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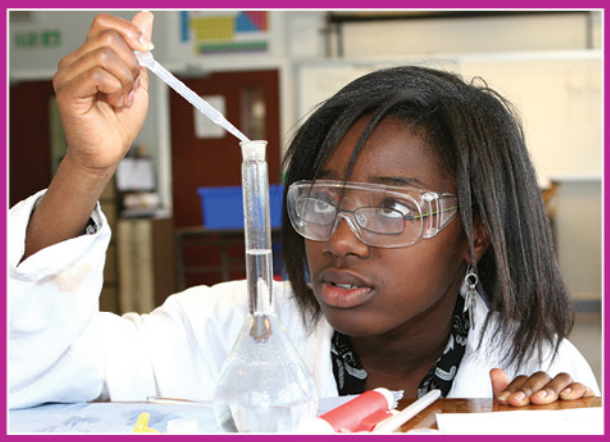


PUBLIC ATTITUDES TO SCIENCE 2011

Literature Review
May 2011

BIS | Department for Business Innovation & Skills

Contents

Introduction

This report presents the findings of a literature review carried out as part of Public Attitudes to Science (PAS) 2011, a study of attitudes among the UK public. PAS 2011 was conducted by Ipsos MORI on behalf of the Department for Business, Innovation and Skills (BIS). This review forms part of a wider body of work for the study, including qualitative workshops and discussion groups, as well as a quantitative survey of the UK public with a booster sample of the public aged 16-24.[1]

Research Objectives

There were various overriding objectives for PAS 2011, which have been provided in full in the Main Report. In addition to these, the specific objectives of the literature review were to:

- Identify previous relevant UK and overseas research to create a corresponding reference list;
- Explore how public attitudes to science in the UK compare with attitudes in other scientifically developed countries;
- Establish whether/why attitudes to science change with age; and
- Inform the design of the qualitative discussion guides and quantitative survey.

Methodology

Ipsos MORI searched for literature which met inclusion criteria (Appendix A) developed by Ipsos MORI and BIS, in consultation with the PAS steering group[2]. Of these, we prioritised the documents that contained the most recent data, as well as those referred for inclusion by BIS or by the steering group, and reviewed 46 documents/sources in detail by completing the pro forma found in Appendix B. The Ipsos MORI research team then held a series of internal analysis meetings to draw out and discuss the key themes emerging from the literature.

We have included references for all the sources cited in this report. For those interested in exploring this topic further, we have also created an index of main sources (Appendix C) to refer to.

Interpretation of the Data

It is important to note that some of the research we present in this review is not directly comparable, due to differences in question wording, the order of questions and the methodologies used to carry out the research, so comparisons between countries using different datasets should be treated with caution. It should also be noted that some data are representative of Great Britain (i.e. excluding Northern Ireland) rather than the UK population (i.e. including Northern Ireland) although the differences between GB and UK findings overall are likely to be very small.

[1] The findings from the quantitative and qualitative research are available in *Public Attitudes to Science 2011: Main Report*, published alongside this review. See http://www.ipsos-mori.com/assets/docs/polls/sri-pas-2011-main-report.pdf.

[2] See the Main Report for a list of members of the PAS steering group, and their respective organisations.

Key Findings

1. Defining the Sciences

1.1. How the UK Public Defines the Sciences

When researching public attitudes to science, it is important to define the boundaries of the term "science", or to at least understand how members of the general public define it, so we know what is being measured. The BIS definition of science is broad, encompassing research *"undertaken in the physical, biological, engineering, medical, natural and social disciplines, including the arts and humanities"*.[3] However, there has been little research on whether the public agrees with this definition.

MORI/Office of Science and Technology (2005) found that people in the UK aged 15+ tended to take a narrow view of what constitutes "science". The most common spontaneous mentions among UK adults were laboratories, Bunsen burners, test tubes and chemicals (19%), and advancements in healthcare (17%). By contrast, "engineering" (which BIS includes in its definition) evoked different associations, mostly about construction and machinery. This supports more recent qualitative research which found that people's understanding of engineers and engineering was primarily related to construction and manual professions, rather than to the sciences (Marshall, McClymont and Joyce, 2007).

1.2. Differences between Countries

The Science for All Expert Group (2010) has noted that the terms "science" and "scientist" are perhaps more narrowly defined in British culture than in other countries. However, that is not to say that other countries have a clear, wider understanding of science – a survey by the Social and Cultural Planning Office of the Netherlands (2001) found that the Dutch general public was vague about the meaning of the word, and only a third could provide a definition. The authors of that research suggested that this may be due to the high proportion of Dutch people that claimed to never read anything concerning science, either in newspapers or books.

The Special Eurobarometer survey carried out for the European Commission in 2005 (2005a) sheds light on the differences between countries in terms of what people think to be "scientific". At the overall level, Europeans thought the most scientific of the areas asked about were medicine (89%), physics (83%) and biology (75%), while among the least scientific were economics (40%) and history (34%). Broadly speaking, those in Eastern European countries were the most likely in Europe to view economics and history as scientific. By contrast, people in the UK were among the least likely to see economics and history as scientific (29% and 21% respectively). In that respect, they were close to those in France, Spain and Italy. Nonetheless, trend data from the survey indicated that perceptions across Europe have changed over time, with more viewing these disciplines as scientific in 2005 than in 2001.

Further qualitative research as part of the Eurobarometer (European Commission, 2008a) suggested that across Eastern Europe, participants often considered a wider array of subjects such as psychology, sociology, anthropology, social sciences, political science and economics to be part of the sciences because they felt these subjects employed the scientific method. That is to say, participants thought they were based on logical study processes, rigorous approaches and testing for proof. A low knowledge of the processes involved in

[3] For the wording of the BIS definition, see http://www.bis.gov.uk/policies/science/science-and-society.

scientific study (see Section 2.3) may therefore explain the relatively narrow view of the sciences in the UK.

2. Levels of Understanding of the Sciences

2.1. Science Knowledge among Adults

Although PAS 2011 is not a study of scientific literacy, levels of scientific literacy feature in many existing international comparisons. Two Eurobarometer surveys (European Commission, 2005a and 2001) have considered knowledge of science among Europeans to be important in shaping public attitudes. The 2005 survey asked Europeans if various statements, such as "the Sun goes around the Earth", were true or false. The average proportion of correct answers across all the statements for Europeans overall was 66%, with the UK scoring close to this at 68%. The populations of the Northern European countries of Sweden, Denmark, Finland, Norway and the Netherlands had the highest average scores, answering an average of three in four statements correctly.

The level of knowledge of science among Europeans tended to be similar to that among those from the US, with similar demographic variations, according to the latest study by the US National Science Board (NSB, 2010). However, the same study found that while the factual knowledge of Americans has remained stable in recent years, the level of knowledge among Europeans has increased.

2.2. Science Knowledge among Young People

There is also much research on scientific literacy among young people. The Wellcome Trust (2009) conducted a knowledge quiz on UK adults aged 18 and over, as well as young people aged 14-18 and found that both groups scored identically. Kumar and Buglass (2009) noted that performance at A Level in science, technology, engineering and maths (STEM) subjects has improved consistently since 2004 in the UK. There are many limitations to this observation however, with criticism from some quarters that A Levels have become easier over time.[4]

The Programme for International Student Assessment (PISA, 2006) compared 15-year olds across OECD countries using a standardised questionnaire. It found that the UK had an above-average level of top performers in science (2.9% of UK 15-year olds reached the highest proficiency level, compared to 1.3% in OECD countries overall) and fewer poor performers than average (16.7% at the lowest level, versus 19.2% overall).

2.3. Understanding of the Scientific Process

However, even with standardised measures, the value of looking at scientific literacy as part of public attitudes to science is limited. Bauer, Allum and Miller (2007) and Sjøberg (2007) have noted that measures of scientific literacy often fail to include knowledge and understanding of the scientific process, over and above scientific facts.

Where it has been looked at, understanding of the scientific process tends to be low. Indeed, the Wellcome Trust (2009) has found that when asked what "studying something scientifically" means, only a quarter of UK adults aged 18 and over, and a similar proportion of 14-18 year olds, spontaneously associated it with "theory construction" or "experiments". More recently, the Science and Trust Expert Group (2010) has commented that many people in the UK are unaware of how scientists conduct their work, with little knowledge of specifics

[4] See for example http://www.guardian.co.uk/commentisfree/2010/aug/21/ben-goldacre-bad-science-exams.

such as peer review and the Research Ethics Committee structure. This is also apparent in work by MORI/Science Media Centre and Nature (2003), which found that 75% of the British public did not know what "peer review in scientific publications" meant, or could not define it correctly. An earlier study by MORI/SMC in 2002 found that 71% of the public in Great Britain expected scientists to give an "agreed view" about scientific issues, highlighting a lack of understanding of the critical appraisal of each others' work that scientists undertake.

However, the UK is not alone here. The European Commission (2008a) found in qualitative research that very few participants across Europe spontaneously referred to the notions inherent in the scientific method, such as rationality and proof, when discussing what science was. Instead, people tended to refer to scientific research findings and the concrete benefits that arise from these.

3. Engagement with the Sciences

3.1. Feeling Informed about the Sciences

Various studies measure public engagement with science by asking how informed people say they are about it. A recent Special Eurobarometer survey (European Commission, 2010) showed that people in the UK tended to feel better informed about new scientific discoveries and technological developments than the rest of Europe (17% very well informed, versus 11% across Europe).

The Eurobarometer survey found that Europeans overall felt less well informed about science issues in 2010 than in 2005, with the exception of environmental problems. By contrast, the PAS 2008 study (People, Science & Policy/TNS) noted that the proportion feeling informed in the UK had increased from 2005 to 2008.[5]

Although knowledge of the sciences among young people is not perceptibly different from that of adults, there is evidence that young people are better informed in certain ways. The Wellcome Trust (2009) found that young people in the UK aged 14-18 tended to have a better (self-assessed) understanding of science terms such as "DNA" and "stem cells".

3.2. Sources of Information on the Sciences

MORI/OST (2005) found that the top sources of information on science in the UK by a clear margin were television, documentaries (67%), television news programmes (63%) and newspapers (53%). However, it is worth noting here that advertising research commonly finds that people tend to overestimate the extent to which they pick up information from television, so the influence of television is perhaps less strong than it appears.

The internet has, perhaps inevitably given its prevalence, become an increasingly important source of information on science. In the MORI/OST (2005) study, three in ten (30%) said they used the Internet to find out about science. In the follow-up PAS 2008 study (PSP/TNS), over a third (35%) said they had searched online for information on a scientific topic. More recently, the Wellcome Trust (2009) observed that the Internet was by far the most common source of information on medical research among the UK public. Nonetheless, the use of other types of new media to find out about science has generally been low, with just nine per cent having read a blog about science and three per cent having downloaded a podcast about science in PAS 2008.

[5] It should be noted that the difference between the Eurobarometer and PAS 2008 results may in part be attributable to differences in methodologies between the two studies.

Turning to international comparisons, the NSB's review of evidence (2010) found that television and the Internet were the primary sources which Americans used for science and technology information. It also noted that the Internet was the main source among Americans for specific issues such as global climate change or biotechnology.

Qualitative research (European Commission, 2008) has indicated that people in the UK tend to value television more than the print media for information on the sciences, whereas in other European countries like Belgium and Greece, participants often criticised the quality of television programmes about science. People in the UK were similar to those in Germany and the Netherlands in doubting the ability of the print media to treat scientific questions properly, and believing that the media only discussed these issues when something had gone wrong. Indeed, PAS 2008 (PSP/TNS) found that seven in ten UK adults (69%) felt the media sensationalises science, while in the earlier MORI/OST (2005) study, 71% felt this.

3.3. Interest in the Sciences

The European Commission (2010b) has found that people in the UK have tended to be more interested in new scientific discoveries and technological developments than Europeans overall (43% in the UK said they were interested, versus 30% across Europe). The Commission also asked Europeans whether it was *not* important to know about science in their daily lives. Here three-fifths (61%) in the UK disagreed, compared to just half (48%) of all Europeans. Moreover, on this measure, the importance Europeans attach to science had increased since 2005, and the countries where perceived importance had increased the most were Norway, Sweden and the UK.

However, when looking at the extent to which people pursue an interest in science, there appears to be less of a difference between people in the UK and the average European. A 2005 Special Eurobarometer (European Commission, 2005a) found that one-fifth (22%) of people in the UK regularly read articles on science in newspapers, magazines, or on the Internet, which was similar to Europeans overall (19%). The proportion of UK adults that regularly talked with friends about science and technology in the UK was also in line with the European average (11% versus 10%).

Comparing America to Europe, the NSB (2010) observed that the overall levels of public interest in "new scientific discoveries" and the "use of new inventions and technologies" tended to be higher in the US than in Europe. However, two areas within science in which Europeans and Americans were similarly interested were the environment and environmental pollution.

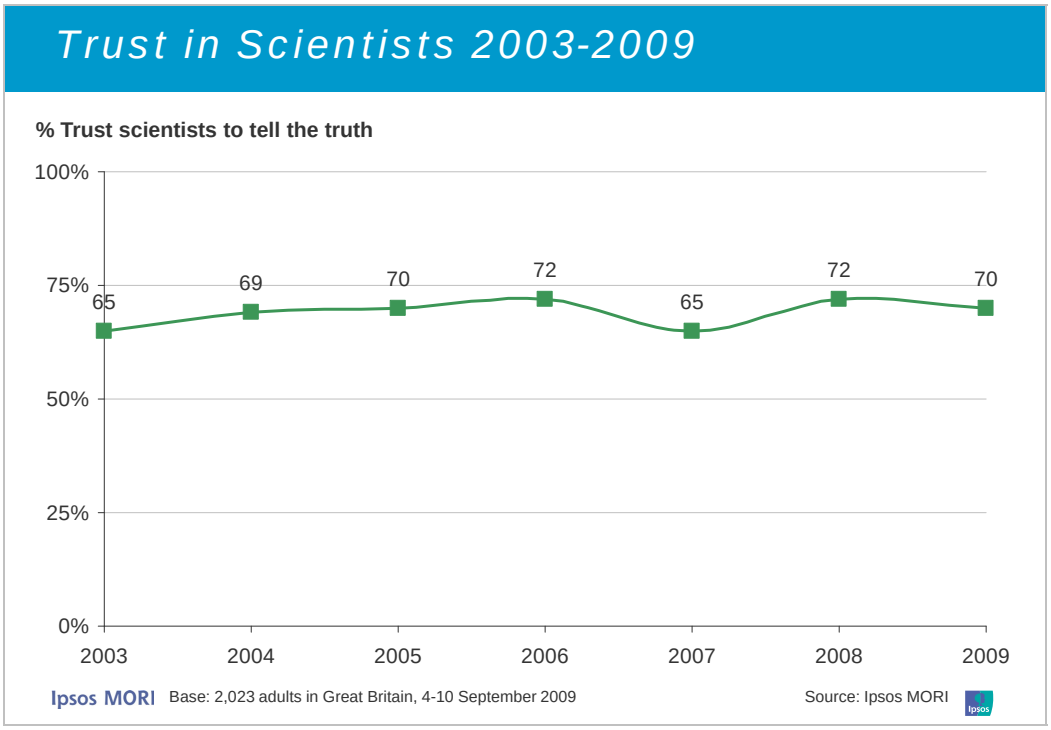
4. Trust in the Sciences

Previous research has suggested that the public is sceptical that scientific research is inherently objective or that scientists can always be trusted (Whitmarsh and Kean, 2005). This makes understanding levels of trust an important aspect of PAS research.

4.1. Trust in Scientists

The Ipsos MORI/Royal College of Physicians (RCP) 2009 Trust in Professions tracker, which has been running for the last 26 years, found that seven in ten Britons (70%) trusted "scientists" to tell the truth. This figure is one of the highest of the professions measured and in 2009 was up five percentage points on 2007. The proportion trusting scientists fell marginally between 2008 (72%) and 2009, but this fall was not statistically significant. In fact, measurements of trust in scientists have been above six in ten since they were added to the tracker, in 1997. This suggests that overall trust in scientists has been stable, despite

negative media coverage of perceived scientific controversies, for example the MMR controversy.



However, figures about trust in "scientists" do not tell the full story. There is much research to show that trust in scientists depends on the institutions that they work for. Indeed, Whitmarsh and Kean (2005) noted that various studies have shown trust in scientists working for universities, and charities, to be higher than for Government and industry scientists. Previous research also suggests that trust in scientists working for different institutions mirrors public trust in those same institutions. For example Poortinga and Pidgeon (2003a), who examined the results of a MORI survey, found that low trust in Government scientists matched overall distrust of government among British adults.

It should be noted that the 2009 Ipsos MORI/RCP survey was conducted prior to the "climategate" controversy[6] so does not show any impact this may have had.[7] Although there has been no research measuring the impact of "climategate" directly that we are aware of, the most recent Special Eurobarometer on science (European Commission, 2010) observed that there was widespread suspicion of scientists when it came to talking about controversial scientific and technological issues. Six in ten (58%) thought scientists could not be trusted to tell the truth about these issues *"because they depend more and more on money from industry"*. People from the UK were among the least likely to take this view (49% agree), alongside those in Ireland, Malta, the Czech Republic, Turkey and Poland, possibly indicating greater public trust in scientists in these countries.

[6] The "climategate" controversy was based on allegations that climate scientists at the University of East Anglia (UEA) had manipulated scientific information to strengthen the case for climate change. Various inquiries in 2010 cleared the UEA scientists of withholding information or manipulating data.
[7] Fieldwork for the Ipsos MORI/RCP Trust in Professions Survey took place from 4-10 September 2009.

4.2. The Significance of Levels of Trust

Although trust in the sciences in the UK appears high based on survey data, this is not the whole story. The Science and Trust Expert Group (2010) has commented that low trust in scientific research is not necessarily undesirable, since it may reflect healthy scepticism on the part of the public. Based on a survey of British attitudes to governance of the sciences, Poortinga and Pidgeon (2003b) have proposed that trust has two dimensions: general trust, which incorporates perceptions of competence, fairness and openness of scientists; and scepticism, which incorporates how sceptical people are about how policies are enacted.

The Science and Trust Expert Group (2010) also highlighted that trust, or lack of it, can be interpreted in various ways, all of which should be explored. These include:

- scientists' testimony not being trusted;
- scientists not being trusted to perform research that is beneficial;
- scientists not being trusted to make good social policies (ethical concerns); and
- not trusting the uses that others make of science and technology (e.g. Government and industry).

4.3. Attitudes towards Regulation

Two recent public dialogues on synthetic biology have shown that the UK public wants regulation to oversee scientific research and has concerns about research taking place in unregulated environments (Bhattachary, Calitz and Hunter, 2010; King and Webster, 2009). Within this, concerns were less to do with the robustness of research and more to do with its social and ethical implications. Bhattachary et al. (2010) noted that, after being informed of how the sciences are funded and regulated, many participants wanted Research Councils to incorporate normative or social values into a broader definition of "good science", moving beyond the perceived current focus on technical excellence.

PAS 2008 (PSP/TNS) found that knowledge of how the sciences are regulated in the UK was low. However, most people thought that there was some form of regulation by the Government and over half were confident that the science and engineering sectors were properly regulated. The report also remarked that the UK public was conservative in its attitude towards regulation of the sciences, with most wanting the use of new technologies to be delayed until the science behind them was fully understood.

Efforts to improve public trust in regulation will be challenging. In their analysis of perceptions of genetically modified (GM) food in Britain, Poortinga and Pidgeon (2005) reasoned that people did not assess the strength of regulation of GM food and *then* decide whether GM food was acceptable or not. Instead, the authors suggested that people started out with preconceived notions of whether GM food was acceptable, which then determined how risky they thought it was and how much they trusted in regulation. This suggests that public confidence in the regulation of controversial areas such as GM foods is largely predetermined by how much they support these developments in the first place.

5. The Place of the Sciences in Society

5.1. Beliefs and Values Regarding the Sciences

In a survey of social values regarding the sciences, the European Commission (2005b) evidenced that a majority of Europeans thought that the development of new technologies

will have a positive effect on society in the next 20 years. The Commission's more recent Special Eurobarometer (2010b) on the sciences found that those in the UK were particularly optimistic – three-quarters (76%) agreed that science and technology will make lives healthier, easier and more comfortable, compared to two-thirds (66%) of Europeans overall. People in the UK also tended to be less concerned about the speed of scientific developments, compared to the average European.

However, the same survey showed that those in the UK still thought there was a limit to what the sciences can achieve, as did most Europeans. Over half (54%) in the UK disagreed that science and technology would prevent the exhausting of the Earth's natural resources, versus a similar proportion across Europe (56%).

Much of the literature on public attitudes to science also examines people's attitudes to faith and superstition. Again, the most recent work on this has been done by the European Commission (2010b). This found that people in the UK tended to be somewhat less superstitious than their European counterparts, with 35% agreeing that *"some numbers are lucky, especially for some people"*, versus 40% in Europe overall. However, when contrasting science with faith, people in the UK were divided with 36% agreeing *"we depend too much on science and not enough on faith"* and 39% disagreeing – this was similar to Europeans overall.

There are various datasets comparing European attitudes to those in the US. The World Values Survey (2000) has asked people in various countries whether scientific advances will help or harm mankind in the long run. Although these data are over ten years old[8], they highlight the difference in optimism between the US and other developed economies. Over half (56%) of Americans thought scientific advances will help in the long run, versus 48% in Germany, 40% in Great Britain, 31% in Italy and 24% in Japan. People in these latter countries were more likely to reserve judgement, saying some advances will help, while some will harm.

Gaskell, Ten Eyck, Jackson and Veltri (2005), discussing various pieces of evidence on values across cultures, concluded that people in the US were generally more optimistic about new technologies than Europeans. They noted that in Europe, people tended to be more concerned about the effect of new technologies on the environment, placed less emphasis on economic progress and were less confident about regulation.

5.2. The Sciences in Culture

The limited literature that does deal with the perceived cultural impact of the sciences suggests that the UK public tends not to associate the sciences with "culture". Farmelo (2009) has argued that it is unlikely that most people in Britain would include any aspect of the sciences within their definition of culture. This, Farmelo has said, is in contrast to other European countries such as France.

Evidence from the recent Special Eurobarometer (European Commission, 2010) has also suggested that the UK public sees less of a link between the sciences and "culture", relative to the rest of Europe. Compared to an average of seven in ten (70%) across Europe, just over half (55%) in the UK thought that *"by being interested in the sciences, young people also improve their culture"* – the second lowest figure ahead of the Netherlands. The Eastern European countries of Bulgaria, Estonia and Latvia were most likely to make this link.

The literature also suggests that people in the UK have tended not to consider the cultural impact of science because major cultural institutions and initiatives in the UK have generally

[8] The most recent World Values Survey in 2008 also asked about attitudes to the sciences, although these questions were not asked in Great Britain.

not included a role for the sciences. Both Farmelo (2009) and the Science for All Expert Group (2010) have commented on the absence of science content on the radio and on television (outside the BBC) in the UK, and noted that the UK Department for Culture, Media and Sport (DCMS) has not incorporated any science-related events into major cultural projects such as the UK City of Culture and the Cultural Olympiad.

MORI/OST (2005) looked at brand awareness for the biggest science festivals and activities in the UK and found that over half said they had heard of National Science Week[9]. However, the authors of that study indicated that this was probably due to the familiarity of the words "national", "science" and "week", rather than any real awareness of the event. For the other science festivals examined, far fewer had heard of these, with the highest rated being the Royal Society Summer Exhibition (12%).

Another potential proxy of the role of the sciences within culture might be how often people visit scientific institutions and museums. On this basis, science appears to play a bigger role in the US. Evidence collected by the NSB (2010) suggested that visits to informal science institutions (e.g. museums and zoos) tended to be higher in the US than in Europe.

Nonetheless, as PAS 2008 (PSP/TNS) found, most people in the UK tended to have some exposure to science in the form of entertainment and culture. Seven in ten (68%) had watched a science documentary on television, such as Horizon. However, PISA 2006 observed that just 13% of 15-year olds in the UK regularly watched programmes about science, which was lower than the OECD average (21%).

At the same time, there are indications that people consider Britain to be a country with a good reputation for scientific achievements, so see the sciences as having a place in British culture. Research by Ipsos MORI (2010) showed that more than two in five British adults believed that *"Britain is a world leader in science and technology"*. Although not directly comparable[10], just under one in five Americans thought *"US scientific achievements rate as the best in the world"* (NSB, 2010).

5.3. Studying and Working in the Sciences

Various commentators have suggested that the UK will need to improve the number of people studying STEM subjects and going into careers in the sciences, in order to compete in technology-intensive global markets.[11] However, existing research suggests achieving improvements will be challenging – a study by Bennett (2008) in 30 secondary schools across England found that just under a third of 13-14 year olds rated science lessons as being among their favourite.

Bennett and Hogarth (2008) suggested that positive attitudes towards science have been shown to decline most sharply between the ages of 12 and 14 – the so-called "Year 9 dip". At these ages, Potter and Parvin (2008) have noted that children in the UK see science as becoming too theoretical and irrelevant to everyday experiences, moving away from the practical work that they most enjoyed. While three-quarters of 9-14 year olds still saw science as useful, they were not inspired by it.

Archer et al. (2010) has furthermore highlighted that children can report enjoying science, finding it important and interesting, but still reject the idea of working as a scientist. The

[9] Now National Science and Engineering Week
[10] Findings for Britain are from a face-to-face survey, while findings for the US are from a telephone survey, so comparisons should be treated with some caution.
[11] For example, see the Economic and Social Research Council (ESRC)'s 2007 report, *Science education in schools: Issues, evidence and proposals*.

authors suggested this was because "doing" science carries a very different meaning to "being" a scientist, with the latter raising stereotypes of the eccentric scientist.

Perhaps as a consequence, many young people lack enthusiasm about working in the sciences. Research by Ipsos MORI (2010) for BIS showed that seven in ten UK adults (68%) thought science offers an exciting career, but over several waves of this study, 18-34 year olds were most likely to disagree. Potter and Parvin's (2008) work with 9-14 year olds revealed that many thought a job in science would be based in a laboratory, cut off from the world and not utilising communication skills, which put them off the idea. Research by FreshMinds/EngineeringUK (2010) suggested this view also holds for perceptions of engineering among under-19s, who generally did not consider it to involve creativity, and communication and social skills.

However, the evidence does not suggest that young people's attitudes in the UK are any more negative than those in other countries. PISA 2006 found that a third of UK 15-year olds wanted to work in a career involving the sciences, which was comparable to the OECD average. Moreover, the same study found that a higher proportion in the UK (compared to OECD countries overall) thought they would improve their career prospects by studying science, again emphasising perceived usefulness as a motivator, rather than an inherent interest in the subject matter.

6. Attitudes towards Specific Scientific Issues

6.1. Animal Experimentation

Two surveys by Ipsos MORI (2011), on behalf of BIS and the National Centre for the Replacement, Refinement and Reduction of Animals in Research (NC3Rs) respectively (and published jointly) have tracked attitudes to animal experimentation among British adults. The BIS survey found that "unconditional" acceptance of animal experimentation – defined as respondents saying either that animal experimentation did not bother them, or that they agreed with it for all types of research where there is no alternative – has increased by 28 percentage points, from 32% in 1999 to 60% in 2010. Nine in ten (90%) said they accepted animal experimentation "conditionally", i.e. when it was used for specific purposes.

The BIS survey also found that people were generally confident in regulation with the majority believing that the rules governing animal experimentation in Britain were tough (65%) and well enforced (56%). Trust in regulation has also risen over time, with the proportion saying they *"have a lack of trust in the regulatory system about animal experimentation"* falling by 35 percentage points, from 64% in 1999 to 29% in 2010.

Despite this, concerns about animal experimentation remain, with around two-thirds (68%) saying they *"wouldn't be surprised if some animal experiments go ahead behind closed doors without an official licence"* and six in ten (61%) agreeing that *"unnecessary duplication of animal experiments may go on"*.

The NC3Rs survey found that awareness of developments in animal experimentation was low. Just one in five (18%) felt at least fairly well informed about efforts to find alternatives to the use of animals in scientific experiments. A quarter (24%) felt at least fairly well informed about the efforts to improve welfare of animals that are currently used in experiments – the proportion who did not feel at all informed about this rose from 27% in 2009 to 34% in 2011. Awareness of Government initiatives was also low, with just nine per cent saying they knew at least a fair amount about Government initiatives directed at finding non-animal alternatives or improving animal welfare.

6.2. Animal Cloning

Since its emergence in the public consciousness through Dolly the sheep[12] in 1997, the issue of animal cloning has been contentious among the UK public. In its report in 2000, OST/Wellcome Trust noted that there was very little public understanding of the rationale behind animal cloning.

The most recent insight into attitudes towards animal cloning comes from the Eurobarometer survey (European Commission, 2010a). This found that awareness of animal cloning in food production has increased considerably in the last decade. Perhaps unsurprisingly, considering that Dolly came from the UK, awareness of animal cloning in food production was higher in the UK than in the EU overall (81% versus 75%).

However, the UK public was not convinced that its use in food production is beneficial for the country or for them personally – just three in ten (29%) thought it was good for the UK economy, while half (50%) thought it was not good for them and their family. By contrast, animal cloning for food production in developing countries was seen more favourably, with four in ten (40%) agreeing it helps people in developing countries. Underpinning the more negative views were worries about safety and an aversion to animal cloning in principle – half (51%) did not think animal cloning in food production is safe for future generations, while three quarters (74%) saw it as "fundamentally unnatural".

It is worth noting however that on many of the measures, people in the UK tended to be less sceptical than those in the rest of Europe. Compared to the EU overall, those in the UK were less likely to think animal cloning in food production was not good for them on a personal level, more likely to see the economic benefits and more likely to see it having a positive role in developing countries.

6.3. Engineering

The most recent Engineers and Engineering Brand Monitor (FreshMinds/Engineering UK, 2010) showed a highly positive attitude towards the engineering profession. The majority of adults aged 20+ in the UK thought that engineering makes a good contribution to society (79%; 86% in 2009) and would have a positive impact on our future (78%; 91% in 2009). Eight in ten (78%) viewed engineering as a well respected profession.

FreshMinds/EngineeringUK (2010) also found that six in ten (61%) thought engineering offered a desirable career. Reasons given for this included that engineering was a good profession, it was challenging, interesting, well-paid and essential to the economy.

Nonetheless, the same research noted that fewer than two in ten (16%) had personally considered a career in engineering. Women were less likely than men to consider such a career. Indeed, there is a current under-representation of women in the profession – analysis of new registered engineers and technicians showed that only 11.6% of registrants, in 2008, were female (Kumar and Buglass, 2009).

There is evidence that people hold various misperceptions about engineering. FreshMinds/ Engineering UK (2010) found that there was confusion as to what engineering entails, with only a fifth (21%) feeling they know what engineers do, and a minority feeling that they knew much about different types of engineering. Similarly, qualitative research discussed in Marshall, McClymont and Joyce (2007) found that while many participants were aware of engineers' involvement in construction, telecoms and the armed forces, fewer thought they would have any involvement in more diverse areas such as medicine.

[12] See http://www.sciencemuseum.org.uk/antenna/dolly/index.asp.

Secondly, the Brand Monitor (FreshMinds/Engineering UK, 2010) also found that people were confused about the educational pathways into engineering. Around a third (36%) thought students needed a first degree, while two in ten (22%) thought they needed A Levels/Highers and a similar proportion (20%) thought postgraduate qualifications were necessary.

6.4. The Environment

The Economist/Ipsos MORI Issues Index (2011) shows the environment is not a top-of-mind issue for people. Just four per cent[13] said, unprompted, that it was one of the most important issues facing Britain, down from a peak of one in five (19%) in January 2007, prior to the economic downturn. This pattern echoes sentiments expressed two decades ago, which showed spontaneous concern for the environment plummeting in the recession of the early 1990s, from its highest ever level in the middle of 1989 (35%) when it came joint-first with the NHS.

The rest of Section 6.4 separates out attitudes towards climate change and attitudes to energy production.

Attitudes to Climate Change

There is widespread recognition in Britain that the world's climate is changing. In 2010, almost eight in ten adults (78%) in Britain thought this, although this is down from 91% in 2005 (Ipsos MORI/Cardiff University, 2010). This recognition is broadly consistent with results from US surveys (Leiserowitz, 2010).

However, there is widespread scepticism about man-made climate change. In 2010, just one in five (18%) in Britain believed that climate change was being caused mainly or entirely by natural processes, while almost half (47%) thought it was being caused partly by natural processes and partly by human activity (Ipsos MORI/Cardiff University, 2010). Again, this split in public opinion was comparable with the US, where just half said the earth was getting warmer because of human activity (Pew Research Centre, 2009).

In the same Ipsos MORI/Cardiff University survey, as many as 40% believed that the seriousness of climate change was exaggerated, while 50% agreed that politicians make a fuss about climate change in order to distract us from other issues. The proportion of people who agreed that there are risks to people in Britain from climate change fell from 77% in 2005 to 66% in 2010. This decline may be linked to the recent "climategate" controversy.

Attitudes to Energy Production

Europeans have generally been less favourable to nuclear energy than people in the US, though support among both these populations has risen over time. The proportion of Europeans who said they were in favour of nuclear energy production increased from 37% in 2005 to 44% in 2008 – this was higher in the UK, at 50% (European Commission, 2008b). The proportion of Americans favouring the use of nuclear power increased from 53% in 2007 to 59% in 2009 (NSB, 2010).

In Britain, while 61% agreed in 2010 that there are risks to people in Britain from nuclear power, a similar proportion (57%) agreed with the statement *"I don't really like the idea of nuclear power, but I reluctantly accept that we will need it to help combat climate change and improve energy security in the UK"*, suggesting that many people viewed it as a necessary evil (Ipsos MORI/Cardiff University). Evidence from the European Commission (2010a) also suggested that people in the UK would support nuclear energy for the benefits it offers in the

[13] Data taken from the April 2011 Issues Index

long term, with around half (52%) agreeing that it would have a positive effect on our way of life in the next 20 years.

However, the Ipsos MORI/Cardiff University survey found that the public still favoured using renewable sources of energy over and above nuclear power. Solar power was viewed most positively (88% mainly or very favourable), followed by wind (82%) and hydroelectric power (76%). Gas (56%), coal (36%), nuclear power (34%) and oil (33%) were less favoured. These results were similar to the 2005 MORI survey reported in Poortinga, Pidgeon and Lorenzoni (2006).

The European Commission (2010a) has also found broad support for biofuels – man-made fuels derived from biomass – across the EU, with 72% of Europeans feeling that biofuels *"should be encouraged"*. In the UK, a similar 74% thought biofuels should be encouraged. There was even wider support for sustainable biofuels, which 83% of EU citizens and 84% of people in the UK thought should be encouraged.

6.5. Genetically Modified Food

Although the widely publicised GM Nation debate held in the UK in 2003 found a large public opposition to GM food, research shortly after this by MORI/University of East Anglia (2004) suggested that the strength of the public's anti-GM sentiment may have been overestimated, with a greater proportion feeling neutral (39%) rather than opposed (36%) to GM food, and a small proportion (15%) in favour. The series of MORI/UEA surveys begun in 1996 showed an increasing ambivalence to GM food from 1996 to 2003, with more saying they neither supported nor opposed it.

The Special Eurobarometer on biotechnology (European Commission, 2010a) provides the most recent data on attitudes to GM food. This research has highlighted the more favourable attitude to GM in the UK when compared to Europeans overall. In particular, on balance those in the UK thought GM food is good for the economy, albeit by a small margin (42% agreed, while 36% disagreed). The UK was one of only three European countries, including Denmark and Spain, where more agreed than disagreed with this. UK citizens were also more accepting of the principle of GM food than most Europeans – while three-fifths (61%) of all Europeans felt "uneasy" about GM food, just half (49%) of people in the UK did.

People in the UK were however more cautious when considering whether GM food was good for them personally, with two-fifths (40%) thinking it was not good for them and their family (versus 54% in Europe overall). Nonetheless, a similar proportion (39%) in the UK *disagreed* it was not good.

Yet despite the generally moderate to positive support on balance on these indicators, it is important to note that more people in the UK still disagreed that GM food should be encouraged than agreed (45% versus 35%). This suggests it remains a contentious issue among the UK public.

The US perspective on GM food has been covered in a literature review by the NSB (2010). As with many aspects of the sciences covered in this report, the evidence discussed by the NSB suggested that views in the US tended to be less opposed than those in Europe, although US consumers still tended to react negatively to the phrase "genetically modified food". The NSB also noted that the introduction of GM crops into the US has been far less controversial than in Europe.

6.6. Nanotechnology

Awareness of nanotechnology in the UK has been low, with around half (48%) of UK adults saying they had heard of it, according to a Special Eurobarometer survey (European

Commission, 2010a). This was comparable to the EU overall (46%). Furthermore, the NSB (2010) noted that awareness has tended to be equally low in the US. The NSB report did however highlight that, even among those who had heard of "nanotechnology" before, a substantial minority did not know what it refers to.

On this particular topic, the attitudes of people in the UK have tended to be close to the average EU citizen, as the Eurobarometer (2010a) survey has shown. The overall picture was one of uncertainty over whether nanotechnology is a good or bad thing. Over two-fifths (44%) in the UK thought nanotechnology was good for the national economy, while 45% in EU countries overall thought this. Just a quarter (25%) in the UK thought nanotechnology was good for them or their family, versus 27% in Europe overall. A third (35%) in the UK thought it was good for developing countries (33% in Europe). A similar proportion (32%) agreed it was safe for future generations (31% in Europe), but half simply did not know (49%).

Around two-fifths (38%) in the UK saw nanotechnology as being "fundamentally unnatural" (42% in Europe). However, it should be noted that this was lower than the proportions that considered the various other scientific developments asked about in the Eurobarometer survey to be unnatural, including: animal cloning (74%), horizontal gene transfer (70%), GM food (57%) and vertical gene transfer (48%).

Similarly, PAS 2008 (PSP/TNS) data suggests that nanotechnology is among the least contentious of the scientific issues explored in this report. In that survey, seven in ten (69%) said they were not worried about nanotechnology. The level of worry was among the lowest for the various issues explored. Furthermore, two-thirds (65%) thought that nanotechnology was very or fairly beneficial, while just under two in ten (14%) felt it was not beneficial.

6.7. Stem Cell Research

Public dialogue workshops have been carried out by BMRB Social Research (2008) to gauge public opinions on stem cell research. This research, among members of the general public and relevant stakeholders, found widespread conditional support for stem cell research and therapies. The conditions related to the sources of the stem cells, the purpose of the research and the clinical risks in treatment.

There were ethical and social concerns related to both tissue-specific stem cells and the generally more controversial embryonic stem cells. Stem cells derived from foetal material caused most concern among participants, in part due to moral issues, but also practical ones such as how informed consent to use such material is gained, and the ultimate purposes of the research.

However, despite their ethical concerns about stem cell research, many considered it more immoral not to develop treatments for patients with serious diseases when stem cell research offered the potential to do this. There was also general agreement (but with a minority strongly disagreeing) that creating embryos for research purposes using IVF was acceptable.

6.8. Synthetic Biology

Awareness of synthetic biology in the UK is low, including awareness of the term and its meaning. According to a survey reported in King and Webster (2009), two-thirds of adults in the UK had not heard of synthetic biology. They found this was comparable with awareness in the US. The Special Eurobarometer on biotechnology (European Commission, 2010a) also found that awareness was low in the UK (21% had heard of it), if somewhat higher than the European average (17%).

In the King and Webster (2009) survey, there was, on balance, support for creation of life but less support for modification of life. Over six out of ten (63%) agreed with the statement *"creating new man-made microorganisms that will produce medicines or biofuels should be supported"*, with a third (33%) agreeing strongly. On the other hand, more disagreed than agreed that *"re-designing an existing micro-organism so that it produces medicines and biofuels should not be allowed"* (46% versus 24%).

The qualitative aspect of King and Webster's (2009) research found that the complexity of life mattered to people. In their public dialogue workshops, there was greater acceptance of the modification of simpler life forms, such as bacteria and yeast, partly because these organisms were not seen to be "alive". However, dialogue participants were not at all supportive of creating or modifying humans and other more complex life forms by synthetic biology. Similarly, their survey showed that about four in ten (39%) agreed that *"the idea of creating man-made micro-organisms is worrying"*.

The public dialogues by King and Webster (2009) and, more recently, Bhattachary et al. (2010) found that people's acceptance of synthetic biology research depended on the end goals. Bhattachary et al. (2010) found that workshop participants were more favourable towards synthetic biology when it was shown to address global problems such as global warming, serious diseases, energy problems and food security. King and Webster (2009) similarly noted that participants prioritised the application of synthetic biology to biofuels over medical uses, as the former was deemed to impact on more people.

Both King and Webster (2009) and Bhattachary et al. (2010) also explored attitudes to the regulation of synthetic biology in public dialogue workshops. In both sets of research, workshop participants raised concerns about whether the Government could control synthetic biology and especially whether it could keep up with the speed of development (see also Section 4.3).

7. Attitudes by Demographic Group

Previous research has indicated consistent demographic differences in attitudes to the sciences among the UK public, in terms of gender, level of education and social grade, and age. However, there remain important gaps in the literature, particularly in relation to minority and ethnic groups, although this was explored in PAS 2008. Below, we discuss findings from previous literature specific to these subgroups.

7.1. Gender

Many recent studies on public attitudes to science have found that women tend to feel less informed and enthusiastic about science than men. The UK is in line with other countries in Europe in having this gender split. The 2010 Special Eurobarometer (European Commission) found that across Europe men were more likely than women to be interested in scientific discoveries and technological developments (36% versus 24%) and to think of themselves as well informed about these (66% versus 56%).

At secondary school level, girls appear to be less interested in the sciences than boys. In a survey of 13-14 year-olds, significantly more boys than girls had science among their favourite lessons (Bennett, 2008). Bennett and Hogarth (2008) found that female students' attitudes to both school science and the sciences outside of school were more negative than those of male students at age 12, and became increasingly so throughout secondary school.

This disconnect from the sciences comes despite girls performing better in some areas. PISA (2006) found that, among UK 15 year-olds, girls were better able than boys to recognise issues that can be explored scientifically. Boys performed better at applying

knowledge of the sciences in a given situation to describe or interpret phenomena scientifically. In UK state exams, girls have tended to perform better than boys in science, but proportionally have not pursued the physical sciences and engineering post-16.

However, Haste (2004), reporting on survey research among 11-21 year olds in Great Britain, found that girls were not altogether less interested in the sciences than boys, but took interest different aspects. In particular, girls were less keen to separate scientific and technological knowledge from its social and ethical context, whereas boys saw the sciences as distinct from ethics. In a review of evidence, Whitmarsh and Kean (2005) made a similar observation and noted that by placing too much emphasis on preparing future science professionals and too little on the wider social and environmental context of scientific research and developments, the UK curriculum may not cater as well to girls as boys.

The process that begins at secondary school may be one of the reasons that women are more likely to have negative attitudes towards careers in science-related subjects. Women remain under-represented in the engineering sector (Kumar and Buglass, 2009). In a 2010 survey, women were less likely than men to think a career in engineering was desirable and less likely to rate engineering as exciting (FreshMinds/EngineeringUK, 2010). PAS 2008 (PSP/TNS) found, similarly, that women were less likely than men to think that a career in science or engineering was a good choice.

Differing perceptions on what a career in science involves may explain the different attitudes between men and women. FreshMinds/EngineeringUK (2010) found that women were more likely to see a career in engineering as dull, technical and complicated, whereas men tended to see it as challenging, dynamic and creative. People have also tended to hold preconceived images of those working in the sciences – qualitative research by PSP (2008) found that women thought of physics as a boy's subject and physicists were typically seen as male.

7.2. Social Grade and Education

Research by Ipsos MORI (2010) found that those from less affluent backgrounds tended to be less engaged in the sciences. Those in the social grades C2DE were less likely than those ABC1s to have heard or read about *"how science affects all our lives"* (27% versus 57%) or about *"how science will affect the jobs we do in the future"* (14% versus 28%). Although around half of the overall population (48%) were interested in learning more about scientific development, DEs were less interested, with just one third (32%) agreeing.

In a cluster analysis based on survey results, PAS 2008 (PSP/TNS) found low social grades and education levels to be recurring features of the less engaged clusters. Those who were "Confident" (i.e. had high level of interest in science and confidence in the research process) were the most highly educated of all the groups, with the largest proportion of those from social grades AB. The "Less Confident" had the lowest education level of any group, and over half were from social grades DE. Similarly, those in the "Indifferent" group (i.e. with limited understanding of the sciences and lack of concern about how they are regulated) came disproportionately from grades DE and had the smallest proportion of people with a higher education.

This difference has tended to exist throughout Europe. The European Commission (2010b) found that Europeans who had completed higher education or were still studying were more likely to be interested in scientific discoveries and technologies. Those who were still studying (beyond undergraduate level) were also less concerned about the pace of scientific advances. Finally, those with a higher education were more likely to think that EU-wide research funding was insufficient.

The less affluent have also tended to be less well informed about the sciences. Those from lower social grades and those who had lower levels of education had most difficulty describing what physicists do (PSP, 2008). Ipsos MORI (2011) included some more general questions on attitudes to the sciences in research on animal experimentation and found that those in social grades AB were more likely than average to feel informed about scientific research (48%, versus 32% overall).

7.3. Age

The picture emerging from existing literature is that older people in the UK and other countries tend to have lower levels of scientific knowledge than the young (see Sections 2.1 and 2.2), but younger people attach less importance to the sciences and are less likely to think of working in the sciences as a positive career choice than older generations. For instance, research by PSP (2008) found that young adults (aged 18-24) were less likely than those aged 25 and over to agree that it is important that young people have a grasp of physics (70% versus 81%).

PAS 2008 (PSP/TNS) found that young people (aged 16-24) were less concerned than those aged 25 and over about the complexity of science and speed of development. However, despite being more at ease with modern science, they were less likely to think that a career in science or engineering was a good choice. In its cluster analysis, the study found that those over 60 made up half of the "Less Confident" cluster, i.e. the cluster of people who were more concerned about the speed of scientific development and less well informed about science. On the other hand, young people made up a considerable part of the "Distrustful" cluster, characterised as lacking trust in Government and authority, and sceptical of the benefits of science. Ipsos MORI's interpretation of these data is that while older people are often more intimidated by science, young people are more likely to be more sceptical of its truths.

7.4. Ethnicity

As noted at the beginning of this section, relative to the above demographic groups, there has been less research into how attitudes to the sciences differ by ethnic group. The PAS 2008 survey explored how attitudes differed between Asian, Black and White people using a booster sample of ethnic minority respondents. However, even that research cautions against drawing oversimplified conclusions, given that these differences are likely to be driven by a range of underlying cultural and religious differences between and within ethnic minority groups.

PAS 2008 does however provide evidence of broad overall differences between Asian, Black and White people. Asian people showed the highest levels of interest in science and science issues, and were also more likely to have participated in a science-related activity in the last 12 months (46% had taken part) than White people (42%) and Black people (28%). Asian people also tended to feel more informed about science (64% informed) than White people (55%) and Black people (53%).

The survey also found that Asian and Black people tended to be more worried than White people about developments in science, particularly with regards to stem cell research and nanotechnology, and they were more likely than White people to believe that *"we depend too much on science and not enough on faith"*. However, at the same time they were less worried than White people about the regulation of science, being more confident that regulators are capable of making the right decisions.

8. Conclusions

This review has revealed the considerable differences between countries in attitudes to the sciences. Compared with other European countries, people in the UK have generally felt better informed about the sciences and have been more interested in finding out about them. They have also been more trusting of scientists than Europeans overall.

When it comes to specific scientific issues such as animal cloning, nuclear power and GM food, attitudes in the UK have tended to sit in between those in the rest of Europe and attitudes in the US. People in the UK have often been more accepting of developments in these areas than the average European, but less so than the US public (although the data are rarely directly comparable between the UK and US).

People in the UK also appear to have taken a different, often narrower view of what constitutes "science" compared to other countries. In the UK, the sciences have tended to be understood in terms of outcomes rather than processes, and the public's understanding of the scientific method has been low. The relationship between the sciences and culture also appears to be different in the UK compared to other countries.

The review has also highlighted the challenges in improving public perceptions of the sciences in the UK. Although there has been a high level of scientific knowledge among young people in the UK relative to other countries, the evidence suggests young people have been frequently alienated from the sciences during secondary school and have often had misconceptions about what careers in the sciences entail. People have also tended to have preconceptions about science being a male subject, which has made it challenging to encourage more women into a career in the sciences. In addition, those from less affluent backgrounds have often been less engaged with the sciences.

Finally, there are gaps in the existing literature about public attitudes. There are insufficient data on how big a part the UK public sees the sciences playing in British culture and heritage. There is also no clear general public definition of "the sciences" and what it means to trust in the sciences. This has implications for the quantitative and qualitative phases of PAS 2011 – it is important that we ask the public to define "the sciences" and that we explore what people see as the cultural benefits of science.

Appendices

Appendix A: Inclusion Criteria

Search Strings

To systematically search for relevant literature, we used the search strings below. As the review progressed, we refined these search strings to locate specific information.

Search term one		**Search term two**		**Search term three**
Public attitudes	and	Survey	and	Science/scientists
Public engagement		UK		Science curriculum
Public trust		Europe		Science education
Public understanding		International		Science policy
PAS		Women		Scientific literacy
PUS		Young people		Scientific research
		Business		Biotechnology
		Economy		Animal testing
		Prosperity		Climate change
				Embryos
				Engineering/engineers
				Genetically modified/GM
				Genetics
				Medicine
				Nuclear power
				Social science
				Stem cell research
				Synthetic biology
				Technology

Initial Sources

Below is a list of sources used initially to gather literature, before moving onto search engines. We also asked members of the PAS Steering Group to forward us relevant literature for inclusion.

- Biotechnology and Biological Sciences Research Council (BBSRC)
- Department for Business, Innovation and Skills (BIS)
- Economic and Social Research Council (ESRC)
- EngineeringUK
- Eurobarometer
- Ipsos MORI/MORI
- Medical Research Council (MRC)
- Nestlé Family Monitor
- OECD Programme for International Student Assessment (PISA)
- People, Science & Policy (PSP)
- Pew Research Centre
- The Royal Society
- Sciencewise Expert Resource Centre (Sciencewise-ERC)
- Science in Society (sci-soc)
- US National Science Board (NSB)
- Wellcome Trust

Timeframe

To ensure the research was current, we excluded any literature published before 2001 from the review except in a few cases where there was no more recent data on a particular topic.

Appendix B: Review Pro Forma

For each document reviewed, we completed the pro forma below. This ensured that each document was quality-assessed, noting points such as methodology, sample sizes, the time of fieldwork, who the data represented and any reliability issues.

Title of report			
Type of report			
Target audience			
Research question/aims and objectives			
Date of publication			
Published by? Note: Government department, academic, grey literature etc.			
Relevance of report	Key document	Some interesting points	Not useful
Included in the review?	Yes		No
Reasons for not including (if applicable)			
Summary of overall report			
Who carried out?			
Data collection method			
Reliability (how old is data, who does it represent etc?)			
Sampling description			
Analysis Note: analysis methods, authors' comments on any limitations etc.			
Other			
Key points			
Useful quotations including page numbers			
Link to full report (name of file)			

Appendix C: Index of Main Sources

The table below notes the main sources for quantitative data used for the literature review:

Publisher	Title	Countries covered	Fieldwork dates	Data collection method	Sample size
Cardiff University	Public Perception of Climate Change and Energy Futures in Britain	Great Britain	January-March 2010	Face-to-face interviews; quota sampling	1,822 adults in Great Britain aged 15+
Department for Business, Innovation and Skills (BIS)	Views on Animal Experimentation (research by Ipsos MORI)	Great Britain	2010	Face-to-face omnibus survey, quota sampling	988 adults in Great Britain aged 15+
EngineeringUK	Engineers and Engineering Brand Monitor	UK	March-July 2010	Online panel recruitment	5,789 respondents aged 7+
European Commission	Special Eurobarometer 341: Biotechnology	32 European countries	January-February 2010	Face-to-face interviews; random probability sampling	26,671 Europeans aged 15+; 1,311 in UK aged 15+
	Special Eurobarometer 340: Science and Technology	32 European countries	January-February 2010		26,671 Europeans aged 15+; 1,311 in UK aged 15+
	Special Eurobarometer 297: Attitudes towards Radioactive Waste	27 European Union member states	February-March 2008		26,746 Europeans aged 15+; 1,306 in UK aged 15+
	Special Eurobarometer 225: Social Values, Science and Technology	34 European countries	January-February 2005		32,897 Europeans aged 15+; 1,307 in UK aged 15+
	Special Eurobarometer 224: Europeans, Science and Technology	34 European countries	January-February 2005		32,897 Europeans aged 15+; 1,307 in UK aged 15+
Institute of Physics	Attitudes to Physics	Great Britain	January 2008	Telephone omnibus survey	1,023 adults in Great Britain aged 18+

Publisher	Title	Countries covered	Fieldwork dates	Data collection method	Sample size
Nestlé Social Research Monitor	Science in My Future (research by MORI)	Great Britain	April-May 2004	Self-completion paper questionnaire across 25 schools	704 young people in Great Britain aged 11-21
Office of Science and Technology (OST)	Science in Society (research by MORI, published 2005)	UK	2004	Face-to-face interviews; quota sampling	1,831 UK adults aged 16+
Organisation for Economic Cooperation and Development (OECD)	Programme for International Student Assessment (PISA)	57 countries including UK	2006	Standardised assessment	400,000 students aged 15; 13,152 UK students aged 15
Pew Research Centre	Public Praises Science; Scientists Fault Public, Media	US	April-May 2009	Telephone interviews; random probability sampling	2,001 US adults aged 18+
Research Councils UK (RCUK) and the Department for Innovation, Universities and Skills (DIUS)	Public Attitudes towards Science 2008	UK	August-September 2007	Face-to-face interviews; quota sampling	2,137 UK adults aged 16+
Royal Academy of Engineering and the Engineering and Technology Board (ETB)	Public Attitudes to and Perceptions of Engineering and Engineers 2007	Great Britain	June 2007	Telephone interviews; random probability sampling	1,000 adults in Great Britain aged 16+
University of York	Annual National Survey of Year 9 Students' Attitudes to Science	England	2008	Self-completion paper questionnaire across 30 schools	804 young people in England aged 13-14
Wellcome Trust	Wellcome Trust Monitor	UK	January-March 2009	Face-to-face interviews; random probability sampling	1,179 UK adults aged 18+; 374 young people aged 14-18
World Values Survey	World Values Survey (WVS)	97 countries including Europe and US	2000	Random probability sampling; face-to-face interviews	~1,000-4,000 interviews per country

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