PERSONAL DETAILS

This is to confirm that I consent to TNS using personal information only for market research purposes only

NAME OF RESPONDENT:
(Mr/Mrs/Miss/Ms) _____

ADDRESS: _____

_____

_____

POST CODE: | | | | | | | | |

TELEPHONE NUMBER:
(inc. area code) | |

INTERVIEWER DECLARATION

DECLARATION: I certify that this interview has been personally carried out by me with the respondent at his/her address (in home)/in hall/in street/in store (exit)/underground and conducted within the MRS Code of Conduct, and according to the project instructions. I further certify that the respondent is not a friend or relative of mine, and I have not interviewed him/her on any survey in the last six months.

INTERVIEWER SIGNATURE: _____

INTERVIEWER NAME:
(Block capitals) _____

DATE: _____

THANK YOU FOR TAKING PART IN THIS STUDY

PUBLIC ATTITUDES TO SCIENCE

SERIAL NUMBER:					JOB NUMBER:						CARD:		SAMPLE POINT:					INTERVIEW NO:		INTERVIEWER NUMBER:				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
					1	**6**	**1**	**2**	**9**	**5**	**0**	**1**												

CONTACTS: (26) (27)	REFUSALS: (28) (29)	NO REPLY: (30) (31)	INTERVIEW START TIME WRITE IN: (32) (33) (34) (35)	INTERVIEW LENGTH (MINUTES): (36) (37)

SKIP COLS 38 - 40

NOTE TO INTERVIEWERS:
ALL PERSONAL IDENTIFYING INFORMATION MUST BE RECORDED ON THE REMOVABLE FRONT SHEET, INCLUDING TELEPHONE NUMBER BUT CODE PRESENCE OF TELEPHONE IN HOUSEHOLD HERE.

	CODE
	(41)
IF TELEPHONE NUMBER PROVIDED CODE HERE	1
IF NO TELEPHONE NUMBER CODE HERE	2
If no telephone number, why not	
EX-DIRECTORY	3
NO PHONE	4
REFUSAL	5

(42) (43) (44) (45) (46) (47)

DATE OF INTERVIEW: | | | | | | |

DAY OF INTERVIEW: _____

REGIONAL MANAGERS INITIALS: _____

A. SEX

	(48)
MALE	1
FEMALE	2

B. AGE OF RESPONDENT WRITE IN EXACT AGE LAST BIRTHDAY AND CODE

(49) (50)

	(51)
16 - 24	1
25 - 34	2
35 - 44	3
NOTE: CHECK AGE QUOTA 45 - 54	4
55 - 59	5
60 - 69	6
70 +	7

C. WORKING STATUS OF RESPONDENT

	(52)
FULL-TIME PAID WORK (30+ HOURS PER WEEK)	1
PART-TIME PAID WORK (8-29 HOURS PER WEEK)	2
PART-TIME PAID WORK (UNDER 8 HOURS PER WEEK)	3
RETIRED	4
STILL AT SCHOOL	5
IN FULL TIME HIGHER EDUCATION	6
UNEMPLOYED (SEEKING WORK)	7
NOT IN PAID EMPLOYMENT (NOT SEEKING WORK)	8

	CODE
D. STATUS OF CHIEF INCOME EARNER IN HOUSEHOLD	(53)
RESPONDENT	1
MAY BE MULTI CODED RESPONDENTS PARTNER	2
OTHER ADULT IN HOUSEHOLD	3

E. SOCIAL GRADE OF CHIEF INCOME EARNER

WRITE IN DETAILS BELOW AND CODE

1. OCCUPATION OF CHIEF INCOME EARNER _____

(54)

2. INDUSTRY _____	A	1
3. SELF EMPLOYED/ EMPLOYED: _____	B	2
4. QUALIFICATIONS: _____	C1	3
5. NO. RESPONSIBLE FOR: _____	C2	4
IF RETIRED OR WIDOWED OCCUPATIONAL PENSION?	D	5
THE CHIEF INCOME EARNER IS THE PERSON WITH THE LARGEST INCOME, WHETHER FROM THEIR EMPLOYMENT, PENSION, STATE BENEFITS, INVESTMENTS OR ANY OTHER SOURCE	E	6

SKIP COL 155

F. Are there any children aged 16 or under living in this household?

	(56)
YES	1
NO	2

AS A RESULT OF THE INTERVIEW YOU HAVE JUST DONE AND THE INFORMATION YOU HAVE GIVEN US, TNS MAY LIKE TO CONTACT YOU IN FUTURE ABOUT THIS OR OTHER RESEARCH PROJECTS, AND THEREFORE KEEP YOUR CONTACT DETAILS ON FILE - IS THAT ALL RIGHT?

	(57)
YES - OK	1
NO - RESPONDENT DOES NOT WANT TO BE CONTACTED AGAIN	2

G Which of these ethnic groups do you consider you belong to?

	(52)
White	1
Black – Caribbean	2
Black – African	3
Black – Other	4
Indian	5
Pakistani	6
Bangladeshi	7
Chinese	8
Mixed race	9
Other (CODE AND WRITE IN)	0
Refused	XX

Hello. My name is …….. We are conducting a survey about the public's attitudes towards some current issues that concern us all. Would you be able to spare some time to give me your views? It should take around 30 mins.

Here is a leaflet which tells you about market research and explains your rights under our industry code and the Data Protection Act.

HAND OUT LEAFLET

I'D LIKE TO BEGIN BY ASKING YOU A FEW QUESTIONS ABOUT YOURSELF AND YOUR INTERESTS.

RANDOMISE

SHOW CARD A

Q.1 There are a lot of issues in the news and it's hard to keep up with every area. Looking at this list of issues, for each one I would like you to tell me if you are very interested, moderately interested or not interested.

(READ OUT)

	VERY INTERESTED	MODERATELY INTERESTED	NOT INTERESTED	ROUTE
Crime/anti-social behaviour	☐	☐	☐	
Economics and finance/state of the economy	☐	☐	☐	
Education	☐	☐	☐	
Employment	☐	☐	☐	
Energy/nuclear power issues	☐	☐	☐	
Environmental issues	☐	☐	☐	
Health issues	☐	☐	☐	
Housing	☐	☐	☐	
Immigration	☐	☐	☐	
International current affairs	☐	☐	☐	
Medical discoveries	☐	☐	☐	
Music	☐	☐	☐	Q.2
New films	☐	☐	☐	
New inventions and technologies	☐	☐	☐	
New scientific discoveries	☐	☐	☐	
Religion/faith	☐	☐	☐	
Science and science issues	☐	☐	☐	
Sport	☐	☐	☐	
Terrorism	☐	☐	☐	
Transport/congestion	☐	☐	☐	
UK politics	☐	☐	☐	
Welfare and social exclusion: for example, drugs and poverty	☐	☐	☐	

SHOW CARD B

Q.2 I am going to read out some general statements other people have made. For each statement please tell me whether you agree strongly, agree, neither agree nor disagree, disagree or disagree strongly.

READ OUT - ROTATE ORDER - TICK START	AGREE STRONGLY	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	DISAGREE STRONGLY
1. ☐ You have to trust experienced people to make decisions	☐	☐	☐	☐	☐
2. ☐ What people like me think will make no difference to the government	☐	☐	☐	☐	☐
3. ☐ Politicians need specialist help to regulate some areas (by regulate we mean to monitor and control)	☐	☐	☐	☐	☐
4. ☐ People shouldn't tamper with nature	☐	☐	☐	☐	☐
5. ☐ I enjoy new situations and challenges	☐	☐	☐	☐	☐
6. ☐ It is important for me to keep on learning new skills	☐	☐	☐	☐	☐
7. ☐ New technologies should not be used until the relevant experts are sure that there are no risks to people	☐	☐	☐	☐	☐
				ROUTE: Q.3	

SHOW CARD C

RANDOMISE ORDER

Q.3a Which of the things in this list have you visited or attended in the last 12 months?

IF VISITED OR BEEN TO IN THE LAST 12 MONTHS

Q.3b How many times have been to/visited (…..) in the last 12 months?

Q.3c Of those that you have not visited or been to in the last 12 months, which, if any, would you be interested in attending/visiting?

DO NOT READ OUT	Q.3a DONE	Q.3b TIMES	Q.3c INTERESTED IN	ROUTE
Science museum	☐		☐	Q.4a
Science centre	☐		☐	
Art gallery	☐		☐	
Another type of museum (not science or art)	☐		☐	
Science festival	☐		☐	
Laboratory or similar scientific site	☐		☐	
Zoo	☐		☐	
Theme park	☐		☐	
Planetarium	☐		☐	
Been to a lecture/talk on a science-related subject	☐		☐	
Been to a public meeting or debate on a science-related subject	☐		☐	
Participated in a science-related activity at a school, community centre or university	☐		☐	
Sporting event as a spectator	☐		☐	
Tourist attraction visitor centre	☐		☐	
Historic house or garden	☐		☐	
Taken part in a Science Horizons or Sciencewise public event	☐		☐	
None	☐		☐	

SHOW CARD D SHOWS THE 'BENEFICIAL' SCALE THE INTERVIEWER WILL READ OUT THE TOPICS

Q.4a I'm now going to read out a list of topics. For each one please tell me whether you think it is very beneficial, fairly beneficial or not beneficial to society. ALLOW DON'T KNOW

READ OUT – RANDOMISE ORDER	VERY BENEFICIAL	FAIRLY BENEFICIAL	NOT BENEFICIAL	ROUTE
The use of technology for surveillance (for example CCTV)	☐	☐	☐	
Understanding more about space, planets and stars	☐	☐	☐	
Understanding the causes of climate change	☐	☐	☐	
Research into new drugs to cure human diseases	☐	☐	☐	
Understanding the causes of obesity	☐	☐	☐	
Research into new sources of energy	☐	☐	☐	
Research into storing radioactive waste	☐	☐	☐	
The development of robots that can think for themselves	☐	☐	☐	
The use of animals in research that aims to cure diseases	☐	☐	☐	
Research using stem cells, that is cells that can grow into different parts of the body, as a way of curing diseases	☐	☐	☐	Q.4b
Understanding how people learn	☐	☐	☐	
The impact of globalization on developing countries	☐	☐	☐	
The impact of immigration on the UK	☐	☐	☐	
Developing faster methods of transport	☐	☐	☐	
Nanotechnology – using tiny particles (a millionth of the thickness of a human hair) in manufacturing different sorts of products	☐	☐	☐	
Wi-fi networks that allow computers to access the Internet and the world wide web from anywhere using technology similar to that used by mobile phones	☐	☐	☐	

SHOW CARD E

Q.4b Now please tell me whether you are very worried, fairly worried, not very worried or not at all worried about….

RANDOMISE ORDER	VERY WORRIED	FAIRLY WORRIED	NOT VERY WORRIED	NOT AT ALL WORRIED	ROUTE
Research into the use of technology for surveillance (for example CCTV)	☐	☐	☐	☐	
Research into understanding more about space, planets and stars	☐	☐	☐	☐	
Research into understanding the causes of climate change	☐	☐	☐	☐	
Research into new drugs to cure human diseases	☐	☐	☐	☐	
Research into understanding the causes of obesity	☐	☐	☐	☐	
Research into new sources of energy	☐	☐	☐	☐	
Research into storing radioactive waste	☐	☐	☐	☐	
Research into the development of robots that can think for themselves	☐	☐	☐	☐	
The use of animals in research that aims to cure diseases	☐	☐	☐	☐	Q.5
Research into using stem cells, that is cells that can grow into different parts of the body, as a way of curing diseases	☐	☐	☐	☐	
Research into understanding how people learn	☐	☐	☐	☐	
Research into the impact of globalization on developing countries	☐	☐	☐	☐	
Research into the impact of immigration on the UK	☐	☐	☐	☐	
Research into developing faster methods of transport	☐	☐	☐	☐	
Research into nanotechnology – using tiny particles in manufacturing different sorts of products	☐	☐	☐	☐	
Research into Wi-fi networks that allow computers to access the Internet and the world wide web from anywhere	☐	☐	☐	☐	

SHOWCARD B

Q.5 I am now going to read out some more statements other people have made about some topical issues. For each statement please tell me whether you agree strongly, agree, neither agree nor disagree, disagree or disagree strongly.

READ OUT - ROTATE ORDER - TICK START
ALLOW D/K

		AGREE STRONGLY	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	DISAGREE STRONGLY
1.	We depend too much on science and not enough on faith	☐	☐	☐	☐	☐
2.	Scientists make a valuable contribution to society	☐	☐	☐	☐	☐
3.	Britain needs to develop science and technology in order to enhance its international competitiveness	☐	☐	☐	☐	☐
4.	I don't understand the point of all the science being done today	☐	☐	☐	☐	☐
5.	Finding out about new scientific developments is easy these days	☐	☐	☐	☐	☐
6.	There is so much conflicting information about science it is difficult to know what to do	☐	☐	☐	☐	☐
7.	I am not clever enough to understand science and technology	☐	☐	☐	☐	☐
8	Science is such a big part of our lives that we should take an interest	☐	☐	☐	☐	☐
9	Even if it brings no immediate benefits, scientific research which advances knowledge is necessary and should be supported by the Government	☐	☐	☐	☐	☐
10	I am amazed by the achievements of science	☐	☐	☐	☐	☐
11	Women don't tend to think scientifically	☐	☐	☐	☐	☐
12	School put me off science	☐	☐	☐	☐	☐
13	I cannot follow developments in science and technology because the speed of development is too fast	☐	☐	☐	☐	☐
14	Science and technology is too specialized for most people to understand it	☐	☐	☐	☐	☐
15	It is important that young people have a grasp of science and technology	☐	☐	☐	☐	☐
16	It's normal for scientists to disagree	☐	☐	☐	☐	☐
17	It is important to know about science in my daily life	☐	☐	☐	☐	☐
18	On the whole science will make our lives easier	☐	☐	☐	☐	☐

ROUTE: Q.6a

			ROUTE
Q.6a	Do you think that a career in science is a good career choice for young people these days?		
	Yes	☐	Q.6b
	No	☐	Q.6c
	It depends on the young person	☐	
	Don't know	☐	

Q.6b Why do you say that it would be a good choice? INTERVIEWER CODE			ROUTE
	Well paid	☐	Q.6c
	Good prospects	☐	
	Secure	☐	
	Country needs scientists	☐	
	Many job opportunities in science	☐	
	Science career good background for another career	☐	
	Opportunities to work abroad	☐	
	Opportunities to travel	☐	
	Interesting	☐	
	Good contribution to society	☐	
	Personally satisfying	☐	
	Other, specify	☐	

* **ASK ALL** *			
	Yes	☐	Q.6d
	No	☐	
Q.6c Do you think that a career in engineering is a good career choice for young people these days?	It depends on the young person	☐	Q.7
	Don't know	☐	

Q.6d Why do you say that it would be a good choice? INTERVIEWER CODE			ROUTE
	Well paid	☐	Q.6c
	Good prospects	☐	
	Secure	☐	
	Country needs engineers	☐	
	Many job opportunities in engineering	☐	
	Engineering career good background for another career	☐	
	Opportunities to work abroad	☐	
	Opportunities to travel	☐	
	Interesting	☐	
	Good contribution to society	☐	
	Personally satisfying	☐	
	Other, specify	☐	

* **ASK ALL** *			
	Very much better	☐	Q.8
	Somewhat better	☐	
Q.7 In general, how good was your science education at secondary school compared with your education in other subjects?	About the same	☐	
	Somewhat worse	☐	
	A lot worse	☐	
	Didn't study any science subjects	☐	
	Don't know	☐	

SHOWCARD B

Q.8 I am now going to read out some more statements other people have made about working in science. For each statement please tell me whether you agree strongly, agree, neither agree nor disagree, disagree or disagree strongly.

READ OUT - ROTATE ORDER - TICK START	AGREE STRONGLY	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	DISAGREE STRONGLY
1. ☐ Because of science and technology there will be more opportunities for the next generation	☐	☐	☐	☐	☐
2. ☐ Science is not a suitable career for a woman	☐	☐	☐	☐	☐
3. ☐ Young people's interest in science is essential for our future prosperity	☐	☐	☐	☐	☐
4. ☐ Compared to other professions, engineering offers a well paid career	☐	☐	☐	☐	☐
				ROUTE: Q.9	

		ROUTE
SHOWCARD F Q.9 How well informed do you feel, if at all, about science and scientific research and developments?		
	Very well informed ☐	
	Fairly well informed ☐	
	Not very well informed ☐	Q.10
	Not at all informed ☐	
	Don't know ☐	
SHOWCARD G Q.10 Which of the following statements on this card do you most agree with? SINGLE CODE ONLY	A.These days I hear and see far too much information about science ☐	Q.11
	B. These days I hear and see too much information about science ☐	
	C. These days I hear and see the right amount of information on science ☐	
	D. These days I hear and see too little information about science ☐	
	E. These days I hear and see far too little information about science ☐	
	Don't know ☐	

Q.11a Who, if anyone, do you think regulates the way science is conducted? DO NOT PROMPT Q.11b Who do you think should regulate the way science is conducted? DO NOT PROMPT MULTI CODING ALLOWED		Q.11a	Q.11b	
	Scientists themselves	☐	☐	Q.12
	Universities	☐	☐	
	The Government	☐	☐	
	The NHS	☐	☐	
	Ethics Committees	☐	☐	
	Medical charities	☐	☐	
	Environmental groups	☐	☐	
	Campaign groups	☐	☐	
	Business/industry	☐	☐	
	The United Nations (UN)	☐	☐	
	The Royal Society	☐	☐	
	Scientific professional bodies	☐	☐	
	Health and Safety Executive (HSE)	☐	☐	
	The general public	☐	☐	
	Other	☐	☐	
	No one	☐	☐	
Health and Safety Executive (HSE)	Don't know	☐	☐	

SHOWCARD H Q.12 How much confidence do you have in the way science is regulated?	A great deal	☐	Q.13
	A fair amount	☐	
	Not very much	☐	
	None at all	☐	
	Don't know	☐	

		Q.13a	Q.13b	ROUTE
Q.13a Who, if anyone, do you think regulates the way engineering is conducted? DO NOT PROMPT Q.13b Who do you think should regulate the way engineering is conducted? DO NOT PROMPT MULTI CODING ALLOWED	Engineers themselves	☐	☐	Q.13c
	Universities	☐	☐	
	The Government	☐	☐	
	The NHS	☐	☐	
	Ethics Committees	☐	☐	
	Medical charities	☐	☐	
	Environmental groups	☐	☐	
	Campaign groups	☐	☐	
	Business/industry	☐	☐	
	The United Nations (UN)	☐	☐	
	The Royal Society	☐	☐	
	Engineering professional bodies	☐	☐	
	The Royal Academy of Engineering	☐	☐	
	Health and Safety Executive (HSE)	☐	☐	
	The general public	☐	☐	
	Other	☐	☐	
	No one	☐	☐	
	Don't know	☐	☐	

			ROUTE
SHOWCARD H Q.13c How much confidence do you have in the way engineering is regulated?	A great deal	☐	Q.14
	A fair amount	☐	
	Not very much	☐	
	None at all	☐	
	Don't know	☐	

SHOW CARD I Q.14 Which of the ways set out on this card would make you more confident about the results of scientific studies? MULTI CODING ALLOWED	If the results are checked by another scientist	☐	Q.15
	If the results are published in an academic journal	☐	
	If the results are in the newspaper	☐	
	If the results are on the TV news	☐	
	If the results are in a TV documentary	☐	
	If industry is using the results to make products	☐	
	If a Government spokesperson says so	☐	
	A campaign group says so	☐	
	If it is someone I have heard of	☐	
	If it is an organisation I have heard of	☐	
	It is published on the Internet	☐	

Q.15	And is there anything else that would give you confidence that the results of scientific studies are correct? _____ _____ _____		Q.16
	None	☐	

			ROUTE
	SHOW CARD J		
Q.16	Thinking now about scientists, which two or three of the following, if any, do you think are the most important in determining whether you would trust a scientist? CODE UP TO THREE	Being older ☐ Being apolitical/Non political ☐ Academic credentials ☐ Experience ☐ If I can understand what they are saying ☐ If they are from a Black or Minority Ethnic Group ☐ If they are White ☐ If they are linked to a UK university ☐ If they are independent of Government ☐ If they are independent of business/industry ☐ If they are Government scientists ☐ If they are employed by business/industry ☐ If they are male ☐ If they are female ☐ If they listen to my concerns ☐ If they share my concerns ☐ If they are smartly dressed ☐ If they are wearing white coats/lab coats ☐ Nothing ☐ Don't know ☐	Q.17
	SHOW CARD K		
Q.17	Would you say you personally trust scientists more or less, or about the same as you did three years ago? IF MORE OR LESS Is that a little more/a little less or much more/much less? SINGLE CODE ONLY	Trust them much more ☐ Trust them a little more ☐ About the same ☐ Trust them a little less ☐ Trust them much less ☐ Don't know ☐	Q.18

				ROUTE
	SHOW CARD J			
Q.18	Thinking now about engineers, which two or three of the following, if any, do you think are the most important in determining whether you would trust an engineer? CODE UP TO THREE	Being older	☐	Q.19
		Being apolitical/Non political	☐	
		Academic credentials	☐	
		Experience	☐	
		If I can understand what they are saying	☐	
		If they are from a Black or Minority Ethnic Group	☐	
		If they are White	☐	
		If they are affiliated to a UK institution	☐	
		If they are independent of Government	☐	
		If they are independent of business/industry	☐	
		If they are Government engineers	☐	
		If they are employed by business/industry	☐	
		If they are male	☐	
		If they are female	☐	
		If they listen to my concerns	☐	
		If they share my concerns	☐	
		If they are smartly dressed/Smart appearance	☐	
		If they are wearing white coats/white lab coats	☐	
		Nothing	☐	
		Don't know	☐	
	SHOW CARD K	Trust them much more	☐	Q.20
		Trust them a little more	☐	
Q.19	Would you say you personally trust engineers more or less, or about the same as you did three years ago? IF MORE OR LESS Is that a little more/a little less or much more/much less? SINGLE CODE ONLY	About the same	☐	
		Trust them a little less	☐	
		Trust them much less	☐	
		Don't know	☐	

SHOWCARD B

Q.20 I am now going to read out some statements that other people have made about science and scientists. For each statement please tell me whether you agree strongly, agree, neither agree nor disagree, disagree or disagree strongly.

READ OUT - ROTATE ORDER - TICK START		AGREE STRONGLY	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	DISAGREE STRONGLY
1. ☐	The benefits of science are greater than any harmful effect	☐	☐	☐	☐	☐
2. ☐	The more I know about science the more worried I am	☐	☐	☐	☐	☐
3. ☐	Science is getting out of control and there is nothing we can do to stop it	☐	☐	☐	☐	☐
4. ☐	The speed of development in science and technology means that it cannot be properly controlled by Government	☐	☐	☐	☐	☐
5. ☐	In general scientists want to make life better for the average person	☐	☐	☐	☐	☐
6. ☐	Science is driven by business – at the end of the day it is all about money	☐	☐	☐	☐	☐
7. ☐	There are strong rules governing the way science is done	☐	☐	☐	☐	☐
8 ☐	Scientists seem to be trying new things without stopping to think about the risks	☐	☐	☐	☐	☐
9 ☐	Rules will not stop researchers doing what they want behind closed doors	☐	☐	☐	☐	☐
10 ☐	It is important to have some scientists who are not linked to businesses	☐	☐	☐	☐	☐
11 ☐	The independence of scientists is often put at risk by the interests of their funders	☐	☐	☐	☐	☐
12 ☐	Government should delay the introduction of new products until scientists are completely certain there are no bad side effects	☐	☐	☐	☐	☐
13 ☐	Industry should wait until scientists are completely certain that there is no danger to their workers to use new methods of production	☐	☐	☐	☐	☐
14 ☐	Scientists should listen more to what ordinary people think	☐	☐	☐	☐	☐
15 ☐	Scientists should be allowed to experiment on monkeys, if this can help resolve human health problems	☐	☐	☐	☐	☐
16 ☐	Scientific advances tend to benefit the rich more than they benefit the poor	☐	☐	☐	☐	☐

ROUTE: Q.21

		ROUTE
Q.21 Do you think that the following statement is true or false? The law states that all medicines must be tested on animals prior to their use by people.		
	True ☐	Q.22a
	False ☐	
	Don't know/not sure ☐	

Q.22a When I say 'public consultation' what comes to mind?

_____

_____

_____

_____

Q.22b

			ROUTE
SHOW CARD L Q.22b How much effort do you think the Government is making to bring together members of the public, scientists and policy-makers to discuss new scientific developments?	A great deal of effort	☐	Q.23
	Some effort	☐	
	Not very much effort	☐	
	No effort at all	☐	
	Don't know	☐	
Q.23 What, if any, would you say are the main BENEFITS to society from greater public involvement in decision-making about science? DO NOT PROMPT MULTI CODING ALLOWED	Better decision-making	☐	Q.24
	Better media coverage	☐	
	Promotes interest in/understanding of, science	☐	
	Greater/quicker scientific progress and adoption of technologies	☐	
	Improved democracy/accountability	☐	
	Improvements in the economy	☐	
	Improved public trust in policy-makers and decision-makers	☐	
	Less opposition to scientific research	☐	
	More balanced debate	☐	
	More funding for science	☐	
	More tolerance of scientists	☐	
	Appreciation of where taxes go/Justify research funding	☐	
	Enables the public to judge science issues for themselves	☐	
	Enables the public to make informed decisions about their lives	☐	
	Better science education in schools	☐	
	Medical benefits	☐	
	Other (PLEASE WRITE IN)	☐	
	Nothing	☐	
	Don't know	☐	
Q.24 What, if any, would you say are the main BARRIERS to greater public involvement in decision-making about science? DO NOT PROMPT MULTI CODING ALLOWED	Campaigns by activist groups	☐	Q.25
	Commercial or other barriers to making information available to the public	☐	
	Government policy	☐	
	Public don't have the time	☐	
	Lack of awareness among scientists of the public's understanding of science	☐	
	Lack of communication skills among scientists	☐	
	Lack of public interest in science	☐	
	Public's lack of understanding of science/scientific processes	☐	
	Scientific jargon/Technical language/The terminology	☐	
	Mistrust of scientists	☐	
	The negative image of science	☐	
	Level of public concern about science	☐	
	Other (PLEASE WRITE IN)	☐	
	Nothing	☐	
	Don't know	☐	

SHOWCARD B

Q.25 Here are some things other people have said about public consultation. For each statement please tell me whether you agree strongly, agree, neither agree nor disagree, disagree or disagree strongly.

READ OUT - ROTATE ORDER - TICK START	AGREE STRONGLY	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	DISAGREE STRONGLY
1. ☐ Public consultation events are just public relations activities and don't make any difference to policy	☐	☐	☐	☐	☐
2. ☐ Public consultation events are unrepresentative of public opinion	☐	☐	☐	☐	☐
3. ☐ When publishing the results of research, scientists should always state how they were funded	☐	☐	☐	☐	☐
4. ☐ The Government should act in accordance with public concerns about science and technology	☐	☐	☐	☐	☐
5. ☐ Those who regulate science need to communicate with the public	☐	☐	☐	☐	☐
6. ☐ We have no option but to trust those governing science	☐	☐	☐	☐	☐
7. ☐ For people like me it is important to be involved in decisions about science and technology	☐	☐	☐	☐	☐
8 ☐ The public is sufficiently involved in decisions about science and technology	☐	☐	☐	☐	☐
9 ☐ Women have different priorities for science to men	☐	☐	☐	☐	☐
10 ☐ Experts and not the public should advise the Government about the implications of scientific developments	☐	☐	☐	☐	☐
11 ☐ The Government should use tax payers money to fund scientific research	☐	☐	☐	☐	☐
12 ☐ Scientists are too dependent on business and industry for funding	☐	☐	☐	☐	☐
				ROUTE: Q.26	

SHOWCARD B

Q.26 Here are some things other people have said about how science is communicated. For each statement please tell me whether you agree strongly, agree, neither agree nor disagree, disagree or disagree strongly.

READ OUT - ROTATE ORDER - TICK START	AGREE STRONGLY	AGREE	NEITHER AGREE NOR DISAGREE	DISAGREE	DISAGREE STRONGLY
1. ☐ Politicians are too easily swayed by the media's reaction to scientific issues	☐	☐	☐	☐	☐
2. ☐ Scientists put too little effort into informing the public about their work	☐	☐	☐	☐	☐
3. ☐ Scientists should be rewarded for communicating their research to the public	☐	☐	☐	☐	☐
4. ☐ The media sensationalises science	☐	☐	☐	☐	☐
5. ☐ I would like more scientists to spend more time than they do discussing the implications of their research with the general public	☐	☐	☐	☐	☐
6. ☐ Funders of scientific research should help scientists to discuss research and its social and ethical implications with the general public	☐	☐	☐	☐	☐
7. ☐ We ought to hear about potential new areas of science and technology before they happen, not afterwards	☐	☐	☐	☐	☐
				ROUTE: Q.27	

			ROUTE
	SHOW CARD M		
Q.27	Which of the following statements on this card describe your views? The maths I learnt at school was…	Useful in my job ☐ Useful in my day-to-day life ☐ Interesting ☐ Boring ☐ Not at all useful ☐ Useful for other subjects I studied ☐	Q.28a
	MULTI CODING ALLOWED		
	SHOW CARD N	Express ☐ Daily Mail ☐	
Q.28a	Which daily newspapers, if any, do you read regularly? By regularly I mean at least three issues out of every four.	Mirror ☐ Daily Record ☐ Daily Telegraph ☐ The Financial Times ☐ Guardian ☐ Independent ☐ Daily Star ☐ Sun ☐ The Times ☐ Metro ☐ Other (code and write in) ☐	Q.28b
		None ☐	Q.29
		Don't know ☐	Q.28b
	SHOWCARD O	Very often ☐ Fairly often ☐	
Q.28b	How often would you say you read articles on science or technology in any of these newspapers?	Not very often ☐ Not at all often ☐ Not sure ☐	Q.29
	SHOW CARD P	Independent on Sunday ☐ Mail on Sunday ☐	
Q.29	And which SUNDAY newspaper, if any do you read regularly? By regularly I mean at least three issues out of every four.	News of the World ☐ The Observer ☐ The People ☐	
	MULTI CODING ALLOWED	Sunday Express ☐ Sunday Mirror ☐ Sunday Sport ☐ Sunday Telegraph ☐ Sunday Times ☐ Sunday Post ☐ Sunday Mail ☐ Any other Sunday Paper ☐	Q.30
		None ☐	Q.31
		Don't know ☐	Q.30

SHOWCARD O

Q.30 How often would you say you read articles on science or technology in any of these newspapers?

		ROUTE
Very often	☐	
Fairly often	☐	
Not very often	☐	Q.31
Not at all often	☐	
Not sure	☐	

ASK ALL

Q.31 Have you read a book about science in the last 12 months, other than in the course of your work?

		ROUTE
Yes	☐	
No	☐	Q.32
Don't know/not sure	☐	

Q.32 Do you ever use the Internet these days?
IF 'YES' PROBE FOR SOURCE

MULTI CODING ALLOWED

Yes – via mobile device	☐	
Yes - at home	☐	
Yes – at work	☐	
Yes – at college	☐	
Yes – via the library	☐	Q.33
Yes – via friends	☐	
Yes – via Internet cafes	☐	
No	☐	
Don't know	☐	

Q.33 Do you have digital TV at home?

Yes	☐	
No	☐	Q.34
Don't know	☐	

READ OUT

RANDOMISE

Q.34 Have you done any of the following in the last 12 months? Have you…

	YES	NO	DK	
Watched a science documentary e.g. Horizon?	☐	☐	☐	
Listened to a science programme on the radio?	☐	☐	☐	
Read a science magazine, e.g. New Scientist?	☐	☐	☐	
Discussed science with a friend or member of your family	☐	☐	☐	
Asked friends or family about a scientific topic, including a medical topic	☐	☐	☐	
IF YES AT Q.32	☐	☐	☐	Q.34
Searched for information about a scientific topic using the Internet?	☐	☐	☐	
Watched or listened to a broadcast about a scientific topic on your computer?	☐	☐	☐	
Downloaded a podcast on a scientific topic?	☐	☐	☐	
Read a blog about science?	☐	☐	☐	
IF YES AT Q.33	☐	☐	☐	
Have you ever used interactive TV while watching a science programme?	☐	☐	☐	

			ROUTE
SHOW CARD R ALLOW MULTICODE Q.35 Which, if any, of the following applies to you? Just read out the letter or letters.	A Been a member of a science organisation in the last 5 years	☐	Q.36
	B Currently subscribe to a science magazine	☐	
	C Have (ever) worked as a scientist or engineer	☐	
	D Have taught a science subject	☐	
	E I am a scientist	☐	
	F I am an engineer	☐	
	G I have never met a scientist or engineer	☐	
	H I have scientists or engineers among my friends and relatives	☐	
	I I work with scientists or engineers	☐	
	J Member of a science organisation	☐	
	K Once subscribed to a science magazine but don't now	☐	
	None of these	☐	
	Don't know	☐	

And finally, just a few questions about you to ensure we talk to a good cross-section of people.

			ROUTE
SHOW CARD S Q.36 Please tell me the highest level of qualification you have obtained. CODE FIRST THAT APPLIES	PhD	☐	Q.37
	Professional qualification/chartered professional/ NVQ/ SVQ level 5	☐	
	Postgraduate	☐	
	First degree or equivalent/ NVQ/ SVQ level 4/ HNV	☐	
	A levels/ Scottish Higher/ BTEC (higher) or equivalent/ NVQ SVQ level 3/ HNC	☐	
	GCSEs/ CSEs/ O levels/BTEC (first diploma) or equivalent NVQ/SVQ level 1 or 2	☐	
	Still studying	☐	
	None of the above	☐	Q43
	Don't know	☐	
SHOW CARD S Q.37 And what is the highest qualification you have in any area of science or engineering?	PhD	☐	Q.38
	Professional qualification/chartered professional/ NVQ/ SVQ level 5	☐	
	Postgraduate	☐	
	First degree or equivalent/ NVQ/ SVQ level 4/ HNV	☐	
	A levels/ Scottish Higher/ BTEC (higher) or equivalent/ NVQ SVQ level 3/ HNC	☐	
	GCSEs/ CSEs/ O levels/BTEC (first diploma) or equivalent NVQ/SVQ level 1 or 2	☐	
	Still studying	☐	
	None of the above	☐	
	Don't know	☐	
IF 24 OR UNDER AND STILL STUDYING ASK: Q.38 Are you currently studying any science subjects?	Yes	☐	Q.39
	No	☐	Q.40

IF 24 OR UNDER AND STILL STUDYING ASK: SHOW CARD T Q.39 How interested are you in having a job that means you need to have qualifications in science subjects?	Very interested Fairly interested Not very interested Not at all interested Haven't decided yet Don't know	☐ ☐ ☐ ☐ ☐ ☐	Q.40
2 SHOW CARDS: U AND S Q.40 And what is the highest qualification you have in any of the subjects listed on this card? Area Studies Demography Economic and Social History Economics Education Environmental Planning/Planning Human Geography Linguistics Management and Business Studies Political Science and International Relations Psychology Science and Technology Studies Social Anthropology Social Policy Social Work Socio-legal Studies Sociology Statistics, Computing and Methodology	**QUALIFICATIONS:** PhD Professional qualification/chartered professional/ NVQ/ SVQ level 5 Postgraduate First degree or equivalent/ NVQ/ SVQ level 4/ HNV A levels/ Scottish Higher/ BTEC (higher) or equivalent/ NVQ SVQ level 3/ HNC GCSEs/CSEs/O levels/BTEC (first diploma) or equivalent NVQ/SVQ level 1 or 2 Still studying None of the above Don't know	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	
IF 24 OR UNDER AND STILL STUDYING (CODES 5 OR 6 AT QC (WORKING STATUS) AT ASK: Q.41 Are you currently studying any of these subjects?	Yes No	☐ ☐	Q.42 Q.43
IF 24 OR UNDER AND STILL STUDYING AT (CODES 5 OR 6 AT QC (WORKING STATUS) ASK: SHOWCARD T Q.42 How interested are you in having a job that means you need to have qualifications in one or more of these subjects?	Very interested Fairly interested Not very interested Not at all interested Haven't decided yet Don't know	☐ ☐ ☐ ☐ ☐ ☐	Q.43
SHOWCARD V RECORD NUMBER OF CHILDREN IN EACH AGE GROUP Q.43 Are you a parent of any children aged 21 or younger?	Under 5 6-11 12-16 17-18 19-21	☐ ☐ ☐ ☐ ☐	Q.44

			ROUTE
SHOW CARD W	No religion	☐	Q.46
Q.44 Do you regard yourself as belonging to any particular religion? IF YES which one: CODE ONLY ONE DO NOT PROMPT	Christian – no specific denomination	☐	Q.45
	Roman Catholic	☐	
	Church of England/Anglican	☐	
	Baptist	☐	
	Methodist	☐	
	Presbyterian/Church of Scotland	☐	
	Free Presbyterian	☐	
	Brethren	☐	
	United Reform Church (URC)/Congregational	☐	
	Other Protestant (code and write in)	☐	
	Other Christian (code and write in)	☐	
	Hindu	☐	
	Jewish	☐	
	Muslim/Islam	☐	
	Sikh	☐	
	Buddhist	☐	
	Other non-Christian (code and write in)	☐	
	Refused/Not willing to say	☐	
SHOW CARD X	Very religious	☐	Q.46
	Somewhat religious	☐	
Q.45 Which of these statements on this card best describes you?	Neither religious or nonreligious	☐	
	Somewhat nonreligious	☐	
SINGLE CODE ONLY	Very nonreligious	☐	
	(Can't choose)	☐	

SHOW CARD Y

Q.46 Which group on the card is closest to the total income of everyone in your household, from all sources before tax? Please include state benefits, child benefits and housing benefits.

				ROUTE
WEEKLY		**ANNUAL**		Q.47
A) Under 60	☐	A) Under 3000	☐	
B) 60 - 119	☐	B) 3000 - 5900	☐	
C) 120 - 199	☐	C) 6000 - 9999	☐	
D) 200 - 299	☐	D) 10 000 - 14 999	☐	
E) 300 - 499	☐	E) 15 000 - 24 999	☐	
F) 500 - 699	☐	F) 25 000 - 34 999	☐	
G) 700 - 899	☐	G) 35 000 - 44 999	☐	
H) 900 - 1099	☐	H) 45 000 - 54 999	☐	
I) 1100 - 1149	☐	I) 55 000 - 59 999	☐	
J) 1150 - 1250	☐	J) 60,000 - 64 999	☐	
K) 1250+	☐	K) 65 000+	☐	
Refused/Don't know	☐	Refused/Don't know	☐	

			ROUTE
Q.47	Do you have the regular use of a car, van or motorcycle?	Yes ☐ No ☐	Q.48
SHOWCARD CC Q.48	Thinking about your main place of residence, do you…	Own it outright (without a mortgage) ☐ Own it with a mortgage ☐ Rent from a private landlord ☐ Rent from the Council or a housing association ☐ Live with parents/other relatives/guardians ☐	Q.49
Q.49	And lastly, do you think that you have just taken part in a social science research project?	Yes ☐ No ☐ Don't know/not sure ☐	CLOSE

Appendix 3 – Literature Review

Contents

1. Introduction

1.1 Background

The project brief asked for research that:

- Identifies previous relevant UK and overseas attitudinal research (produced by and for various sectors);
- Enables relevant major findings from previous research to both inform the 2008 survey design and augment the analysis of the 2008 survey results; and
- Provides an overview of current public attitudes to science in other scientifically advanced countries, which can be compared to corresponding attitudes in the UK.

In order to provide this information, it was agreed that the initial research undertaken by the project would include:

- online omnibus survey (TNS);
- media monitoring (PSP);
- social science focus groups (PSP);
- a literature review to inform the development of the questionnaire (PSP); and
- a literature review to augment analysis of results of the 2008 survey (PSP).

1.2 Purpose of this Appendix

The report presented in this appendix is the literature review that was used to augment the analysis of the 2008 survey. It is presented in such a way as to be an easy point of reference. Useful references are summarised and quoted; allowing readers to easily identify the relevant reports (or sections of reports) that provide useful and insightful comparisons.

1.2.1 Definitions

We have taken a broad approach to this element of the work that supports the full range of requirements. Thus, when sourcing references, our definition of 'attitudes' has included:

- hopes for science;
- concerns about science;
- the utility of science;
- basic "blue sky" research;
- different aspects of science;
- national and international investment;
- individual nations' places in world science;
- science education; and
- science-based careers.

1.3 Appendix structure

Sections 2 of this report presents information on attitudes to science among the general public in the UK, Europe and elsewhere. Section 3 presents information about attitudes to science by young people. Section 4 highlights other issues that have come out of the literature review but that do not fit under any of the previous section headings. The full bibliography is listed in section 5.

2. Attitudes to Science: evidence from previous research

2.1 General public - UK

In the UK, the importance of encouraging dialogue between scientists and the public has been widely recognised for some time; the need to engage the public with developments in science was recognised as a key aspect of science policy in the 2000 report by the House of Lords Select Committee on Science and Technology.

In general, the public is interested in and has a positive attitude towards science. A large study found that three-quarters of the British public are 'amazed' by the achievements of science (OST/Wellcome Trust 2000). This positive view is largely due to the perceived direct benefits of science and engineering, which make lives *'healthier, easier and more comfortable'*. However, views are not totally driven by the need for science to be productive. In 2000, 72% of the public agreed that 'even if it brings no immediate benefits, scientific research which advances the frontiers of knowledge is necessary and should be supported by the Government'. Alongside this, the majority agree that Britain needs to develop science and technology in order to enhance its international competitiveness.

Interest in science and attitudes to science are affected by age, level of education and gender. Generally, as familiarity with a topic increases interest increases but, attitudes to science are, in reality, more complex than this. The OST and Wellcome Trust (2000) concluded that the public can be divided into different groups dependent on their attitudes to science; these groups have distinct profiles and are summarised below.

- *Confident believers* (17% of the sample): are supportive of science because they appreciate the benefits and have confidence in society and the political system to control developments. They are up-market and well-educated.
- *Technophiles* (20%): are less trusting of regulatory system but have more confidence in scientists. They are up-market, well-educated, and have the highest level of science qualifications.
- *Supporters* (17%): are trusting of the regulatory system, but younger than confident believers. They have higher than average qualifications but less than technophiles, and their social class similar to the average for the UK.
- *Concerned* (13%): are concerned about their personal and society's ability to cope with changes. They are most likely to be female and have the greatest scepticism of authority.
- *Not sure* (17%): do not tend to have strong views because they neither agree nor disagree with the 40 attitude statements in the questionnaire. They do not identify any benefits brought by science. They are poorly educated and under 35 with below-average incomes.
- *Not for me* (15%): are uninterested but think science is important. They are poorly educated and most likely to be over 65.

In research for the Royal Academy of Engineering and the Engineering Technology Board, the public was found to have an initially limited awareness and understanding of engineering and engineers, which was narrowly defined and primarily related to construction and manual professions. Upon further discussion with members of the public, BMRB (2007) found that some started to relate engineering to design and problem solving. However, there was a general lack of confidence in knowledge about engineering. Engineering as a profession was viewed positively, but there were so many types of engineers that the public were confused about what they did, although overall it was thought that 'engineers fix things'. As expected, they found that greater knowledge of engineers and engineering led to a more positive attitude towards them. This research is particularly relevant to the current project given that it was carried out in 2007, shortly before fieldwork for the 2008 survey began.

The Wellcome Trust (2005a) considered public attitudes to gene therapy and found that awareness of, and knowledge about, gene therapy were both fairly low, but most participants were found to be optimistic about progress in gene therapy research. Attitudes towards the acceptability of altering genes are complex and vary a great deal from one scenario to another. The research showed that people do make distinctions between medical and non-medical applications, and between somatic, germline and in utero gene therapy. While the majority are comfortable with the idea of somatic therapy for serious illness (for instance, 82% would allow somatic gene therapy to treat heart disease), only two-thirds (64%) would support germline therapy for this, and in utero therapy commanded even less support (49%).

The Wellcome Trust (2005b), when they looked at biomedical science, reported that the views of individuals were not stable and that this lack of stability is often masked in repeated surveys/polls. Other work by the Wellcome Trust and MRC (2000) looked at the public perceptions of the collection of human biological samples. Use of such samples in research was not a well-known practice, but in principle it was considered acceptable if accompanied by informed consent. The use of human biological samples in genetics research was less readily accepted. They suggest that this is largely because genetics and genetics research tend to be misunderstood.

Research commissioned by the Royal Society and the Royal Academy of Engineering's Nanotechnology Working Group aimed to assess awareness about nanotechnology, and also whether nanotechnology would have a positive or negative effect on quality of life (BMRB Social Research 2004). They found that there was limited awareness about nanotechnology (29% of respondents said they were aware of the term). Awareness was higher among men (40%) than women (19%), and was slightly lower for older respondents. There was also a clear pattern by social grade, with awareness peaking at 42% for ABs and falling to 16% of DEs. The majority (68%) of those who were able to give a definition of the word felt that it would improve life in the future, compared to only 4% who thought it would make things worse. Over one tenth of respondents said that whether nanotechnology would make things better or worse depended on how it was used, despite the fact that this was not presented as an option on the questionnaire.

Research was conducted by MORI on behalf of NESTA (2005) to coincide with the launch of FameLab.[18] They found that the general public is positive about the need to be informed about new developments in science and technology, although only 40% actually felt sufficiently informed. The most common reasons given for wanting to be informed were:

- to raise awareness/improve knowledge;
- to understand the implications/concerns for everyone; and
- that information/results/research should be available to all.

PSP has worked with CCLRC (now part of the Science and Technology Facilities Council) to help develop a communication strategy to engage with interested adults (PSP for CCLRC 2004). This research involved focus groups and a telephone survey. Over three-quarters of those surveyed agreed that 'Science and technology are making our lives healthier, easier and more comfortable'; men (83% versus 73% of women) and those from the higher social classes (83% AB versus 73% E) were more likely to agree with this statement. Science was seen as a 'hard' (difficult) subject at school, despite this, people were largely interested in, and supportive of, science. Despite the generally positive view of science, there was a significant minority of people who were concerned about the control of science. Women, older people and those in the lower social grades were more likely to be concerned (PSP for CCLRC 2004). Scientists were seen as rather special, but slightly detached people, dedicated to their work with the intent to make life better for the average person.

Another recent survey for OST by MORI (2005) confirmed the general findings of others; that overall public opinion of science is positive. There is also a general fear of the unknown among the public with regard to scientific developments. Opinions about science are not only affected by demographics and level of scientific knowledge but also by perceived level of risk of the processes/products/results of scientific advances. Scientists working for industry and the government were least trusted when compared with other employers or funders. Crucial factors in determining trust in scientists were competence, credentials, experience and honesty (MORI 2005). Ongoing research by MORI (2006) also suggests that the public are more trusting of scientists compared with ten years ago. This survey showed that the proportion of people who thought that scientists 'tell the truth had increased from 63% in 1997 to 72% in 2006 (Opinion of Professions, 2006)

People are generally amazed by scientific achievements, yet have greater uncertainty with regard to the benefits of science being greater than any harmful effects (OST/Wellcome Trust 2000). This 2000 study also indicated a low level of confidence in regulation and the government.

Sturgis & Allum (2004) found that those people with greater knowledge of politics were more likely to respond positively to science when their knowledge of the topic increased. They suggested that it may be because "*whatever leads knowledge of science to increase one's favorability towards it, is even more effective when people are familiar with the complex range of circumstances surrounding scientific and technological development within the wider political landscape."*

Debates about risk are important. Wildson & Willis (2004) argue that the public also wants answers to the more fundamental questions at stake in any new technology:

[18] NESTA FameLab is an annual national competition to find the UK's best new talent in science communication.

- Who owns it?
- Who benefits from it?
- To what purposes will it be directed?

As part of their report MORI (2005) conducted a review of the literature on the public's opinion of science and scientists. They drew on a number of sources (e.g. MORI/UEA 2003, MORI/OST 1998/1999) with a particular focus on certain issues proven to be of particular concern to the general public. These were: biotechnology/GMOs; human genetics/cloning; stem cell research; and animal experimentation. They highlighted research from the UK, Europe and the USA and concluded that the role played by improving communication and enhancing public engagement on science appears to vary by issue. They highlighted that there is a need for sensitivity on how particular issues are communicated, and how these are related to overall levels of trust in science and scientists (MORI 2005).

A major quantitative survey was undertaken in 2002 as part of a study to help understand public attitudes towards science, risk and forms of governance (Poortinga & Pidgeon 2003). Various risk cases (e.g. climate change and radioactive waste) were put into context by comparing them with various personal and social issues. The most important issues were mainly personal ones. Nevertheless, respondents were still interested in the various risk cases mentioned above. When considering trust in scientists, respondents trusted scientists working for environmental organisations and universities most and those working for government and industry least. There was an overall distrust of government, which was not thought to be responsive to the needs of ordinary people; respondents were ambivalent with regard to their feelings of trust for scientists working for government. There was some concern, however, that the funding of science had become too commercialised and support for more public control over science was expressed.

Some studies have highlighted a lack of knowledge by the public of the regulation of science. For example, few participants in a study about gene therapy knew anything about the existing regulatory system: 15% of the sample were aware that the UK permits experiments altering genes in somatic but not reproductive cells (Wellcome Trust 2005a). A poll by MORI (2003a) also found that three quarters of those surveyed had no idea what 'peer review in scientific publications' means, or could not define it correctly. The survey also showed that nearly as many (71%) of the public favoured replication or the kind of scrutiny provided by peer review. Few people, however, even know what research is being conducted, and much less understand why it is being done and what potential implications there are (Field & Powell 2001).

People do, however, exhibit a desire for more knowledge. They generally want to know the rationale behind scientific research, for example, the reasons why researchers want to do whole animal cloning (OST/Wellcome Trust 2000). The public also wants to learn about scientific developments *during* the research stage rather than hearing about them in the mass media after the research has been conducted (MORI 2005). However, the OST/Wellcome Trust (2000) found that the concept that increases in knowledge might bring more questions than answers is difficult to communicate to the general public.

Those members of the public who do not think it is important to be kept up-to-date believe that such developments are either not relevant or too technical/specialised for the general public to understand (NESTA 2005). Two thirds of those surveyed for the OST/Wellcome Trust (2000) agreed that science and technology was too specialised for most people to understand. The public believe the following to be barriers to a greater of understanding of science and technology (NESTA 2005):

- a lack of appreciation by the public about how science affects them (35%);
- a lack of public interest (29%);
- scientific jargon/technical language/terminology (29%); and
- lack of education (28%).

These barriers were more likely to relate to the abilities of the public themselves rather than to scientists (NESTA 2005). NESTA concluded that the biggest barrier to a greater understanding of science by the public is lack of appreciation about how scientific developments affect them personally or society in general. This lack of appreciation about how science affects them is more apparent in the physical sciences than in any of the other sciences. Nevertheless, Miller (2004) found that even though there are some continuing reservations about the pace of change engendered by science and technology and the relationship between science and faith, the public consistently reconciles these differing perceptions in favour of science.

2.2 General public - European

2.2.1 Eurobarometer

In 2005, the European Commission published *Europeans, Science and Technology* and *Social values, science and technology* (European Commission 2005a). It was reported that the *"majority of those interviewed would like more information on science and technology and seem*[ed] *rather dissatisfied at the way in which they are currently informed about research and progress, especially by scientists"*. Respondents also regarded technosciences with a mixture of distrust and suspicion. It was further noted that lessons in science communication needed to be learnt from controversies such as the GM food debate.

The European Commission (2005a) also highlighted that the correlation between scientific knowledge and support for science is low and that people are more interested in how the science will ultimately affect them and society rather than the details of how the scientific application/technology is developed. Furthermore, the pace of such scientific developments can be viewed both with awe and foreboding. A third of those respondents who indicated a lack of interest in science did so due to their inability to understand 'scientific and technological questions', and another third simply did not care (over one third of these were young people and students).

Europeans consider themselves poorly informed on issues concerning science and technology, and, as highlighted above, there is a link between low interest and the feeling of lack of information (European Commission 2005a). Although a strong confidence in science and technology continues, a somewhat stereotyped vision seems nonetheless to exist, which bases itself on the classic image of 'machine against man'. There is the recognition of the positive role scientists play in society, but, there is a note of criticism towards scientist's obscurity concerning the results of their achievements and the way they handle information towards the public. Furthermore, a certain fear of scientists is expressed in two manners: in a more open way concerning scientist's excessive power (due to their high knowledge), and in a more implicit way concerning the risks of scientific research going beyond the limits set by ethics and morality.

Europeans would like to impose a balance between ethics and scientific progress, which will certainly demand much effort on behalf of the scientific community as well as the public authorities who are expected to impose the legal basis of such a control through ethics.

Europeans also wish to see more women implicated in the field of science and further integrated into the scientific community, which should reflect more equal opportunities between genders. Results also make clear that Europeans' hopes for future scientific and technological development lie in the hands of the younger generations who should show more interest and participate more intensively in the field of science.

Finally, the report also shows that Europeans think that the USA is ahead of Europe in a number of fields of science.

Pardo & Calvo (2006) considered the results of the Eurobarometer (2005) and reported that similarities and differences between the way people perceive and judge science are more linked to sociodemographics and cognitive variables (such as educational level) than nationality. Cultural aspects of science, however, are more highly influenced by nationality. They concluded that "*There are virtually no differences in how the two groups at the opposite extremes of the social stratification view the positive aspects of science measured by the Eurobarometer, but differences are observable in their perception of certain (real or supposed) side effects of scientific change, such as its role in undermining religious beliefs or accelerating social change. It is the groups at the lower extreme of the stratification that are most sensitive to such effects or impacts."* This suggests that differences in attitudes are linked to an individual's perceptions of personal control over social change.

2.2.2 Social sciences

There is very little previous national or international research looking into public attitudes to the social sciences. The only source that appears to cover this is the Eurobarometer survey (European Commission 2005b, Eurobarometer 2001). In 2001 the survey asked: Which scientific and technical developments do you find most interesting? One of the options was economics and social sciences. Medicine (60.3%) and the environment (51.6%) were the two areas of greatest scientific interest to Europeans. Genetics and economics and the social sciences achieved comparable ratings (22.2% and 21.7% respectively). Interest in the social sciences was much more widespread in two Scandinavian countries, Sweden (40.9%) and Denmark (39.4%).

For each of a number of disciplines, respondents were asked to indicate whether it appears to them – 'rather scientific', 'not very scientific' or 'don't know'. The options, starting with the most scientific, are: medicine, physics, biology,

astronomy, mathematics, psychology, astrology, economics and history. Europeans' answers on defining the boundaries between scientific and non-scientific subjects made it possible to define two groups comprising the major sciences on the one hand and the minor sciences on the other.

- The first group comprised, with the positive replies in ascending order, medicine (92.6 %), physics (89.5 %), biology (88.2 %), astronomy (77.9 %) and mathematics (72.3%).
- The second group includes psychology (64.5 %), astrology (52.7 %), economics (42.3 %) and history (33.1 %).

The opinions regarding the major sciences do not vary very much in the different countries of the EU, but there are striking differences of opinion regarding the social sciences such as economics, psychology and, above all, history; generally speaking, these disciplines are less often considered "scientific" in France, Spain and Italy compared with other European states.

The results of the Eurobarometer (2005) showed that interest in economics and the social sciences increased to 24% (from 22% in 2001). Those countries with more than 40% of respondents interested in economics and the social sciences were Denmark, Luxemburg, Sweden and Switzerland (42%, 46%, 42%, 42% respectively). Looking at the overall results by sociodemographic status there is little difference dependent on gender and age, although those who remained in education over the age of 20 or were still studying were more likely than those who remained in education up to the age of 19 to be interested in social science.

Respondents were again asked to indicate how scientific they thought certain subjects were. Three distinct groups of subjects were reported (compared with two in 2001).

- The first group consists of subjects which are viewed as highly scientific, namely medicine (89%), physics (83%, biology (75%), astronomy (70%) and mathematics (72%).
- The second group consists of subjects which are perceived as somewhat scientific. These are psychology (53%), economics (40%), astrology (41%), homeopathy (33%) and history (34%).
- Finally, the last group consists of the only subject which is considered by Europeans as not at all scientific, namely "horoscopes".

2.2.3 Spain

A survey undertaken in Spain by Lujan & Todt (2007) assessed citizens' opinions on the precautionary principle, the part played by science in policy making, as well as their respective level of trust in science. The results of a study showed that Spanish citizens, by a significant margin, consider that *"scientists may be influenced by economic interests that values play a key role in policy making, and that policy should be guided by precaution"*.

2.2.4 Finland

The Finnish Society for Scientific Information (2001) found that Finns have strong confidence in science and that science is a matter of great public interest. Some of the main findings of the survey are:

- 62% of the respondents claimed to follow developments in science, research and technology with interest. Medicine is the field that inspires the most interest, followed by environmental research.
- Mass media provides information on scientific developments to the people, especially radio and television (92%) and newspapers (86%).
- Finns have great confidence in universities and other institutions of higher learning (68%).
- The benefits of technology and medicine are thought to be good or very good (88%), and people think that scientific research can produce reliable results (58%).
- There is consensus that science can help humankind fight diseases such as cancer and AIDS; also, that it can improve material well-being and the standard of living.
- Three in four believe Finnish science is of a high international standard and that science will be increasingly important to the future success not only of society at large but also individual citizens.

Finns also have some doubts and reservations:

- 19% expressed scepticism about the usefulness of sciences to people's daily life; while
- 45% think science can help improve the state of the environment, 33% do not think so.

Respondents expressed hope, rather than confidence, that science can promote peace and prevent wars. The Finnish Society suggests that the results demonstrate that Finns have confidence in science and are 'realistically optimistic' about what science can do.

2.2.5 Portugal

Two surveys commissioned by the Portuguese Observatory for Science and Technology (1996/97, 2000) show a growing interest as well as confidence in science and technology in Portugal. However, they report that the results also show the general lack of 'scientific culture' of the Portuguese population compared to other Europeans. Public interest in scientific-related issues had increased, especially in the field of medicine: in the 1996/97 survey, two in three Portuguese (69%) were very or somewhat interested in discoveries in the field of medicine whereas in 2000, this figure rose to 76%. The interest in inventions and new technologies also experienced a sharp increase, i.e. from 58% to 67%. Public confidence in science in general also increased as almost 39% of those surveyed declared having confidence in science compared with 32% in the 1996/97 survey.

2.2.6 Netherlands

The Social and Cultural Planning Office of the Netherlands conducted a survey in 2001 and found that respondents had positive attitudes towards science and scientists and believed in the power of science to solve today's problems. Only a third, however, could provide a proper definition of the word science. Attitudes towards new technologies had improved but this depended on the type of technology; "the internet or email are held in high esteem, there are still objections to genetically modified food, nuclear energy and military technology". In addition, nearly half of those surveyed never read anything about science or watched anything related to science on the television.

2.2.7 France

Boy (2007) looked at the evolution of public attitudes to science in France from six surveys conducted between 1972 and 2007 (the same questions were not always asked each time). Most of those surveyed over the years have consistently believed that scientific research is funded equally by the state and private enterprises, whereas the proportion of state provision has actually decreased. The support for basic research, whether or not it has practical applications, has increased from 39% in 1994 to 52% in 2001.

The image of scientists has become slightly more negative over time when you consider responses to the following two statements:

- "Research scientists are devoted people working for the good of humanity."
- "Due to their knowledge, research scientists have power that can make them dangerous."

Respondents were also asked to assess the extent to which science does humanity harm versus good. The major observed changes since 1972 are:

- negative answers (more harm than good) have remained very low;
- the positive answer (more good than harm) has decreased; and
- the median answer (as much good as harm) has increased.

2.3 General public – Other International

2.3.1 USA

National Science Foundation, Science and Engineering Indicators (NSF)

It is believed that although the American public tends to express a high level of interest in science, many lack confidence in their knowledge of science (National Science Foundation, Science and Engineering Indicators 2006). Those that are more highly educated are more likely to express high levels of interest in science and to be more confident in their knowledge base. Respondent's understanding of the nature of scientific inquiry was tested by way of a combination of a number of questions, including questions asking respondents to explain what it means to study something scientifically and specific questions on experimental design. Results indicated that nearly three quarters of those surveyed did not understand the concept of scientific inquiry. Many in the scientific community are concerned that lack of knowledge about science and technology (S&T) may adversely affect the level of government support for research, the number of young people choosing S&T careers, and the public's resistance to miracle cures, get-rich-quick schemes, and other scams.

More specific NSF (2006) findings related to the media are:

- The media can and does affect the public's view of scientific issues.
- Television is still the main source of information about S&T, but the Internet is a strong competitor (in 2004, the Internet was the second most popular source of news about S&T, up from fourth place in 2001).
- S&T ranked tenth of 14 categories of news followed most closely by the public in 2004.
- Very few Americans (about 10% of those surveyed) say they are not interested in S&T issues. S&T museums are much more popular in the United States than in other countries.

Many people throughout the world cannot answer simple, science-related questions. Nor do they have an understanding of the scientific process. However, even though few Americans surveyed understand the concept of scientific inquiry, the authors noted that:

> *"US adults may be somewhat more knowledgeable about science than their counterparts in other countries, especially Russia and China. However, science knowledge in the United States is not improving. Survey respondents' ability to answer most questions about science has remained essentially unchanged since the 1990s. Although the US survey has not shown much change over time in the public's level of knowledge about science, the most recent Eurobarometer does show an increase. The change occurred in almost all countries surveyed; Belgium, Germany, Ireland, Luxembourg, and the Netherlands recorded double-digit increases between 1992 and 2005 in the percentage of correct responses to science literacy questions."*

Most Americans have positive attitudes about the benefits of S&T, but some have reservations, including concerns about moral issues. Support for government funding of research is strong:

- Americans have more positive attitudes about the benefits of S&T than are found in Europe, Russia, and Japan. In recent surveys, 84% of Americans, compared with 52% of Europeans and 40% of Japanese, agreed that the benefits of scientific research outweigh any harmful effects. In 2004, 83% of Americans surveyed agreed that 'even if it brings no immediate benefits, scientific research that advances the frontiers of knowledge is necessary and should be supported by the federal government.' Support is also strong in Europe and Asia.
-

The biggest concern is loss of privacy from tiny new surveillance devices (nanotechnology). But, most people have confidence in the scientific community and a high opinion of science as an occupation.

- Since 2002, more people have expressed confidence in the leadership of the scientific community than in any other profession except the military.
- Scientists share (with doctors) the top spot in the Harris poll of occupations having the most prestige; engineers are about in the middle of this ranking.
- Most Americans say they would be happy if their son or daughter chose a career in science.

[The NSF also provides comparisons with attitude data from other countries such as Korea, Russia and China]

Other USA

Americans say they take pride in their nation's leadership role in science and technology and believe the USA needs to continue investing in scientific research and development in order to remain at the forefront of discovery and innovation (Gallup 2001). Other pertinent findings from the survey that are related to education are:

- 93% say students in their state need a stronger education in science to be prepared for the new inventions, discoveries and technologies that increased investment will likely bring.
- 85% agreed that improving pre-college science education in their state should be one of their governor's top priorities.
- Americans think it very likely that most entry-level jobs in the future will require a basic level of science literacy.
- Americans see a strong connection between good science education and US economic success.
- Almost all Americans (93%) say it is important for the US to maintain its current global leadership position in science and technology.

As the role of genetic science in everyday life has grown, policymakers have become concerned about Americans' understandings of this science. Bates (2005) looked specifically at the American lay public's understanding of genetics. The study found that the public does not process messages about genetics through the linear, transmission model assumed by previous research. The public processes messages about genetics complexly and critically. Another study considered environmental issues and found that although the US public are aware of global warming in a general sense, understanding of particular causes, possible consequences, and solutions is more limited. Both mass media and interpersonal communication appear to make a positive contribution to understanding, but also perpetuate some popular misconceptions (Stamm et al 2000).

2.3.2 South Africa

A survey of 1,000 South Africans was conducted by Pouris in 2001. South African women show less interest in science than men and top issues of interest are medical discoveries, environmental issues and new technologies. Interest and level of informedness increases as educational level increases. But, levels of self-reported understanding are significantly lower than the levels of interest in the same issues across all topics (particularly so for medical discoveries and new technologies (73% versus 49%, and 63% versus 42% respectively).

On average, South Africans have more confidence in the people running the institutions of their country than the Americans do for their own. Medicine and scientific institutions enjoy similar trust in both countries.

South Africans believe strongly in the benefits of science and technology.

- More than three quarters believe that S&T makes our lives easier and more comfortable, that scientists work for the good of the average person, that work becomes more interesting and S&T will create more opportunities for future generations.

Respondents did express concern, however, about the adverse effects of S&T.

- 58% agree that we depend too much on science and not enough on faith.
- 69% agree that science makes our way of life change too fast.

The most frequently mentioned media was reading a magazine and watching TV shows focusing on science and nature.

Compared with EU, USA and Japan, South Africans appeared to be more optimistic about the benefits of science but at the same time they have more concerns that science affects the traditional way of life.

2.3.3 Australia

Research in Australia has shown that it is no longer sufficient to ask broad questions relating to attitudes towards, or acceptance of, biotechnology *per se*, as these measures vary markedly for different applications of biotechnology and gene technology (Biotechnology Australia 2005). This study involved quantitative and qualitative research and the results are summarised below.

- When compared to other current societal issues (e.g. pollution of the environment), a large proportion of people rated GM foods and cloning as the least concerning issues.
- The majority thought that cloning would make things worse, but that the other technologies could improve the way of life in the future.
- Members of the public hold diverse opinions in relation to the various applications of gene technology; there is no one 'public view'.
- Most felt the use of gene technology in a medical context was acceptable. They acknowledged that almost any technology would be considered acceptable if it were going to benefit one's self or loved ones.
- Some considered medical applications of gene technology to pose fewer risks, partly as they were contained in scientific laboratories and hospitals and would be used infrequently, usually as a last resort.
- Participants largely made judgments of technologies on the basis of how the applications would affect them personally. Mainly because of this, objectives intended to benefit producers, companies or wider society (as opposed to individuals) were generally considered to be unnecessary and of little value.
- Once the details of any specific techniques were discussed, additional concerns arose among participants, for example, religious beliefs.
- There was strong consensus that cloning was the least acceptable application of gene technology.
- Respondents had the least confidence in consuming food from genetically modified animals, followed by meat from animals fed GM stock feed, food containing a genetically modified ingredient and genetically modified fruit and vegetables. There was, however, great variation in participants' reactions to genetically modifying food, ranging from disgust to indifference.

Findings relating specifically to the media:

- The greatest proportion of respondents said that they would use the Internet to search for information about gene technology, with newspapers and magazines being the next common source of information.
- Sources which the fewest people had confidence in included religious organisations and the media.
- The source of information was seen as critical in judging the credibility of the information.
- Participants expressed a desire for information from multiple independent sources in order to ensure they received balanced information and to have access to both sides of the debate.

2.3.4 New Zealand

Commonsense, trust and science

The Ministry of Research Science and Technology commissioned research to look at how patterns of beliefs and attitudes to science affect communication of science. (Hipkins et al 2002). The research provided insights into what the public knows, thinks, and feels about science. The methodology employed built on similar research carried out in the United Kingdom (OST/Wellcome Trust 2000). The UK researchers reported that communication activities may effectively inform the public about a science issue but still fail to allay mistrust of scientists. So, for this research, Hipkins et al (2002) proposed as a tentative hypothesis that such continuing distrust might partly result from a lack of broad understanding of how science ideas are investigated, debated, and resolved within the science community itself. That is, aspects of the 'nature of science' are as important to science communication as are the relevant science concepts.

Summary of key findings:

- A majority of New Zealanders are interested in at least some aspects of science and technology, with interest highest in those areas where personal and societal benefits are most evident. A majority of New Zealanders are personally confident that they can engage with new ideas in science, although they prefer to do so on their own terms and when they choose.

- Six segments of New Zealand society were identified, each with a distinctive profile of attitudes and beliefs about science. The profiles of most of these segments showed similarities to those identified in previous research in the UK. The six New Zealand segments are: [SIMILAR OST/WT (2000) GROUP IN SQUARE BRACKETS, see also page 2]
    - *Confident Science Believers* [confident believers]
    - *Educated Cynics* [technophiles]
    - *Concerned Science Supporters* [supporters]
    - *Confused and Suspicious* [concerned]
    - *Uninformed Individualists* [not sure]
    - *Left Behind* [not for me]
    - [see full reference for more details about these groups]

- Most New Zealanders hold strongly realist views of science. A significant proportion of the population appears to hold the view that 'seeing is believing' and they are not inclined to take scientific claims on trust. In part, this appears to be related to the seeming invisibility of links between scientific theory and investigative methods. Many New Zealanders do appear to have gaps in their understandings of basic science theory in areas that underpin contemporary research and debate.
- On the whole, people recognise that new developments in science and technology are important to New Zealand's economy. However some segments of the population show a high level of concern about the consequences of new developments in science and technology; this appears to be partly related to personal value positions. Some New Zealanders see openness about uncertainty as evidence of honesty on the part of scientists.
- Concerns about the consequences of science are frequently balanced by a desire not to unduly hamper the advancement of knowledge likely to be of benefit. Health and environmental issues are both areas of high interest to many New Zealanders. A small majority sees a role for the government in funding basic research, and there is a significant level of desire for government control over scientists, and accountability of scientists to the public.
- Most people would prefer to have discretionary access to impartial science information, and they are discriminating of the sources they will trust. Professionals are trusted above all media sources. Politicians and lobby groups are the least trusted sources of information about science issues. All except the 'left behind' segment have 65% or greater access to the Internet and access is highest amongst the group with the most active interest in science, although there is some suspicion about the trustworthiness of the Internet.

Science and the general public

In 2005 a survey of 800 New Zealanders was undertaken to inform several aspects of New Zealand's Ministry of Research Science and Technology's (MoRST) policy work, in particular the impact of attitudes about science on the potential supply of future scientists needed for New Zealand's ongoing research programmes. A summary of findings is presented below

- A majority of New Zealanders are interested in at least some aspects of science and technology. Familiarity and accessibility (to personal experience and daily lives) are instrumental factors in stimulating interest, with interest highest in areas relating to new medical techniques, saving endangered species, new forms of energy for transport and improving the quality of our agriculture and horticulture.
- People have a broad appreciation of the role of science in society, and the importance of scientific advance and discovery for New Zealand's and the world's future. Over 80% consider that science is an important subject for students to study at school, and that it is a worthwhile career to pursue.
- People appreciate the contribution science makes to New Zealand, in both economic and environmental terms, and perceptions of the contribution science makes have increased since 2002, particularly in terms of environmental preservation. Two in three people support the government funding basic scientific research regardless of the economic benefit. Agreement has also strengthened on this dimension since 2002.
- Perceptions of science being out of control have diminished significantly since the 2002 survey. There is still a significant level of desire for government control over scientists, and accountability of scientists to the public, although the level of agreement about the need for this has declined significantly since 2002.
- Two in three people agree that New Zealand scientists are doing the science research that New Zealand needs for the future. However, there is some feeling that New Zealand scientists are limited by a lack of resource and a concern that scientific talents are being lost to overseas countries.

Findings relating to the media:

- Most people are discriminating of the sources they trust to access information about a science matter, such as environmental pollution. The majority would expect to access information from a professional scientific source. Television has reasonable credibility, either in documentary or current affairs guise. Media sources such as newspapers, the Internet and radio talk back are not considered trustworthy sources. Politicians are the least trusted source of information about science issues.
- While about half of those surveyed feel they receive about the right amount of information about science these days, over forty percent feel they receive too little.

2.3.5 Japan

Biotechnology

A survey of the Japanese population in 2000 revealed decreasing support for biotechnology and genetic engineering in particular (Macer & Chen 2000). Although a majority of people remain optimistic about biotechnology and its uses, a growing number of people feel that the risks associated with agricultural applications, and even environmental and health applications, are increasingly unacceptable. In both 1997 and 2000, Japanese respondents were more favorably disposed to biotechnology and genetic engineering than their counterparts in Europe or New Zealand. From 1997 to 2000 the awareness of biotechnology has increased, and the number of proponents and opponents has also grown, suggesting that viewpoints are becoming increasingly polarized (as is the case in other parts of the world). Areas of particular concern are the impact of genetic engineering on the variety of fruit and vegetables available and the possibility of compulsory genetic testing and discrimination by insurance companies. Whereas medical applications of biotechnology receive high approval ratings, applications such as 'preimplantation diagnosis' and 'xenotransplantation' are less acceptable than agricultural applications, such as GM crops and food.

The respondents are well informed and even discriminate between biotechnology and genetic engineering, which is viewed less favorably. More people (62% in 1997 and 66% in 2000) perceive biotechnology in a positive light compared with genetic engineering, and also believe that the latter is more risky. From 1997 to 2000, more respondents have become convinced that genetic engineering (12% in 1997 and 24% in 2000) could actually make life worse. The major concerns expressed about genetic engineering are 'fear of the unknown', 'going against nature', and 'environmental destruction'.

Survey of public attitudes

The National Institute of Science and Technology Policy in Japan (2002) surveyed the public about their attitudes and understanding of S&T. Attitudes toward S&T are predominantly positive and the majority of respondents think that the benefits of scientific research outweigh the harmful results. Respondents are concerned, however, about the harmfulness of genetically modified foods. The National Institute of Science and Technology Policy conducted an international comparison among 15 countries which showed that Japan has the lowest level of interest in S&T topics, with the exception of environmental pollution. Respondents also indicated a relatively high level of support for government expenditures on scientific research. The most common sources of S&T information are television and newspapers. An extremely low percentage of people read S&T magazines and few reported visits to public facilities related to S&T.

Promotion of science and technology

Ministry of Education, Culture, Sports, Science and Technology's (1999) annual report on the promotion of science and technology found that:

> *"The public sees science and technology as having raised their standard of living and enhanced their material affluence and individual enjoyment. There are also great expectations on the role that science and technology can play in the future improvement of safety and efficiency in environmental conservation, recycling, and waste treatment, among others. At the same time, however, negative assessments are also on the rise, and an increasing number of people harbor a negative impression of science and technology, e.g., too compartmentalized to understand, fear of abuse or misuse, or progressing at too fast a rate. A strong negative impression of science and technology can cause aversion, which can in turn prevent a technology from being utilised, thus preventing individuals and society from benefiting from that technology."*

They suggested the following to help deepen public understanding:

- Science and technology must actively contribute, in ways clearly apparent to the public, to the solving of environment problems.
- Science and technology must make clearly apparent contributions to health and safety, which are the basis of public peace of mind. At the same time, any negative effects that could arise from this process must be carefully forecasted and prevented or eliminated.
- Most of those who feel they cannot keep up with the progress of technology are most likely to be women and the elderly. Therefore, the introduction into society of a product or service that uses information or telecommunications technology should also be accompanied by innovations that also encourage women and the elderly to use that product or service.

2.3.6 Korea

Research by Bak (2001) attempted to grasp the multifaceted relationships between education and public attitudes toward science by examining the deficit model. Bak (2001) found that respondents' levels of education and levels of scientific knowledge make independent contributions to public attitudes toward science. Also, university (and postgraduate) levels of education have very weak effects on public attitudes toward science. Furthermore, education is a much weaker predictor of public attitudes toward controversial scientific research, compared to its strong influence on science in general. Bak (2001) concluded that although education may indeed enhance public support for science in general, it may not help much to reduce tensions around politicised, controversial scientific research. For scientific controversies, Bak (2001) thought that gender might be a more important variable than education.

2.3.7 Malaysia

A nationwide survey was conducted by the Malaysian Science and Technology Information Centre in 2004 to assess the Malaysian public's awareness of science and technology; a summary of the findings is presented below.

- An analysis of the trends from 1998 to 2004 shows that the interest of the Malaysian public towards S&T has remained relatively constant.
- Malaysians perceive themselves as having between a poor and an average knowledge of S&T.
- The attitude of Malaysians towards S&T has improved significantly over the years. For instance, in 2004, 69.1% of Malaysians agreed that scientific research has more positive than negative effects, compared to 62.0% who said so in 2002 and 43.8% in 2000.
- Television is the most popular source of information for Malaysians.
- Malaysians seem to have a lower level of understanding of S&T when compared with Europe, the USA, and Japan.
- Malaysians have a generally positive attitude towards S&T and strongly believe in the promise and benefits of science and technology (higher than Europeans, but lower than Americans).
- Malaysians have fewer reservations of S&T compared with Europeans, but slightly more than Americans.

2.3.8 Canada

In 2006, Science Alberta Foundation commissioned a survey of Albertans in order to establish a baseline understanding of public interest and attitudes towards science and technology (Ipsos Reid 2006); below is a summary of the findings:

- There is a general interest in S&T and attitudes are predominantly positive.
- Only moderate engagement with S&T issues.
- Level of knowledge varies.
- 8 out of 10 would support more government investment in S &T.
- Television and the Internet are the two most widely used sources of information.
- Universities and non-profit science organisations are considered to be the most trustworthy sources of science information.

3 Young People

The importance of the need for young people to have a basic understanding of science is almost universally recognised amongst policy makers. Yet, while the number of students taking biology post-16 in the UK has increased significantly over the last 20 years, the number taking chemistry has remained the same, and the numbers choosing physics and maths have decreased significantly (DfES 2006).

The general lack of knowledge of scientific developments in the public and the young in particular could reduce the likelihood of successful public debate on scientific issues. It might also have a negative impact on the development of a future expert workforce that meets national needs. For example, engineering is recognised by young people as important and necessary for day-to-day life, but only a limited proportion (mainly boys) feel it is a future career for them (MORI 1998). Furthermore, the representatives of industry say that they need more high-grade scientists, technicians and engineers if the UK is to compete successfully in technology-intensive global markets (Association for Science Education 2006). The lack of students choosing to study science in post compulsory education in the UK also has a clear potential impact on the ability of the Research Councils to fund world-leading scientific research (RCUK 2006).

Americans have expressed concern about whether their educational system is preparing students for the challenges that accompany new technologies. In a survey conducted by Gallup (2000), 93% said students in their state needed a stronger education in science to be prepared for the new inventions, discoveries and technologies that increased investment will likely bring. Americans also think it very likely that most entry-level jobs in the future will require a basic level of science literacy.

Science is often seen as interesting when it stimulates a sense of awe and wonder (Osborne & Collins 2000). Pupils view school science differently from general 'science in society' because they tend to view science in school as more theoretical and link science outside school with technological spin-offs such as television and mobile phones (Bennett 2003). Pupils tend to value science education for career aspirations rather than as a subject of intrinsic value, and there is little recognition of the value of a generic science qualification as there is for mathematics and English (Osborne & Collins 2000). There is also disparity between students' and teachers' notions of science, the former being associated with high-tech advances and social relevance, the latter with more theoretical aspects and the significant discoveries of the twentieth century (Monk & Osborne 2000). Overall, research suggests that the main factor determining attitudes towards school science is the quality of the educational experience provided by the teacher (Osborne *et al* 2003).

Bennett (2003) summarised the key research findings on pupil's attitudes to science:

- School science is a hard subject.
- Science and school science is not relevant to everyday life and not relevant to most people.
- Pupils see science as causing environmental and social problems (based on their perceptions of negative press coverage on such issues).
- School science is more attractive to males than females.
- Interest in science declines while in secondary school.
- Pupils are more negative about the physical sciences than the biological sciences.
- Pupils are more negative towards school science than to science more generally (or more precisely, the technological spin-offs).
- There is some evidence that curriculum materials which contextualise science and emphasise its applications are successful in fostering a more positive response to science in pupils.

Despite a number of efforts over the years there seems to be persistently negative attitudes towards science among high school children (Bennett 2003). A survey of South Africans, however, showed young respondents to have above average interest in issues of science and technology (Pouris in 2001). In a study in Canada, half of all Albertans did not think that young people got enough exposure to science in school to become interested in a career in science. Attitudes towards usefulness and interest in science classes were mixed. However, the majority of students were interested in pursuing a career in S&T, but, such a career was unappealing to a sizable minority (Ipsos Reid 2006).

In the UK, Haste (2004) looked into how 11-21 year olds view science in their future. Respondents agreed that science provided an overall benefit to health and quality of life. They were least enthusiastic, however, about nuclear power, developing robots, space exploration and trying to find evidence of life on other planets. Given the cue of a cosmologist, a medical researcher and an art historian, they saw the medical researcher as more accessible, less isolated and much more likely to be female, than the cosmologist. It was concluded that young people are quite ethically sophisticated and

able to make distinctions between the benefits of science and the need to see these benefits in context. Haste (2004) identified four distinct groups based on responses to attitude statements. These groups are similar to those identified in the OST/Wellcome (2000) report. The groups are as follows:

- *Green* (not inherently anti-science): ethical concerns, concerned about the environment and scepticism about interfering with nature. They are more likely to be younger girls and those who are interested in a job related to science.
- *Techno*-investor: enthusiasm for investing in science, belief in the beneficial effect of science and trust in government and scientists. They are younger boys and young men in the workforce.
- *Science-oriented*: interest in science programmes and a belief that a scientific way of thinking can be widely applied. They are more likely to be young men in full-time education and in the workforce.
- *Alienated from science*: boredom with science and scepticism about its limitations. They are younger girls and young women in the workforce not interested in a job related to science.

As part of the Einstein Year[19] evaluation, Malek & Stylianidou (2006) asked 11 to14 year olds about their attitudes towards science and scientists. They grouped responses to various science statements and concluded that *"pupils express interest in topics that are about the effects of science on themselves but do not appear interested in the knowledge required to understand these effects"*. Malek & Stylianidou's (2006) findings also support others who have found that there is a drop of interest in science as age increases and that, in general, girls are less interested in science than boys. The pupils surveyed had generally positive attitudes towards scientists, but seemed to be deterred from being scientists by their strongly held opinions that scientists worked long hours, with repetitive work and strict guidelines. Young people's overall interest in science was calculated to be slightly below neutral, but the statements relating to space attracted comparatively high interest.

Jenkins & Pell (2006) report on a questionnaire survey of school pupils in England, the findings of which are highlighted below:

- Most students agree that science and technology are important for society and are optimistic about the contribution that these disciplines can make to curing diseases such as HIV/AIDS and cancer. Science and technology are also seen as creating greater opportunities for future generations and as making everyday life healthier, easier and more comfortable.
- The majority of boys and girls agree that the benefits of science are greater than its possible harmful effects.
- Students' positive views about science, technology and society are not reflected in their opinions about their school science education.
- There is a minority of students who are strongly supportive of science, like school science, want as much science as possible at school and envisage themselves working in the future as a scientist or technologist.
- Most students do not agree that school science (GCSE) is a difficult subject.
- When asked what they wished to learn about, there are marked differences in the responses of boys and girls. For girls, the priorities lie with topics related to the self and, more particularly, to health, mind and well-being. The responses of the boys reflect strong interests in destructive technologies and events.
- Both boys and girls disagree strongly that threats to the environment are not their business.
- Students are optimistic that solutions can still be found to environmental problems but girls are less confident than boys in the ability of science and technology to do so.
- When asked to choose a field of research they would pursue as a scientist, most students chose the treatment and cure of disease or aspects of space science.
- Students' views about science and technology are strongly coloured, if not determined, by elements that characterise the industrialised world but which are absent, or much less in evidence, in countries within the developing world.

In general, children tend to find biology the most interesting of the school sciences (Cambell Keegan Ltd 2000). Physics has some appeal where it is linked to how things work, but less appeal where more abstract. The strongest criticism, in this paper, was for chemistry which respondents believed focused on abstract concepts rather than the application of the knowledge.

[19] In 1905 Albert Einstein changed physics and the way we understand our world. One hundred years on Einstein Year celebrated the excitement and diversity of contemporary physics. During 2005 more than half a million people took part in over 500 events and explored what physics means to them.

A review of the literature found that although girls out perform boys at GCSE in science, girl's attitudes to school science, particularly physical science, are significantly more negative than boys (Osborne *et al* 1997). Girls also tend to choose A-levels that they enjoy unlike boys who are more likely to relate their choice to potential career choices. Some suggest that girls, in particular do not continue with physics because they do not feel sufficiently competent to do so (Murphy & Whitelegg 2006). In 2004/2005 male to female ratios for the science subjects at A-level in England were:

- Physics: 3.7 boys to 1 girl
- Chemistry: approximately equal
- Biology: 1 boy to 1.4 girls (DfES 2004/05)

Additionally, proportionately more young people from Asian backgrounds and fewer from Afro-Caribbean backgrounds are likely to continue their studies in science and engineering (Osborne *et al* 1997). Other than school, Munro & Elson (2000) found that the following factors seem to have a significant influence on children's interest in science and science careers:

- parents and family;
- image of science subjects;
- image of jobs in science and engineering;
- gender; and
- the media.

To explore cultural and social objections to biotechnology, a questionnaire-based empirical study of boys and girls of eleven to eighteen years of age from Germany, Finland, Spain and the UK was combined with philosophical analysis. A majority of young people from all countries felt that the use of biotechnology was not something that should be left to individual choice and spontaneously brought in the notion of limits and barriers. Biotechnology applications were distinguished between, depending on their importance and whether there were seen to be any alternatives. Almost all justifications of their responses were human centred or centred on nature (European Commission 2005b).

Nerlich, Clarke & Ulph (2007) investigated risk by looking at how young people view certain advances in nanomedicine. They compared young people's attitudes to nanomedicine and conventional treatment. Students were asked a number of questions about a hypothetical arthritis sufferer. Their answers show that they were more influenced by the difference between one-shot or repeated treatments, than by any nano or drug-delivery. Results also indicated a consistent gender difference, with male participants demonstrating more excitement for a novel treatment than female participants.

The importance of the need for young people to have a basic understanding of science is widely recognised amongst most policy makers. By boosting the number of young people in this survey we can compare and contrast their attitudes with those of adults in this and other surveys more reliably. We can also compare their views with those found in surveys that looked only at young people (e.g. Haste 2004).

4. A note on comparing public attitude surveys

4.1 Large scale surveys of public perception

Jones (2002) reported in 'Wellcome News' and questioned whether the great number of reports looking at public perceptions of science and scientists were providing consistent messages and whether this could inform future policy. Jones (2002) emphasised that: *"science is seen as a positive force and there is no evidence that trust is declining. Perhaps science is simply experiencing what many other forms of authority have experienced in the past 50 years - an increasingly well-educated, empowered, consumerist populace more willing to question figures of authority and with more platforms on which to do the questioning. The public may now act with more scepticism than in previous times and, with governments exquisitely sensitive to nuances of 'public opinion', may be more aware of their ability to wield influence. Moreover, the growth of a less deferential, questioning population has coincided with the emergence of a host of issues where public impact has collided with scientific uncertainty, leading to a good many questions to be asked."*

He argues that capturing the public's opinions on science is now more complex. *"Bundling everyone together as 'the public' combines any number of communities with varying needs, expectations, aspirations, attitudes and opinions; Science and the Public made a first attempt to break down respondents according to views and patterns of behaviour, but undoubtedly other approaches could be taken. And science itself is a far from homogeneous concept - encompassing facts, uncertainties, regulation, methodologies - and raises ethical issues with few simple answers. Perhaps now we need to look more closely at what opinions are captured, from whom, on what, and how that information is used. This may be the challenge for the next 15 years - and, very probably, beyond."*

Bauer et al (2007) have reviewed the key issues of public understanding of science over the last twenty-five years. They traced developments in relation to large-scale surveys of public perceptions via three paradigms: science literacy, public understanding of science, and science and society. They argue that the association between the survey research protocol and the public 'deficit model' needs to be removed to enable the research agenda to expand in four directions: *"contextualising survey research, searching for cultural indicators, integrating datasets and doing longitudinal analysis, and including other data streams"*.

4.2 Animals in research

It is believed that many factors may influence the outcome of surveys on how people view the use of animals in research. Hageline et al (2003) reviewed 56 surveys targeting scientists, students, and the public in Western countries. Factors related to the survey instrument listed include the questionnaire used and wording of questions. For example, two questions that might seem similar can trigger different respondent inclinations and attitudes, producing quite different answers. Hageline et al (2003) also found that acceptance of animal research tends to be stronger when animals are used in medical research compared with psychological research and when they animals used are of low phylogenetic rank. Furthermore, if the question includes the words 'painful' or 'death' it is more likely to receive a negative response.

Factors related to the respondent include age, gender, upbringing, religion, knowledge, education, and practical experience. Older people, men and rural people are more likely than younger people, women and urban dwellers to accept the use of animals in research. Confidence in science seems to affect views, but Hageline et al (2003) found this to be inconsistent across the surveys they reviewed. They also found that there seems to be a positive association between increasing educational level and acceptance of the use of animals in research.

Hageline et al (2003) reported that the NSF surveys show no significant change in opinions between 1985 and 2001, although the proportion of respondents in opposing the use of animals in research does tended to increase. Results demonstrate that there is great discrepancy in acceptance/opposition estimations reported in different surveys. Therefore, Hageline et al (2003) concluded that interpretation and comparison of results from different surveys should be made with caution.

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