

Towards a better map: Science, the public and the media

Professor Ian Hargreaves,
Professor Justin Lewis
and Tammy Speers

THIS REPORT continues the work PROFESSOR HARGREAVES began with his report *Who's Misunderstanding Whom* published by the ESRC in 2000. Professor Hargreaves is currently Board Member, Office of Communications and the Group Director of Corporate and Public Affairs, BAA. From 1998 to 2003 he was Professor of Journalism and Director of the Centre for Journalism Studies at Cardiff University and he continues there as Professor of Journalism. Before that, he was, in reverse order, editor of *The New Statesman*, editor of *The Independent*, deputy editor of the *Financial Times* and director of news and current affairs at the BBC. He therefore brings to this task widespread experience of all types of reporting, including science reporting on television and radio, as well as in newspapers and magazines.

JUSTIN LEWIS is Professor of Communication and Deputy Head of the School of Journalism, Media and Cultural Studies at Cardiff University. He joined Cardiff in 2000, having worked for 12 years in the United States at the University of Massachusetts. He has written or edited eight books about media and politics, his most recent being *Constructing Public Opinion: How Elites Do What they Like and Why We Seem to Go Along With It*, published by Columbia University Press. He has, in recent years, been particularly interested in media policy, audiences, and how the news media influences public knowledge and opinion.

TAMMY SPEERS worked as research associate on this project. Her PhD continues the work in this project on the MMR vaccine.

The views and statements expressed in this publication do not necessarily reflect those of the ESRC.

CONTENTS

Contents

FOREWORD	1
SUMMARY	2
INTRODUCTION AND METHODOLOGY	6
SCIENCE IN THE NEWS: AN OVERVIEW	
Science in general	9
The three issues: volume and style of coverage	12
Who tells science stories?	15
Media coverage of climate change	19
Media coverage of the MMR controversy	22
Media coverage of cloning and genetic medical research	25
THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE	
Trust	29
Overall levels of scientific understanding	31
What did we learn from media coverage between April and October?	34
The media and public understanding of climate change	35
The media and public understanding of the MMR controversy	40
The media and public understanding of cloning and genetic medical research	46
CONCLUSIONS	50
APPENDICES	
Appendix A	54
Appendix B	55
Appendix C	55
BIBLIOGRAPHY	56

FOREWORD

Foreword

The Economic and Social Research Council supports research into the biggest issues facing contemporary Britain. Many involve science either directly, as with stem cells, renewable energy or climate change, or indirectly, for example our work on innovation and management.

The increased attention paid to science by all forms of media is welcome, but raises the question of whether more coverage means more public awareness and understanding of science. Thinking about how the public understands science has moved on from the 'deficit model' which focussed on a putative failure of 'the public' to know enough science. Instead we now recognise more types of public and more ways in which they engage with scientific knowledge.

This means that new and better tools are needed to understand the way in which the media affect public knowledge of science. We are delighted to support this analysis by Professor Ian Hargreaves and his colleagues of science reporting and the impact it has on its audiences of readers, listeners and viewers. It is the second report we have published from his team and we look forward to further research in this area.



Professor Ian Diamond AcSS
Chief Executive
Economic and Social Research Council

SUMMARY

THE STUDY

This report provides an in-depth contemporary assessment of the media's role in the public understanding of science. It is based on:

- an extensive analysis of the way science and science related issues were reported on television news, radio news and in the press during a seven and half month period in 2002 (involving a total of 2,214 stories)
- two nationwide surveys (both with representative samples of over 1,000), conducted in April and October 2002, tracking the public's knowledge, opinion and understanding of science-related issues reported in the media.

While there is now a body of research both on the public understanding of science, and, to a lesser extent, on the media coverage of science, there have been few empirical attempts to relate the two. This study addresses this gap, and looks at *what* and *how* people learn about science from the media.

While the study looks at some general aspects of science, we focus our attention on three contemporary issues: **climate change**, the **MMR** controversy and **cloning/genetic medical research**. All three issues have received regular attention in the media, and all have serious implications for public policy. They are, in short, the kind of issues that people in a deliberative democracy should know something about.

GENERAL KNOWLEDGE

Overall, public understanding of these three issues is patchy. Both surveys contained a public understanding index of (the same) 13 multiple choice questions about science and science policy issues. The average number of correct answers in both surveys was five, or a score of only 38 per cent. And while having a science education helps, those with a science degree still only averaged 53 per cent (6.9 correct answers, compared with 4.3 scored by those with no science qualifications at all). In terms of age, those between 45-54 scored highest, with the under 25s and over 65s scoring lowest.

Perhaps not surprisingly, broadsheet readers did better than tabloid readers, although again, differences are not great. Most broadsheet readers averaged scores between five and six, tabloid readers between four and five (although readers of the *Daily Star* were well at the bottom of both surveys, averaging around 3.5 correct answers). While TV is the popular source for news about science, the amount of TV news people watch has little effect on knowledge – except for those who rarely watch the news at all, who tend to score lower.

Generally speaking, knowledge did not increase in the six months between April and October, suggesting that patterns of media coverage and learning are fairly consistent and long term. However, what people knew usually corresponded with those aspects of the science stories that received most persistent coverage. The details or subtleties of media coverage are, in this respect, much less important than the general themes of that coverage, in which certain ideas are repeated and associated with one another. While this does mean some information is communicated effectively to most people, it can also result in widespread misunderstanding – even if the reporting itself is generally accurate.

WHAT PEOPLE HAVE LEARNT ABOUT CLIMATE CHANGE

Most people were able to identify the destruction of forests (71 per cent overall) and carbon dioxide emissions (66 per cent overall) as causes of climate change. As many as 55 per cent were also to work out what a carbon sink was (by linking deforestation with global warming), 53 per cent knew that global warming meant British winters were likely to get wetter rather than drier, and around 50 per cent knew that the U.S. has opposed the Kyoto protocol. These are all ideas we found repeated regularly in media coverage.

Interestingly, however, both correct and incorrect answers can be linked to media coverage. Only three per cent of climate change stories we looked at actually explained the 'greenhouse effect', and while the media do *not* make explicit links between global warming and the thinning ozone layer, the two issues are often connected *thematically* as environmental problems. Accordingly, most people were very confused about the science of global warming.

When asked how greenhouse gases might have an effect on climate, only 16.5 per cent answered 'by preventing heat from escaping from the earth's atmosphere', while a majority (54 per cent) thought erroneously it had something to do with thinning the ozone layer. The problem we have identified here is that people have mistaken thematic connections made in media coverage for causal connections in the science. This explains why, in another question, 65 per cent people specifically identified the hole in the ozone layer as a cause of climate change, while 44 per cent blamed nuclear power plants (which ironically, unlike many other forms of energy, produce no greenhouse gas emissions).

Failure to understand the causes of climate change also makes it hard for some people to connect it to their own lives. So while some people – 42 per cent – can work out how an apple imported by air from the other side of the world might be more likely to contribute to climate change than one picked locally, most – 58 per cent – cannot.

We also found that the more coverage a newspaper gives to climate change, the more concerned its readers are about this issue. So, for example, the broadsheets gave much more coverage to this issue than the tabloids, with *The Guardian* and *The Sun* at opposite ends of the spectrum. Accordingly, 83 per cent of *The Guardian/The Independent* readers felt that climate change 'was something we should be concerned about', compared with only 55 per cent of *Sun* readers.

WHAT PEOPLE HAVE LEARNT ABOUT THE MMR VACCINE

Of the three stories, coverage of the MMR controversy suggested the highest level of public engagement. Although there were fewer articles mentioning MMR than on the other two issues, the MMR story was most likely to be the main focus of a story, it generated more Opinion and Editorial pieces, more readers letters and each story was given lengthier coverage on television, radio and in the press. It was also more likely than the other stories to be covered by news reporters rather than by specialist correspondents, and the most likely to include members of the public in the coverage itself.

The main most prominent theme of the coverage involved the alleged link, made by Dr Andrew Wakefield and some anti-vaccination pressure groups, between MMR and autism. Accordingly, most people – two thirds in both surveys – were able to name autism as the condition linked to MMR.

This claim has not, so far, been supported by any empirical evidence (Wakefield's research purports to find a link between the measles virus and autism, not MMR and autism), and researchers trying to find such a link have all drawn a blank. Wakefield's claim might legitimately be seen as news, but we discovered that the coverage was unintentionally misleading in creating the impression that the evidence for the link was as substantial as the evidence against it.

SUMMARY

While a number of news reports tried to make it clear that the bulk of evidence indicated the MMR jab was safe, what people appear to have heard was simply that there were two sides to the debate. Once again, it was the broad pattern of media coverage – rather than the detail – that got communicated. This has led most people – 53 per cent by the October survey – to assume that since both sides got roughly equal coverage, they must correspond to roughly equal bodies of evidence. Only 30 per cent in April and 23 per cent in October were aware that the bulk of evidence actually favoured supporters of the vaccine.

Another prominent theme of the coverage was the proposal to give parents the choice of three separate jabs. While this proposal is strongly supported by Dr Wakefield, there is no empirical research that suggests this is a safer option. Some newspapers actively campaigned for this option, although most media simply reported the fact that there was support for it. Either way, some 31 per cent of respondents in our October survey now appear to favour this option, with only 47 per cent now preferring the MMR jab. This loss of confidence was initially overestimated in both the early coverage and by our respondents, but there is no doubt that the long term public health consequences of a fall in vaccination levels are profound.

In brief, while Wakefield's claims are of legitimate public interest, our report does give credence to the view that research questioning the safety of something that is widely used should be approached with caution, both by scientists publishing that research and journalists covering it. This is especially the case if any decline in public confidence has negative consequences for public health. Indeed, nearly half the people in our October survey (48 per cent) felt that when scientists go against the grain (as Wakefield has), the media should wait until other studies confirm those findings before covering it (about a third – 34 per cent – said that such findings were newsworthy and should be reported as such).

WHAT PEOPLE HAVE LEARNT ABOUT CLONING AND GENETIC MEDICAL RESEARCH

This is the most esoteric of the three issues we examined. We found lower levels of public engagement in the coverage of this story than with climate change or MMR. It generates fewer opinion or editorial articles, fewer readers' letters, makes fewer references to the public and is most likely to be treated as a 'science' rather than a 'news' story. Perhaps not surprisingly, then, while most people feel partly or well informed about climate change and MMR (even if their knowledge of the subject sometimes suggests otherwise), 68 per cent in our survey admitted they were not very well informed about cloning and genetic medical research.

This story has, nonetheless, received persistent (if not pervasive) media coverage, and our study suggests that some aspects of the coverage are seeping through to public understanding of this issue. Most people (66 per cent by October) were aware that the main aim of stem cell research was for the treatment of disease (rather than, say, for producing human clones). And nearly half (46 per cent) were also aware that the key scientific development in this area has been the mapping of the genetic code.

People are more confused when it comes to public policy in this area. In late February of 2002, the House of Lords ruled that the cloning of embryos for research was permissible, and yet only 25 per cent were aware that this kind of research was allowed (47 per cent assuming it was not). This suggests that while there is an awareness of the benefits of cloning and genetic medical research, discussion about law and ethics prompts public anxiety.

This kind of response is very much in keeping with media coverage on this issue, which our report finds often verges between alarming reports about cloning to encouraging reports about the potential medical benefits of genetic medical research. Public understanding broadly reflects this. Public attitudes to this aspect of science therefore depend on the context in which it is understood. In the first survey, for example, when asked out of the blue, people found trends in

genetic research 'worrying' rather 'encouraging' by a margin of ten per cent (44 per cent to 34 per cent). In the second survey, when the question was asked *after* a question linking genetic research to the treatment of disease, this prompted a dramatic turnaround – those 'encouraged' outnumbered the 'worried' by nine per cent (42 per cent to 33 per cent).

Overall, our report finds some indication that while concern about cloning and genetic research remains high, a succession of low profile media reports of the medical benefits of this research does appear to have led to a marginal increase in knowledge of its potential medical benefits. The challenge ahead is to allow people to understand enough about the science to connect their understanding with their concern.

The report comes to the following conclusions:

- The news media clearly play a role in informing the way people understand science. Our study suggests that most people are aware of the main themes or frameworks of media coverage of science related stories – anything else is unlikely to get across.
- These themes or frameworks are then used as building blocks for people to make sense of an issue, and while this sometimes allows people to make informed guesses about those issue, it can lead to misunderstandings.
- People are more likely to become engaged in a science story if it appeals to a broader public interest. This is particularly the case if the story has a straightforward and consistent narrative.
- We find little evidence to support the idea that the presence of more science, scientists and science specialists in the media will increase the public understanding of science. On the contrary, a 'science for science's sake' approach seems the one least likely to generate public engagement and therefore public understanding.
- What matters here, we would suggest, is not so much the science itself, but establishing clear connections between science, policy and the broader public interest.

Introduction

INTRODUCTION AND METHODOLOGY

Relations between the media and science have been the subject of much discussion and some controversy in recent years¹. Scientists have been accused of paying too little attention to communicating what they do, while various sections of the media have been accused of being sensationalist, irresponsible or simply ill-informed when science becomes news.

Much of the research on the public understanding of science to date has adopted what has been called the 'deficit model' of science communication (see Logan for an overview of the history of science communication and role of the deficit model). This model is based on the idea that the more people learn about science, the more supportive they will be of it. Our approach is different. First, while we would agree that many scientists have laudable aims, not all scientific research is uncontroversial or benign. So, for example, it is possible that the more one knows about the science of military technology or the cosmetics industry, the more one might *oppose* scientific research in these areas. We would argue that the value of scientific research should be judged on its merits.

Second, we need to question *why the public needs* to understand science. It is, of course, generally desirable for people to be well informed, whether about history, geography, art, politics, music, physics or biology. But we also need to distinguish between knowledge that is important or useful in a democratic society and knowledge that most of us can get along perfectly well without. The key question, for us, is whether what people know about science allows them to make *informed judgements* when science policy clearly enters the public domain and where there is an identifiable public interest involved.

We are, in this sense, proposing a different *kind* of deficit model, whose organising principle is democratic rather than scientific. A healthy democracy requires a well informed public on matters of public policy. Thus, while knowing science for its own sake might be desirable for many reasons, our concern here is with those aspects of science that people would find it useful to know in order to inform an opinion about issues of the day.

According to a Mori Poll for the Royal Society National Forum on Science in March, 2002, most people claim they *do* want to have a say about science policy, rather than simply leaving it to the experts. So, for example, 55 per cent of people feel that the funding of scientific research is becoming too commercialised, and 53 per cent want more influence over the type of scientific research being done. In an era where most people get much of their information about science from the media, the communication of scientific development and inquiry is, therefore, an important aspect of democratic life. So, do people learn enough about science in the media to have informed opinions?

In this report, we address this question head on. Our purpose, here, is not to engage in hand-wringing about public ignorance, but to better understand the complexity of media and science communication. While other research has looked at media reporting *or* public understanding, this study combines and integrates the two, looking at the *relationship* between media content and public knowledge. We hope, in so doing, to provide a better map of the *way* people learn about science from the media.

¹ See bibliography

Central to this approach is the understanding that what matters is not just media content, but how people engage with that content. So, for example, there is little point in the news media covering science in great detail and depth if it does not also generate much public interest. Some science stories may stick in the public mind, others may be either misunderstood or ignored. By tracking both media content *and* public understanding, we can explore not only what people know, but why they know it.

In order to explore the relationship between media coverage and public knowledge and opinion, we chose to focus on three different science-related issues likely to be in the news – as well as the subject of public discussion – during 2002. All three issues have important social policy implications, and should, in an ideal world, be part of a democratic, deliberative process in which the public take part. Indeed, in all three cases, the government is taking decisions on the public's behalf. The three issues are:

Climate change – one of the biggest science stories of the last decade, and one which continues to be debated nationally and internationally with, in some quarters, a growing sense of urgency.

Development in cloning and genetic medical research – with its wide ranging medical and ethical implications.

The MMR vaccine – perhaps the most conspicuous scientific controversy in Britain in 2002, following suggestions linking the MMR vaccine with bowel disease and autism.

The news coverage of these issues were monitored over a seven and a half months period from 28th January to 15th September, 2002, to explore exactly how these issues were reported, framed and interpreted. We also looked at coverage of science and scientists in general. Two national surveys were conducted – in April and in October, 2002 – with the purpose of exploring what the public knew and thought about climate change, developments in cloning and genetic medical research and the MMR vaccine. We then investigated the extent to which public understanding (or misunderstanding) could be seen as reflecting the nature of media coverage.

METHODOLOGY

MEDIA CONTENT ANALYSIS

The media content sample was chosen to focus on three of the main news sources in Britain, incorporating television news, radio news, and the both the broadsheet and tabloid press, covering a 197 day period from 28th January to 15th September, 2002. The sample was as follows:

Television:

We chose the two news programmes with the largest audience in the UK: the BBC 6:00 evening news (weekdays) and ITV 6:30 evening news (weekdays)

Newspapers:

Our press sample covers a range of broadsheets and tabloids, with five dailies (*The Guardian*, *The Daily Telegraph*, *Daily Mail*, *The Sun*, *The Daily Mirror*) and four Sunday newspapers (*The Mail on Sunday*, *The Sunday Times*, *News of the World* and *The Observer*).

Radio:

Our radio sample is much more selective. We focused on the *Today* programme (highlights archived on the internet), because of its high (albeit fairly upscale) audience for a radio news programme, and because of the influential role it plays on the news agenda.

METHODOLOGY

All stories that contained the following terms were analysed in detail:

- climate change, global warming
- MMR
- cloning and genetic medical research, cloning, clone, gene, genetic, stem cells

This yielded a total of 2,214 stories featuring climate change, developments in cloning and genetic medical research or the MMR vaccine. These were then coded to explore the length of the story, its focus, the sources used, the information given in the stories and various other indicators of the character of the coverage.

We also took a more general look at *all* media stories in this period that used the words 'scientific' and/or 'scientist' (a total of 3,093 stories) in order to provide a snapshot of science coverage overall.²

KNOWLEDGE AND OPINION SURVEYS

Two nationally representative surveys were carried out in April and October 2002. Over 1,000 adults were interviewed face-to-face in 10 different locations around the UK (see Appendix B for further details). The questions were generated by the research team in consultation with scientists and science correspondents. Our aim was to find out what people knew about those science issues regularly in the news, and where there is public interest involved. The first survey was extensively piloted in order to limit question ambiguity. The second survey repeated most of the questions asked in the first survey (in order to monitor any changes that might occur), together with a few further questions arising from analysis of the first survey.

The surveys consisted of around 20 questions relating to each of the three topics; climate change, cloning/genetic medical research and the MMR vaccine, as well as more general questions concerning trust, scientists, levels of science education, media habits and more general demographic information.

²See Appendix A for a description of the latest technology available to simplify the research task for academics.

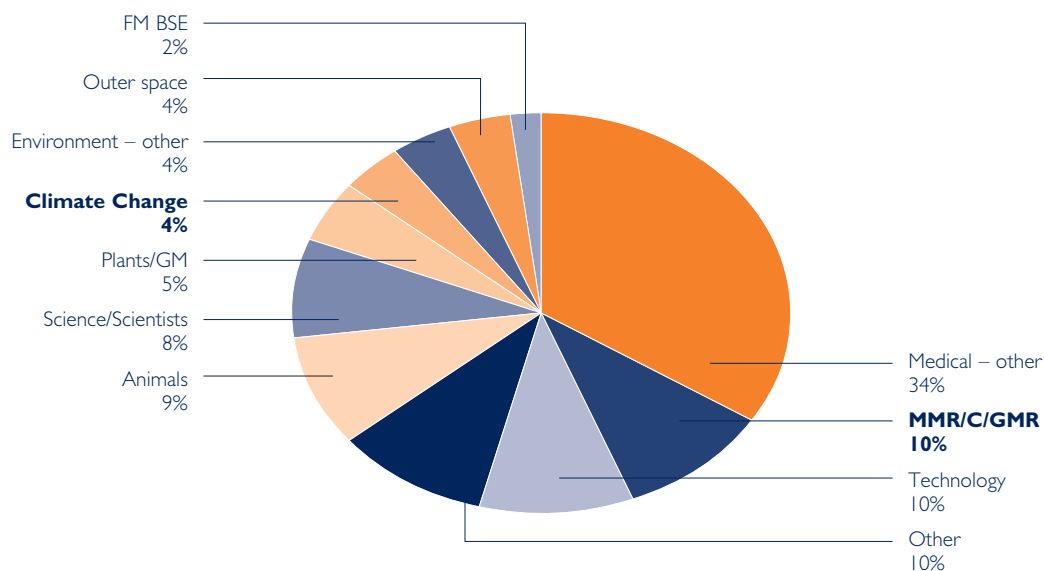
SCIENCE IN THE NEWS: AN OVERVIEW

SCIENCE IN GENERAL

While it is sometimes difficult to categorise science related stories, Figure 1 provides a rough sketch of the kinds of stories that attract media attention.

The categories were collapsed from 32 original categories to 9 to give an overall sense of what kinds of science makes the news. While the three issues under scrutiny in this report can be incorporated under 'medical' (in the case of MMR and genetic medical research) and 'environment' (in the case of climate change) this table lists them separately in order to provide a sense of how they fit into the overall picture.

Fig.1 Types of science stories in the media



SCIENCE IN THE NEWS: AN OVERVIEW

We should note that this snapshot does tend to exclude topics – such as the three we are focusing on – that become stories in their own right (and hence are less likely to be flagged up as ‘science’ stories). So, for example, only 16 per cent of the stories about climate change in our survey used the words ‘scientific’ or ‘scientist’. Previous research found that science is subsidiary theme, not the main focus, in nearly half of all coverage with some reference to science or scientists. (Hansen 1994: 116)

Nonetheless, what is notable here is the prominence of stories with a medical focus,³ especially on television, where, as Table 1 shows, nearly half of all science stories (44 per cent) are about medical developments or issues. The dominance of medical and health-related stories is not surprising, as these are often cast in terms of human interest or in terms of something readers can relate to (ibid: 115). Indeed, the New Zealand government’s report ‘Common sense, Trust and Science’ published in June 2002 also found that for the majority of New Zealanders they are most interested in those areas where personal and social benefits are most evident. (Hipkins, R. et al. 2002) General stories about the state of science or about particular scientists, on the other hand, are completely absent from television news, and while they are the second biggest category in broadsheet newspaper coverage, they are fairly rare territory for the tabloids.

Table.1 Types of science stories in the media

	Newspapers	TV	Radio	Totals
Medical	34%	38%	27%	34%
MMR/Cloning/Genetic Medical Research	9%	11%	20%	10%
Technology	11%	8%	5%	10%
Animals	9%	6%	13%	9%
Science/Scientists	9%	0%	9%	8%
Other ⁴	11%	3%	4%	6%
Plants/GM	5%	2%	3%	5%
Outer space	4%	6%	3%	4%
Environment – other	4%	13%	2%	4%
Climate Change	3%	8%	11%	4%
FM BSE	1%	4%	3%	2%
Total Articles	2632	277	184	3093

³ ‘Medical’ includes all medical and health-related stories, from medical breakthroughs to general information to stories promoting certain types of food for good health. ‘Technology’ includes all stories related to new inventions and general information on technologies. ‘Science/Scientists’ includes stories concerning individual scientists, references to science in general, i.e. comments on the state of science in Britain, government policy on education and science.

⁴ Other includes a variety of stories including sport science, forensic science, the hard sciences such as quantum physics etc.

This contrasts with the *Today* programme on Radio 4, which often engages in discussions about the public understanding of science and the state of science in general (nine per cent of its stories come under this category). The *Today* programme also attempts to tackle difficult subjects avoided by newspapers and television, using what we might call the 'puzzled lay interviewer meets expert' approach to make complex areas intelligible to a general audience. So, for example, on a report on looking for elusive space dimensions in the other universes (from 19 February, 2002), Edward Stourton attempts to both probe and translate the story into non-technical language:

Stourton: "...so many questions I don't quite know where to start. I suppose the obvious first point is what is a parallel universe?"

Professor Andreas Albrecht: "...It can be something sitting out there in the other dimensions if they are there. It could be something part of strange quantum world...or it could be something very far away..."

Stourton: "...If there are all these extra dimensions, why is there only one universe?"

Marcus Chan: "...There could be universes...occupying other dimensions or it could simply be that our universe is like bubble in a vast ocean, and floating out in that ocean are an infinite number of other bubbles all of which contain other universes... There may be universes for instance where Elvis is still alive or Princess Diana didn't crash, didn't die in a crash in Paris..."

Stourton: ..."We could be broadcasting in the *Today* studio in some other universe at this very moment?"

Newspaper coverage also has a distinctive style. It is, in some ways more diverse, with a variety of themes covered (hence the 'other' category is larger here than for radio or television), although this is partly because newspapers often use *science stories as fillers*, with little discussion of the repercussions or background of the research. These stories tend to be quaint or diverting, rather than part of a larger story. Both of the following articles are fairly typical:

"THE ability to write designs, logos and messages on the wings of butterflies could emerge from research to create the first GM butterfly, a scientist said yesterday. Butterfly wing patterns offer unique opportunities to understand how shapes and patterns are made in nature, claimed Dr Antonia Monteiro of the State University of New York, Buffalo. She said that the GM method she was developing could allow companies to put markings on butterflies by scanning their wings with a laser beam" (*The Daily Telegraph*, 13th March, 2002).

"GENDER-bending chemicals that pollute rivers could be causing female birds to sing. Only male birds should trill. But experts in California say females infected with oestradiol, used in hormone replacement therapy, are joining the dawn chorus. The birds also struggle to reproduce, added the *New Scientist* magazine" (*The Sun*, 28th March 28, 2002).

SCIENCE IN THE NEWS: AN OVERVIEW

This kind of coverage is clearly intended to provide amusement rather than increase public understanding of science. For this reason, we shall look in more detail at the stories about climate change, cloning and genetic medical research and MMR – all of which, during this period, received serious, consistent and sustained coverage.

THE THREE ISSUES: VOLUME AND STYLE OF COVERAGE

As Table 2 suggests, all three stories maintained a persistent (though never overwhelming) presence across most media throughout the January to September period. There were, in our sample, 864 stories relating to cloning and genetic medical research (C/GMR), 829 stories featuring climate change and 521 concerning the MMR vaccine.

Table.2 Number of references to Climate Change, Cloning/Genetic Medical Research and MMR

Total number of articles	ALL	TV only	Radio only	Papers only	Daily Mail	Mirror	Sun	Daily Telegraph	Guar	Obser	NOTW	MOS	Sun Times
Climate Change	829	23	21	785	79	78	32	133	320	56	3	14	70
C/GMR	864	17	19	828	139	107	57	149	213	44	13	26	80
MMR	521	14	18	489	82	66	90	72	78	23	18	28	32

While the patterns are broadly consistent, there is, nonetheless, a degree of disparity in news agendas – the tabloid press, in particular, were much less likely than other media (especially *The Guardian*, responsible for more than a third of the reference to this topic) to cover climate change. *The Sun*, *The News of the World* and *The Mail on Sunday* all published more stories about the MMR vaccine than about climate change.

The first impression here is that the MMR story received less coverage than the other two. However, as we shall see when we take other criteria into account, the MMR controversy was, in many ways, the biggest news story of the three.

References were divided into categories, to establish whether it was the main focus of the story, the secondary focus of the story, or only incidental to the story (mentioned only once in passing). Letters to the editor were also coded separately. Figure 2 indicates that while most references to climate change tend to be a secondary or incidental part of the story, MMR was the most likely of the three issues to be the main focus of a story (58 per cent of the MMR stories were focused on this issue)⁵.

⁵ Henceforth, our analysis of media content excludes incidental references (unless otherwise stated).

Fig.2 Focus in stories: TV, radio & papers

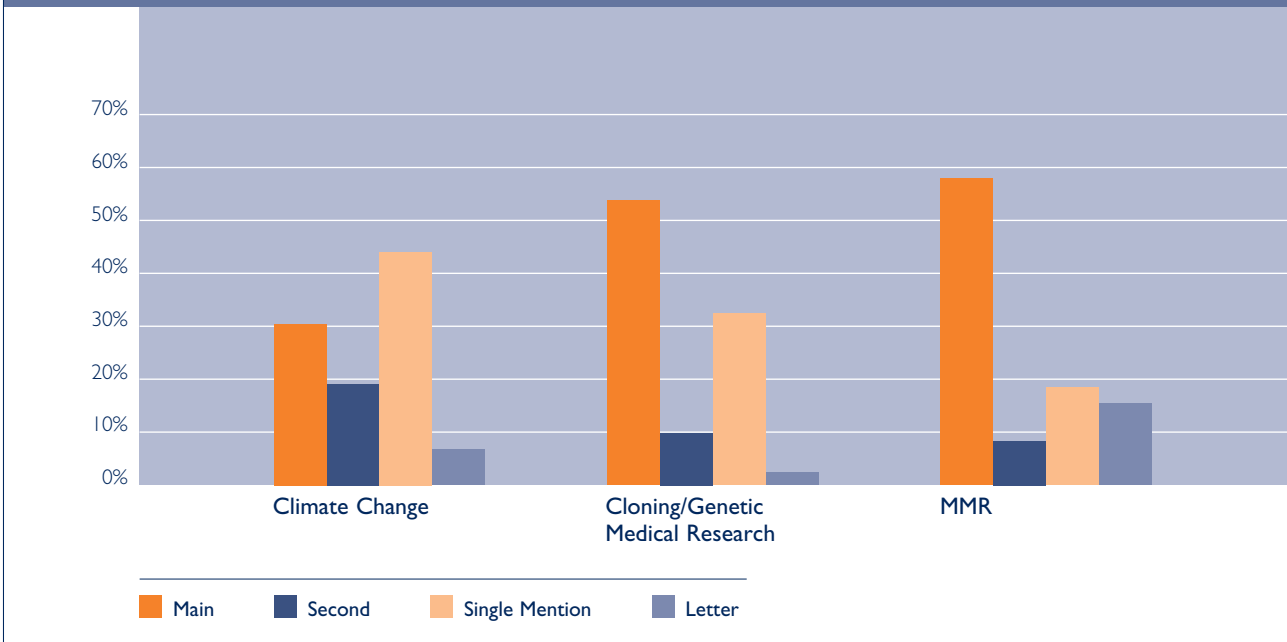
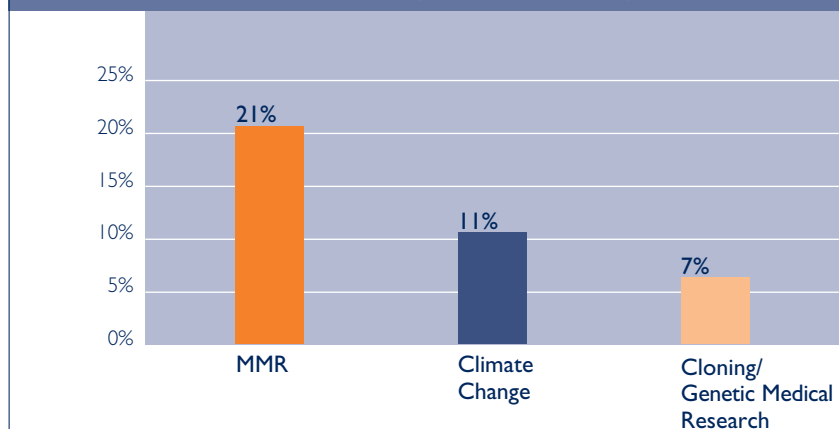


Figure 2 also indicates that the MMR story was the most likely to generate letters to the press, suggesting a higher level of reader engagement with this story. Cloning and genetic medical research stories, by contrast, appear to generate very few readers' letters. Figure 3, which records the number of opinion or editorial pieces (as a proportion of the stories in which the issue was the main or secondary focus), suggests the same pattern. In brief, the MMR story inspired comment in way that cloning and genetic medical research did not.

Fig.3 Op/Eds newspapers
Main/secondary focus only



SCIENCE IN THE NEWS: AN OVERVIEW

Tables 3 and 4 show that stories about MMR were also longer, on average, than stories about climate change or cloning and genetic medical research. This was the case across all three types of media. Newspaper articles on MMR had the longest average length (549 words), followed by cloning/genetic medical research (499 words) and climate change (467 words). TV news stories on MMR were, on average, 3.4 minutes long, followed by 2.5 minutes on cloning and genetic medical research and 2.4 minutes on climate change. Radio stories on MMR were, on average, 6.1 minutes long, followed by climate change stories at 4.2 minutes and cloning and genetic medical research at an average of 4.1 minutes.

Table.3 Average length of newspaper articles

	Climate Change	Cloning/GMR	MMR
<i>The Observer</i>	837	485	1102
<i>The Sunday Times</i>	410	555	632
<i>News of the World</i>	95	332	391
<i>The Mail on Sunday</i>	362	495	477
<i>Daily Mail</i>	470	587	675
<i>The Daily Mirror</i>	265	286	236
<i>The Sun</i>	271	243	209
<i>The Daily Telegraph</i>	425	519	536
<i>The Guardian</i>	592	532	431
All Stories	467	499	549

Table.4 Length of television and radio pieces

Average Length of Story	Radio	TV	Total Coverage Radio	Total Coverage Television		Total TV
				ITV	BBC	
Climate Change	4.2 mins	2.4 mins	59 mins	16:28	41:21	57:49
Cloning/Genetic Medical Research	4.1 mins	2.5 mins	1 hour 16 mins	19:22	23:16	42:38
MMR	6.1 mins	3.4 mins	1 hour 35 mins	23:36	22:32	46:08

While there are some idiosyncrasies here (so, for example, *The Guardian*, *The Observer* and the BBC gave significantly more coverage to climate change⁶), the overall pattern is clear. Of the three, the MMR story was most likely to be the main focus, it generated more OpEds, more letters and was given lengthier coverage on television, radio and in the press.

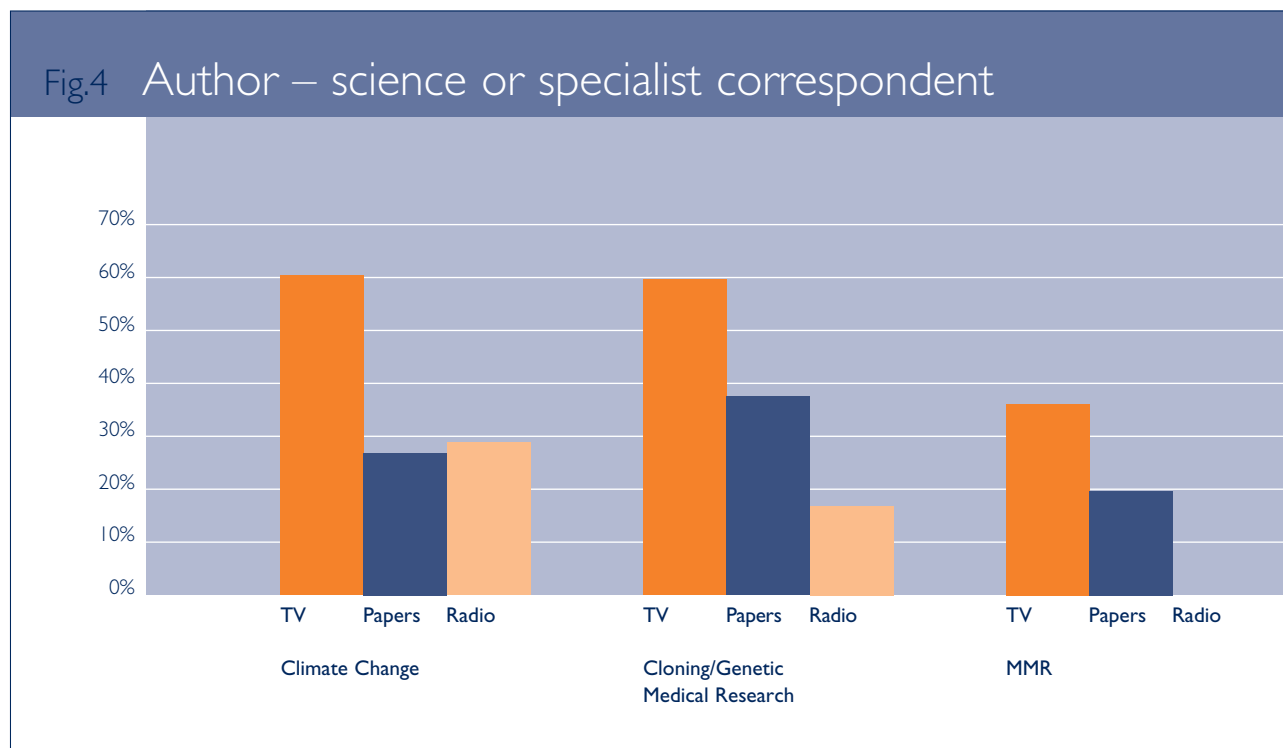
⁶When the World Summit on Sustainable Development took place in early October the BBC early evening news took the opportunity to get its weather forecasters involved with the story. For three days (August 27, 28, 29) the BBC weather forecasters stepped into journalist mode and reported on the current state of the world's environment.

WHO TELLS SCIENCE STORIES?

We get a better sense of the different character of the three stories if we consider who tells them. The MMR story is told primarily by *non-specialist* news reporters, while the cloning and genetic medical research story is almost twice as likely to be reported by *specialist* science correspondents (with climate change falling somewhere in between).

Table.5 Authorship of science stories	
	Main and Secondary Focus Stories Author Science/Specialist Correspondent
Cloning/Genetic Medical Research	38%
Climate Change	28%
MMR	20%

If we break this down by media type, we can see that television in general is much more likely than other media to use science correspondents.



SCIENCE IN THE NEWS: AN OVERVIEW

So although the MMR controversy was based on a specific scientist’s research, our data suggests that it became a news story *in its own right*, leaving the domain of scientific debate to become *the focus of a more general discussion*. So, for example, the question of whether the Prime Minister’s son Leo had been given the MMR vaccine became a subject of much speculation (he insisted it remain a private matter). As we shall see later, the Prime Minister’s involvement in this story was, for many, central to its development.

The cloning and genetic medical research story, by contrast, was more likely to be left in the hands of specialists. This may explain why this story – despite persistent coverage – was less likely to inspire longer stories, readers’ letters, editorials or opinion pieces. So while both MMR and developments in cloning and genetic medical research were stories initially driven by scientific research, and while both involved speculation and action by politicians, they developed very different characteristics.

We shall discuss the impact of this difference on public understanding later. Suffice to say at this stage that while scientists may feel more comfortable with a story told mainly by specialists (and uneasy when it falls into the hands of, say, politicians and pressure groups) there is a danger, when this happens, of losing journalistic and audience interest. Conversely, a story that enters the wide public domain seems likely to make more impact on public consciousness. So, for example, we found people were three times more likely to say they were well informed about MMR than about cloning and genetic medical research. The goal, for those keen to further public understanding, is to turn science stories into narratives that are interesting, accessible *and* informative.

It is notable, in this context, that while we might expect stories told by science correspondents to contain more scientific information, our data suggests this was *not* necessarily the case. During our analysis we isolated 20 discrete items of scientific information relevant to the three issues, and discovered that while science journalists included these references 24 per cent of the time, news journalists used factual information in 28 per cent of their stories (see Appendix C).

When it comes to the *sources* quoted, scientists have a significant presence in all three stories. Their overwhelming presence in the cloning and genetic medical research stories confirms the degree to which this, in particular, is covered as a *science* rather than a more general *news* story. Indeed, even though important political decisions were made during this period – sanctioning the development of stem cell research – politicians were much less likely to be used as sources in genetic medical research stories than on climate change and MMR.

Table.6 Sources in TV, radio & newspapers

	Total Averages	MMR	Cloning/ GMR	Climate Change
Scientist	44%	36%	58%	39%
Public	15%	20%	11%	14%
Pressure group	13%	10%	11%	18%
Politicians	10%	16%	4%	10%
Other	6%	7%	7%	3%
Government	4%	6%	3%	2%
Business	4%	1%	1%	9%
Science PR	4%	1%	6%	5%
Celebrity	1%	2%	0%	0%

The presence of pressure groups and business sources on the climate change story (27 per cent in total) demonstrates the degree to which the battle-lines on this issue have been drawn – by a well established environmental groups and a well organised business lobby (notably those connected with the burning of fossil fuels).

By contrast, science magazines may play an important role in breaking science stories, but their presence as sources is fairly small. In our sample, *Nature* is the only magazine referred to in more than two per cent of stories. If science magazines play a significant role in communicating science to enthusiasts, our data indicate that they are not significant players in communicating science to a non-specialist audience.

Finally, the use of the public as a source in science stories would seem to be particularly important in any attempt to engage people with science stories. Above all, it is a way of signifying that the topic is of public interest. In this context, it is notable that the public were almost twice as likely to be invoked in relation to the MMR story than with regard to the cloning and genetic medical research stories (with, once again, the climate change story occupying a space in the middle). This is a further indicator of how the cloning and genetic medical research stories invoke a specialist rather than a general audience, while the MMR story is reported as involving the public in the story itself.

When broken down by medium, Table 8 suggests that television makes more reference to the public than radio or newspapers in all three stories – and may, as a consequence, be more effective at engaging public interest. Indeed, recent research suggests that there is a heavy demand to include more ‘ordinary people’ in the news (Hargreaves and Thomas 2002), and while television is leading the way here, there may be scope for going further in this direction.

Table.7 Magazines mentioned?

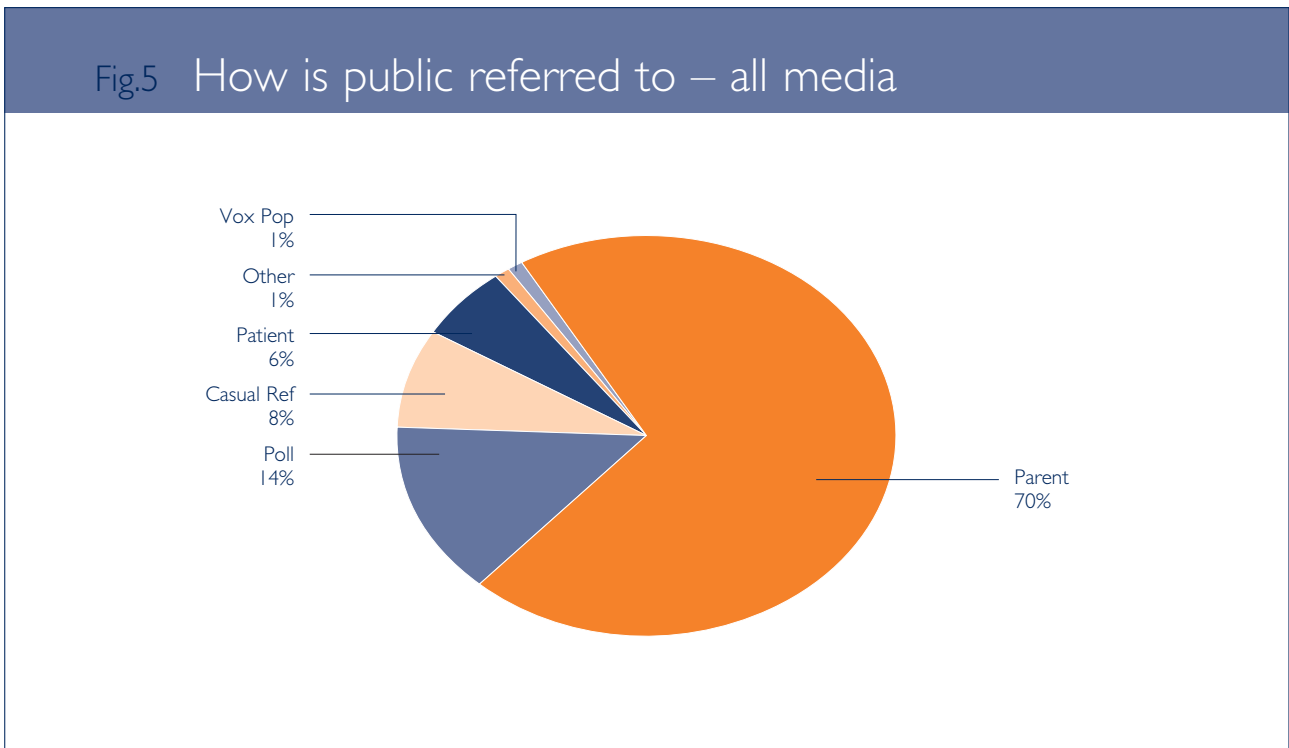
Nature	5%
Science	2%
<i>BMJ/Lancet</i>	2%
Other Medical	2%
<i>New Scientist</i>	1%
Other Science	1%
Not mentioned	87%

Table.8 Public as a source

	Climate Change	Cloning/Genetic Medical Research	MMR
Television	27%	20%	36%
Radio	10%	3%	16%
Newspapers	5%	9%	10%

SCIENCE IN THE NEWS: AN OVERVIEW

So, for example, it is worth noting that although references to public attitudes, feelings or behaviour are not uncommon, this is rarely at the level of the concerned citizen, or even with reference to public opinion in general. Figure 5 shows that the great majority of references to the public are to parents (usually with young children), who are seen as *consumers* of MMR or cloning and genetic medical research, rather than as citizens with a wider interest in their community or society.



Having established a sense of the style, character and prominence of the three stories, we shall now look at each of them in more detail, before moving on to an analysis of how media coverage influenced public understanding.

MEDIA COVERAGE OF CLIMATE CHANGE

As we have seen, 44 per cent of the references to climate change in media coverage are incidental, single sentence references contained in stories primarily about something else. Less than a third of all stories referring to climate change focus mainly on this issue, whereas over half the references to MMR or genetic medical research are in stories where that issue is the main focus.

Climate change is often referred to in connection with other environmental and weather related stories, or with stories about political differences between Europe and the U.S. (specifically, Europe's support and U.S. opposition to the Kyoto protocol). The following examples are fairly typical:

"The new Viper is even bigger and instead of downsizing the V10 engine they've increased the capacity from eight litres to 8.3 litres. Small wonder the Americans didn't sign up to Kyoto. They knew this monster was on the drawing board" (*The Sun*, 13th Sept., 2002).

"The Bush administration has already pulled out of the Kyoto Protocol on global warming, and made it clear that it no longer considers itself bound by the Anti-Ballistic Missile Treaty. It also denies that hundreds of prisoners taken from Afghanistan to the US naval base in Cuba, Guantanamo Bay, are covered by the Geneva Convention" (*The Daily Telegraph*, 7th May, 2002).

"In recent months, the American rogue state has torn up the Kyoto treaty, which would decrease global warming and the probability of environmental disaster. It has threatened to use nuclear weapons in 'pre-emptive strikes' (a threat echoed by Hoon). It has tried to sabotage the setting up of an international criminal court, understandably, because its generals and leading politicians might be summoned as defendants" (*The Daily Mirror*, 4th July 4, 2002).

The high number of incidental references to climate change signify three features that make coverage of this issue distinctive.

1. Although scientific research on climate change is ongoing, findings suggesting that the planet is getting warmer – and that this can be linked to human activity – have been around for some time. It is therefore *possible* to make a incidental references to climate change on the assumption that most people understand roughly what is being referred to – in much the same way that journalists might refer to the Palestinian/Israeli conflict without feeling the need to offer further explanation. We shall look at how far people actually *do* understand the science of climate change in the next section.
2. Second, in a culture where references to the weather are abundant, global warming can take on the everyday relevance of throwaway conversation – thus most weather related stories can, in some way, be related to global warming. In 2002, for example, there were floods in Europe and an unusually early spring in Britain.
3. Third, unlike the MMR story, global warming is now regarded more in the realm of 'fact' than 'controversy': journalists thus feel able to refer to it (during, say, a story about floods) without the need to put it into the context of a scientific debate. While there are a few dissenting voices (such as Melanie Phillips in the *Daily Mail* and, perhaps predictably, car enthusiast Jeremy Clarkson in *The Sun*), most journalists are, in this sense, responding to the *weight* of scientific research which links global warming to the production of greenhouse gasses.

SCIENCE IN THE NEWS: AN OVERVIEW

When climate change is the main or secondary or focus of the story, the *causes* or *effects* of climate change are mentioned more often than not. Overall, 58 per cent of stories in newspapers, television and radio refer to the causes of climate change, and 65 per cent mention at least one effect (in this period, flooding and a warm spring, for example). Just over a third (34 per cent) mention both cause and effect.

Table.9 Coverage of causes and effects of climate change

	Cause mentioned	Effect mentioned	Both cause and effect mentioned	Cause mentioned but no effect	Effect mentioned but no cause
Broadsheets	59%	45%	19%	40%	26%
Tabloids	48%	58%	26%	23%	32%
TV	61%	83%	50%	11%	33%
Radio	64%	71%	43%	21%	29%
Overall averages	58%	65%	34%	24%	30%

Tabloid newspapers are less likely than broadsheets to mention causes of climate change, but more likely to refer to its effects (perhaps because the effects tend to be *more* dramatic than the causes)

Given this volume of coverage, we would expect people to have *some* knowledge of the causes of climate change. However, a more detailed analysis suggests that the media's discussion here is patchy. The causes of climate change are usually mentioned briefly and with little context. So, for example, when causes of climate change are mentioned, the words 'fossil fuels' are regularly used but rarely defined.

What is much less clear from the coverage is *how fossil fuels or greenhouse gasses might actually create global warming*. The following example from the *Daily Mail*, written by science correspondent James Chapman (about polar bears), is thus a rare example of the media explaining, with admirable brevity, *the link* between fossil fuels and climate change:

"But the report said global warming, *caused by greenhouse gases from fossil fuels trapping heat in the atmosphere*, could dramatically shrink the thickness and extent of the polar ice, erasing the bear's habitat" (17th May, 2002, our emphasis).

In fact, Chapman's coverage in the *Mail* was alone responsible for nearly a third of all the explanations of the greenhouse effect provided in our sample of the press. It is also a good example of how tabloid newspaper coverage doesn't have to involve 'dumbing down': in this case, we see a tabloid journalist using his skill for conveying information simply and economically to both explain and inform.

Such explanations are few and far between – while greenhouse gases of one form or another (generally carbon dioxide) are mentioned in 39 per cent of newspaper articles, the 'greenhouse effect' itself is only defined in three per cent of newspaper articles.

Coverage of the *effects* of global warming are, perhaps not surprisingly, often rather inward looking. While there are many references to actual or potential changes in the British climate, the specific effects on the rest of the world – particularly the Third World, where the effects of global warming are, according to most analyses, likely to be devastating – receive less attention. The main threat of climate change is thus seen in British terms – specifically, that an already fairly damp climate will become even wetter, notably in winter. The other anticipated effect – a warmer climate – is seen, understandably, as much more benign (though not always unproblematic). Nigel Slater, writing in *The Observer* about April vegetables, makes a fairly typical comment:

"Listen – I am as worried as anyone else about global warming, but having lunch outdoors five times by the middle of March has been a bit of a treat" (14th April, 2002).

The climate change issue also provides one of the clearest divisions in news priorities between different sections of the press. In terms of the number of stories printed, the broadsheets either gave it more coverage than the other two issues (*The Guardian*, *The Observer*) or made it a close second behind cloning and genetic medical research stories (*The Daily Telegraph*, *The Sunday Times*). By contrast, all but one of the tabloids in our sample gave it less coverage than the other two issues (it ranked third in the *Daily Mail*, *The Mail on Sunday*, *The Sun* and the *News of the World*, with the *The Daily Mirror* giving it a little more coverage than the MMR story, but considerably less than cloning and genetic medical research stories).

The Guardian, in particular, had more than twice as many climate change stories as any other paper in our sample, while *The Sun* and the *News of the World* gave the story very little coverage at all. In this instance, ITV news followed the tabloid agenda, (devoting less time to climate change than to the other two issues), while the BBC gave it more coverage than the other two issues – devoting, in total three times as much time to the story. This may reflect the greater emphasis the broadsheets have in covering international issues, as well as their assumptions about their readers' interests.

The Sun even managed to use a climate change story as an opportunity for some of its renowned *double entendre*, as in its 4th April headline 'WHERE ARE ALL THE TITS? – Figures droop as lots of Little Bustards nip in'.

"TITS are on the decline in Britain, *The Sun* is sad to reveal. Far fewer of the popular birds are seen in public because of our changeable climate, scientists say. But foreign species like the Little Bustard are on the rise, lured by our sunny skies and blown in on strong winds."

Indeed, this story was so irresistible that *The Sun* published an investigative follow up the following day under the headline: 'TITS OUT FOR OUR LAD'

Behind *The Sun's* 'Carry on Climate Change' approach lies some of ambiguities of climate change coverage. It is, on the one hand, regarded as a real phenomenon with real consequences – some them serious. And yet it also a story with a lighter side, one summoned up just as much by Nigel Slater's image of dining al fresco in early spring.

SCIENCE IN THE NEWS: AN OVERVIEW

MEDIA COVERAGE OF THE MMR CONTROVERSY

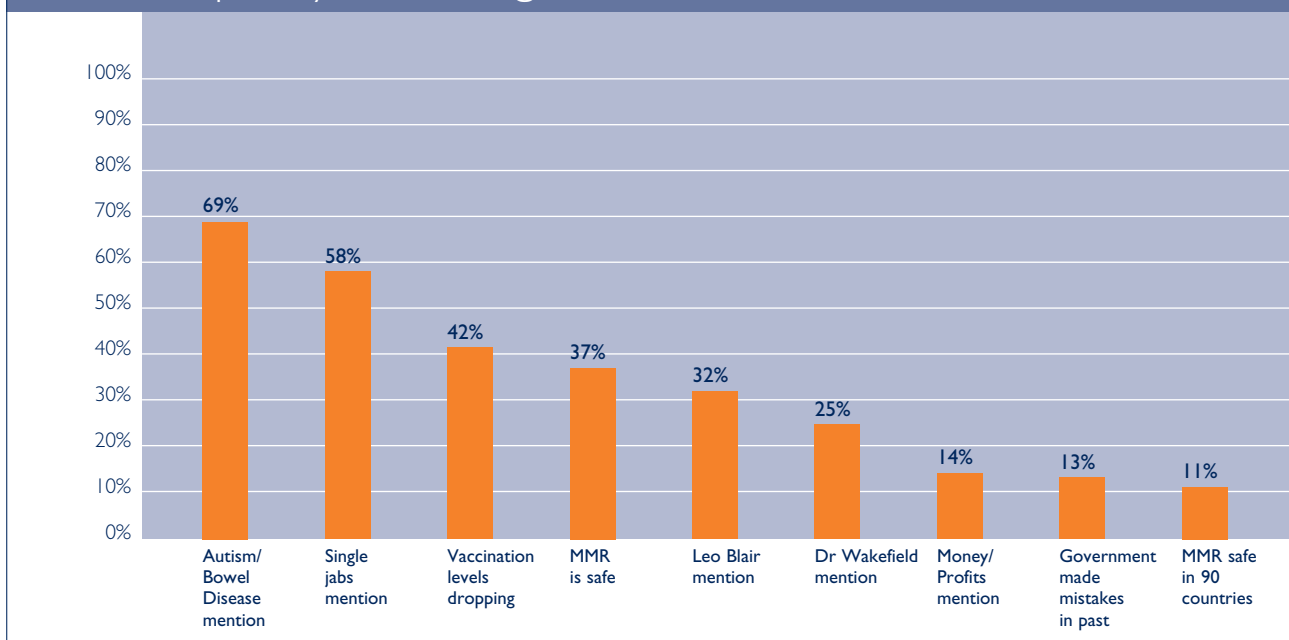
Unlike the other two stories, the MMR coverage conforms to a more conventional news pattern in which a story breaks, generates discussion and debate, then fades away. Of the 561 stories on MMR recorded over a seven and a half month period, 56 per cent of the entire sample appeared in one month between 28 January and 28 February. Coverage was most concentrated on television, after *Panorama* broadcast a programme at the beginning of February on Dr Andrew Wakefield's latest research into the possible links between autism, bowel disease and the MMR vaccine (71 per cent of television coverage appeared period between 2nd and 16th of February).

While the other two stories involve a variety of angles and themes, the reporting of the MMR story was fairly consistent, revolving around the same set of messages and ideas. The story also followed a fairly clear narrative, with the Prime Minister playing a central role. The main focus of the story is the possibility of a link between the MMR jab and autism (or bowel disease linked to autism), a fact mentioned in over two thirds of stories on this issue. It is this link – and hence the more general idea that the MMR jab may be unsafe – that clearly provided the impetus for the story.

However, the source of these claims – Andrew Wakefield's research – is mentioned in only a quarter of these stories, with the broadsheet newspapers accounting for most of these references (suggesting that this was an aspect of the story that was often dropped by those media with less space available).

The bulk of evidence suggests that the MMR vaccine is safe – as opposed to the well established risks of the diseases themselves. The use of such evidence to was often used to 'balance' Wakefield's claim – although not, perhaps, as widely as might have been expected. Television took the lead in this respect: half the television reports on the issue referred to such evidence, while less than a third (32 per cent) of the broadsheet press reports did so. Similarly, over a third of all TV reports mentioned that the MMR vaccine is regarded as safe in the 90 countries in which it is used – a point made in only 11 per cent of reports overall.

Fig.6 Frequency of messages in MMR stories – all media



Attempts to balance claims about the risks of the MMR jab tended merely to indicate that there were two competing bodies of evidence rather than offer more substantive evaluations of the case for or against a link. The following examples are typical:

“Ministers continue to insist the MMR jab which some doctors have linked to autism is the best way of protecting children” (*ITV News*, 5th Feb, 2002).

“Although health chiefs insist that the MMR vaccine is safe, many parents have been put off by uncertainty over possible links to autism and bowel disorders” (*Daily Mail*, 5th Feb, 2002).

“The government has mounted campaigns to persuade parents the MMR jab is safe after some research linked it to autism and bowel disorders in children” (*The Sunday Times*, 28th April, 2002).

The MMR vaccine was introduced in 1988 by Edwina Currie, then Tory Health Minister. In February 1998, Dr Andrew Wakefield and his colleagues from the Royal Free Hospital published a paper in the *Lancet* (Wakefield *et al*, 1998) based on a study of 12 children with an unusual bowel syndrome (linked to autism). Wakefield *et al* purported to have discovered traces of the measles virus in their guts. Although this experiment has been repeated a number of times since then, no other researcher has had similar results. The paper in the *Lancet* did not present evidence linking MMR to bowel syndrome or autism, but at a press conference publicising the research, Dr Wakefield argued that giving children the vaccines in three separate doses would be safer – a suggestion not supported by his many co-authors nor by any scientific evidence.

The evidence provided by Wakefield’s research – limited as it is – involves a link between *the measles virus* (as opposed to the MMR vaccine itself) and a form of bowel disease linked to autism. The connection between the MMR vaccine and autism is a speculative claim made by Wakefield with questionable scientific data to support it.

Despite this, Wakefield’s claims were not comprehensively or systematically challenged in media coverage. It is beyond the remit of this study to account for this failure: what is certainly true is that the weakness of empirical evidence in support of Wakefield’s claim was never fully aired.

Recent coverage was prompted by two simultaneous events; a measles outbreak in South London and an episode of *Panorama* broadcast on 3 February 2002, asking ‘How safe is MMR?’ Dr Wakefield, Professor O’Leary and colleagues then pre-published a paper in *Molecular Pathology* to accompany the *Panorama* edition, which focused on this research.

Even if we accept the link in Wakefield’s data, on the basis of the empirical evidence, it is not clear that a *single measles vaccination* would be safer than the MMR jab. There is *no* data establishing a link with autism that compares the MMR vaccine to the measles virus. Nonetheless, the media coverage quickly moved to the *speculative* link – without, in most cases, exploring Wakefield’s actual data. Because the risks involved with non-vaccination are fairly clear, the idea of offering three single vaccinations as a potentially safer alternative thereby gained a great deal of currency – especially on television and in the tabloids (where 71 per cent and 62 per cent of stories mentioned the proposal to offer single jabs).

This government’s reluctance to offer single jabs (on the basis that might reduce overall levels of vaccination, when the bulk of evidence suggested MMR was safe and no evidence directly implicated the MMR vaccine), pushed attention onto the Prime Minister. The fact that Tony Blair had a young child was seen as a test of the government’s integrity on this issue.

SCIENCE IN THE NEWS: AN OVERVIEW

The Prime Minister's refusal to disclose whether Leo Blair had been vaccinated with the MMR jab tended to increase speculation on the matter, and around a third of all the MMR reports (32 per cent) referred to it.

The following transcript from ITV news, broadcast on 4th February, is indicative of the way the story developed:

"It was reported over the weekend that Leo Blair has had the jab although Downing Street still won't officially confirm it. In Tonight's poll most respondents think that Tony Blair should go public. 80 per cent also want alternatives to MMR. This Liverpool clinic does just that – offering single jabs for each disease to worried parents."

Parent (holding child): "You should be able to have your children vaccinated singly at your own doctors. I object strongly to being told what and when to inject into my children."

Dr Pat Troop, Deputy Chief Medical Officer: "We have no concerns about our current vaccine. I think it will send a very strong signal that parents will say, hang on we think that maybe there is a problem around this vaccine – why else would you offer us a single vaccine – and confidence would go."

This report also demonstrates how the argument against single jabs is more difficult to make in a limited amount of time than a simple appeal to parental choice. Indeed, the framework constructed here very clearly places the burden of proof on the side of those *defending* the MMR vaccine (one of the earliest studies examining the relationship between science coverage and public opinion found that the appearance of a dispute often works to benefit *opponents* of technology – Mazur 1981: 114).

The decline in public confidence suggested by this report led to another recurring theme – the idea that vaccination levels were falling as a consequence of parental anxieties. This point was made in 42 per cent of MMR stories, despite the limited evidence available to confirm it. In February 2002 the rate of MMR vaccinations had dropped by approximately six per cent in the previous five years (it is unclear how much this is due to a lack of confidence in the vaccine). A number of media reports used data rather selectively, which, although often technically correct, implied a more dramatic fall in the take up of the MMR jab.

So, for example, the *Today* programme reported that the MMR vaccine was down to '70 per cent uptake in some areas' (2nd Feb, 2002), the *Mail* reported that 'Uptake of the triple vaccine has fallen to 'dangerously low levels' in some areas, according to the Public Health Laboratory Service' (2nd Feb, 2002), while ITV News reported that 'in parts of London that figure is down to 65 per cent – meaning only two children in three are having the MMR jab. With so many children left unprotected medical experts fear there is a distinct possibility of a measles epidemic...' (5th Feb, 2002).

Other media simply made claims without any supporting evidence. *The Sun*, for example, reported:

"growing concern of possible links between MMR and autism and bowel disorders have seen a massive drop in the number of parents opting for the treatment. The connection was made by Dr Andrew Wakefield in 1998. No scientists confirmed his findings but many parents say their children changed dramatically after the injection" (*The Sun*, 5th Feb, 2002).

This example from *The Sun* is also indicative of the nature of the balance struck between competing claims. Since most health experts were fairly clearly lined up in support of the MMR vaccine, balance was often provided by pitching medical experts against parents: an approach facilitated by the work of parental pressure groups on this issue. This created a serious difficulty for scientists and health professionals, who are only able to propose dry generalisations against the more emotive and sympathetic figures of parents concerned for the welfare of their children.

Our own survey suggests that more parents would, given a choice, still opt for the MMR vaccine over three separate vaccinations or no vaccinations at all. The media coverage, on the hand, suggested anti-MMR parents outnumbered those in favour by more than 5 to 1.

Table.10 Parents as sources – which side are they on?

	Pro-MMR	Unclear/Undecided	Anti-MMR
Newspapers	7	12	37
Radio	0	1	5
TV	3	3	10
Total	10	16	52

There is, of course, a danger here of a significant decline in take up of the MMR vaccine becoming a self-fulfilling prophecy, a point we explore below. The key question we should ask is whether the coverage enabled members of the public to make informed decisions about MMR, either as citizens (on a matter of public policy) or as parents of young children.

MEDIA COVERAGE OF CLONING AND GENETIC MEDICAL RESEARCH

Kitzinger and Reilly, writing about the coverage of genetic research, identified the dichotomous nature of media coverage on this issue. Human medical genetic research is either framed in terms of 'the 'great promise' discourse focusing on the benefits the science can bring' or else, the 'concern' discourse, focusing on the risks associated with the application of knowledge gained' (1997: 322). Our study confirms that this dichotomous framework remains very much in operation: reports tend to be scientifically technical, or else avoid all mention of science and concentrate on the ethical aspect of genetic medical research.

The Sun's coverage of the creation of a national Cell Bank is a good example of this dichotomy, to the extent that the same story is reported twice with very different headlines. The first story, on August 28, 2002, led with the headline 'EMBRYO CELL BANK SHOCK', clearly prompting the 'concern' framework, even if the copy itself is less alarmist:

"HUMAN embryos are to be used by Government scientists to create a bank of cells for medical research. Couples will be asked to donate embryos left over after IVF treatment. The Medical Research Council would then build up a stock of stem cells -the body's building blocks which can develop into any type of cell. Critics claimed there would be undue pressure on IVF couples to make donations. But the Department of Health said: 'We welcome the initiative'."

SCIENCE IN THE NEWS: AN OVERVIEW

Two weeks later (on September 10, 2002) *The Sun* reported the same issue with the headline 'STEM CELLS BANK A FIRST', suggesting that such a thing was a symbol of scientific progress.

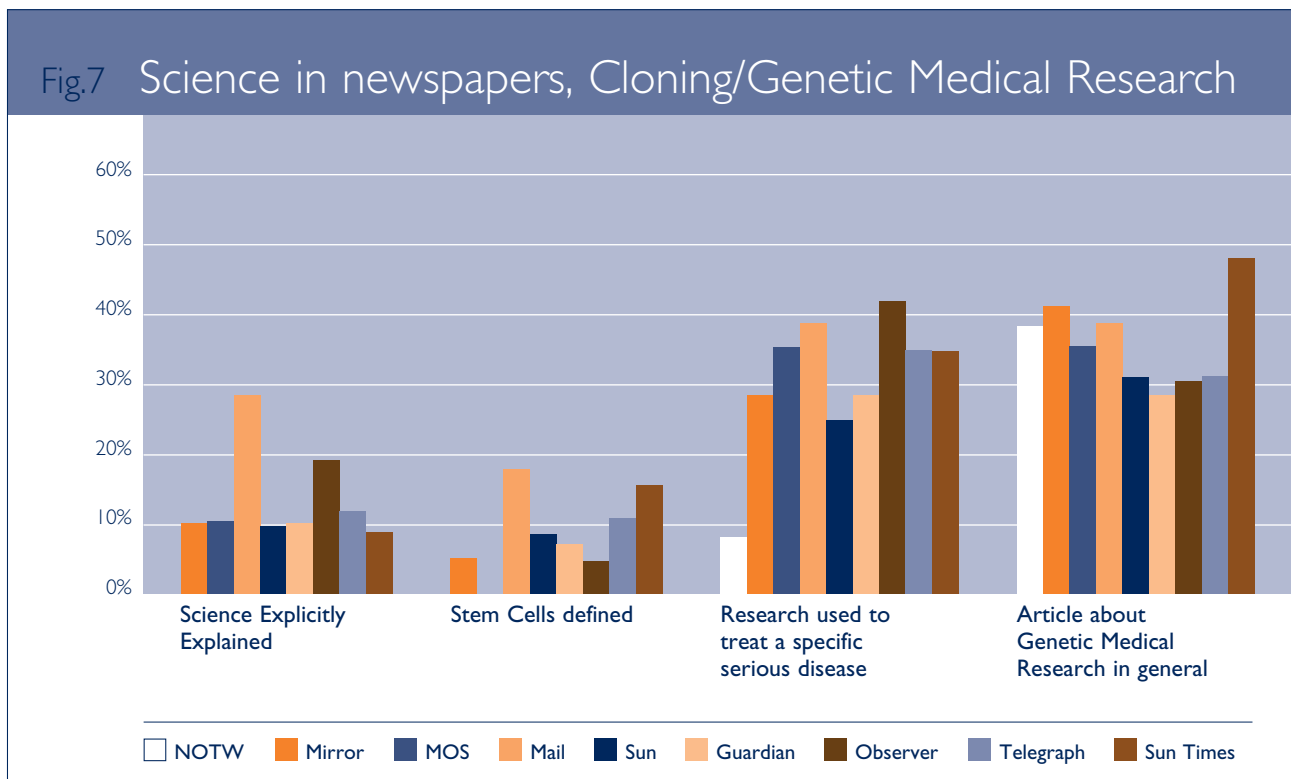
"EUROPE'S first stem cells bank may be set up in the UK within a year, it was announced yesterday. The National Institute for Biological Standards and Control has won a Pounds 2.6million government contract to run one in Hertfordshire. Stem cells – the body's base cells – can be extracted from embryos and adult bone marrow. Doctors will use them to treat such diseases as Parkinson's and diabetes."

The 'great promise' framework relies upon an understanding of the medical potential of genetic medical research, and television and radio reports on this issue tend to also do a better job than the press in explaining why this kind of science is of medical importance. Television, in particular, is consistent in explaining the scientific rationale behind the research, and did so in 16 of the 17 news reports on this issue. However, whilst television may be presenting the issue with a mission to explain it, there is little television coverage overall. So, for example, while the House of Lords decision to permit experimentation of cloned embryos on February 28th was top of both ITV and BBC early evening news broadcasts, coverage of the story was not sustained, making only sporadic appearances over the next six months.

Less than a third of newspaper articles by contrast (32 per cent), explain the scientific rationale behind most of this research. And although the *Mail* was more likely than many other newspapers to include a scientific rationale, it also provides an example of how this scientific context tends to be excluded when the story moves into the 'concern' framework, as in the following editorial:

"In America a lesbian couple deliberately produce a test-tube baby that is, like themselves, deaf. Meanwhile, it is reported that a patient of Italian fertility expert Professor Severino Antinori is pregnant with the world's first human clone, though medical opinion fears for its health in the unlikely event of it ever being born. Such stories provide a chilling, warning vision of the nightmare world we could be entering by allowing such irresponsible dabbling with the very stuff of human life" (8th April, 2002).

Figure 7 shows how often the scientific context is often omitted from newspaper articles about genetic medical research. The first column 'Science Explicitly Explained' represents instances where newspapers have dedicated more than one sentence to explaining the science associated with the story covered.



One could argue that the greater volume of newspaper stories on this issue means that explanations might appear to editors to be repetitive. So, for example, *The Sun* and *The Daily Mirror* both ran short explanatory pieces on the day of the House of Lords ruling – ('STEM CELLS: THE FACTS' AND 'HOW STEM CELLS CAN AID MEDICINE' respectively). The problem with this argument, as we shall see, is the implication that public understanding is such that such repetition is unnecessary.

This lack of clarity may be compounded by the news value given to the more disturbing or frivolous possibilities of cloning research, with headlines like 'SCIENTISTS TO CLONE EXTINCT BEASTS FOR THEME PARK' (*The Sun*, 20th Aug, 2002) or 'JUST WHAT THE WORLD NEEDS – ANOTHER TIDDLES' (*The Observer*, 17th Feb, 2002). The first of these stories – despite its scientific implausibility – was the subject of a follow up *The Sun*, through one of their regular 'vox pops' featuring the views of a 'White Van Man', who opined on August 24th: 'This is crazy. Scientists could be unleashing something dangerous. I don't think they should be playing around with nature – they might get some nasty surprises...'

Figure 7 also shows that a number of stories in the sample addressed Genetic Medical Research, as opposed to cloning. A smaller percentage of these articles referred to current research helping specific diseases, making it easier for the public to understand why the research was carried out. The following two articles show how journalists and politicians use a reference to a medical disease as a short cut in explaining the research:

“BRITISH scientists yesterday announced a breakthrough in the treatment of cervical cancer – that could be taken in an OINTMENT They have identified a molecule that kills cancerous cells but ignores healthy ones. The scientists claim it could be sold in ointment form – avoiding surgery or radiotherapy, which affect fertility...” (*The Sun*, September 6, 2002, upper case in original article).

“I want to make the UK the best place in the world for this research, so in time our scientists, together with those we are attracting from overseas, can develop new therapies to tackle brain and spinal cord repair, Alzheimer's disease and other degenerative diseases, such as Parkinson's,” said Mr Blair...” (*The Daily Telegraph*, May 24, 2002).

On the whole, the dichotomous coverage would, in terms of style, seem to lean in favour of the ‘concern’ framework, which is generally more dramatic and engaging than the coverage of more benign developments in cloning and genetic medical research, which are generally pigeon-holed as ‘science’ stories. Some newspapers do attempt to liven up their coverage, however, with the use of celebrities. Although not mentioned in significant numbers in most media on this issue, celebrities appear in half of all the cloning and genetic medical research articles in the *News of the World* – in particular the actor Michael J Fox’s battle with Parkinsons disease and Christopher Reeve’s support for stem cell research.

In terms of public understanding, the main issue here would seem to lie in people’s ability to connect these two frameworks. In short, we need to understand something about the science of cloning and genetic medical research if we are to make the ethical judgments that place this issue in the public domain.

Media

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

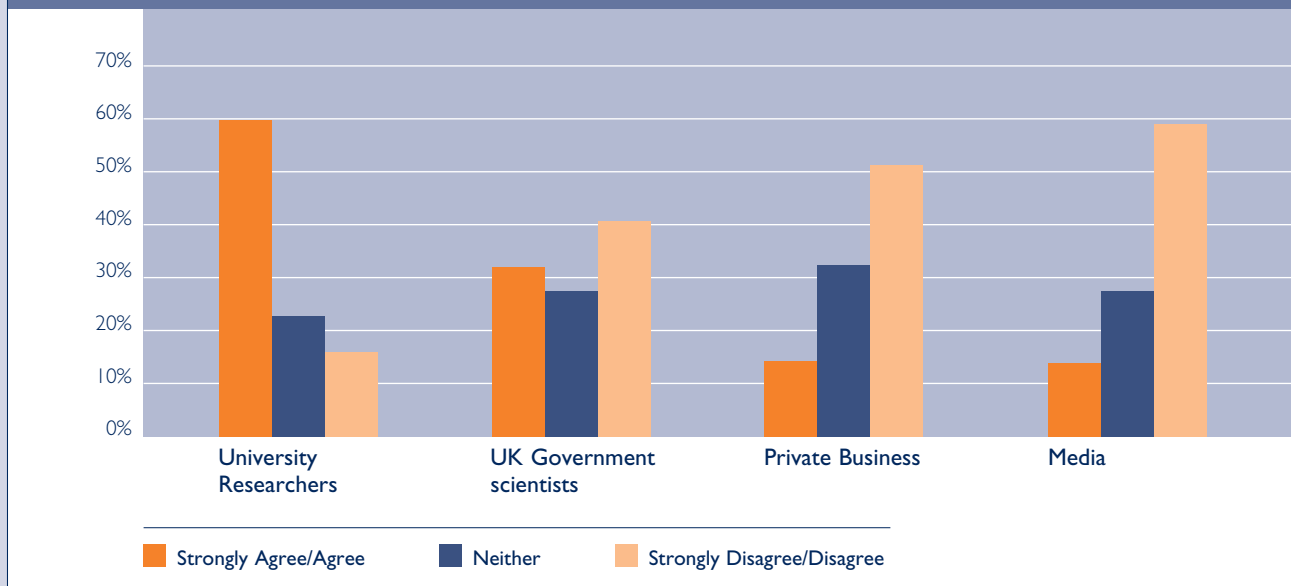
In this section we shall explore the public understanding of and attitudes towards science on the basis of two nationwide surveys. We will look in detail at public knowledge of the three issues we have tracked thus far, and then explore the relationship between media coverage and public understanding.

TRUST

Our first survey in April showed that people, in theory at least, differentiate between types of scientists in terms of trusting the information they receive.

Most people place a great deal of trust in university research scientists, while a majority say they distrust what scientists working for private business have to say.

Fig.8 How far do you agree that you trust scientific evidence from...?



Government scientists come somewhere in between the two. This suggests that scientific information is partly judged in terms of the perceived independence of those producing it. It also reflects trends in other surveys showing the decreasing trust people have towards the motives of private business.

The relevance of this for media coverage is not as straightforward as it might seem. Even if it is clear from media coverage who a scientist quoted is working for (and, perhaps more pertinently, where their funding comes from), it is unlikely, given the generally low levels of recall elicited by news, that most people are able to attend to such detail when absorbing information.

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

A majority also say they distrust scientific information they receive from the media – another response we should *not* take at face value. Research generally suggests that many people often *claim* to receive media – especially, in the British case, the press – with a high level of critical scepticism. This scepticism tends to be somewhat abstract, however, as people tend to trust the media they actually use (Hargreaves and Thomas, 2002). Given this, it is not at all certain that people are actually this discriminating in processing information (Lewis, 2001; Kitzinger, 2000), as we will see shortly.

Since our first survey suggested that people assume that the *motive behind research* is important to understanding the research itself, we explored the issue further in our second survey. The results here suggest that if some people are cynical about the aims of scientific research, a clear majority – 70 per cent – still see scientific research as a force for good in the world.

Table.11 “Which of the following do you think is the main aim of most scientific research?”

To improve human life	70%
To satisfy the curiosity of scientists	11%
To benefit business	11%
Don't know	8%

While one in seven (14 per cent) of the stories on the MMR coverage in our study refer to a decrease in the trust of science and scientists in the last few years – this response would indicate that one should not over-estimate this loss of trust. So, how big an impact did issues like CJD/BSE, in which mainstream science was called into question, actually have on people? The second survey asked the following open-ended question, with responses as listed:

Table.12 “Can you think of anything in recent years which has decreased your trust in science?”

No	45%
BSE/CJD/Mad Cow Disease	24%
Foot & Mouth	17%
GM Food	15%
Cloning/Stem Cell	13%
MMR	12%
Nuclear Issues	10%
Climate Change	8%
Government manipulation of/interference in science issues	7%
Mobile Phones	6%
General Disagreement between scientists	4%
Other	5.3%

Thus prompted, a majority *do* imply a decreasing level of trust, although since the question tends to encourage this response, it is notable how many – 45 per cent – say that nothing has decreased their level of trust. And while the CJD/BSE outbreak is often regarded in media discourse as the key moment in this respect, it may be a distant memory for some people, since it only just heads a fairly wide list of issues people were able to nominate.

OVERALL LEVELS OF SCIENTIFIC UNDERSTANDING

Both surveys asked the same 13 questions in order to establish levels of public understanding of science or science policy. The questions were designed to test a basic (rather than advanced) knowledge of the science or research, with particular emphasis on exploring the policy and political developments in relation to scientific issues. It is worth noting, at this point, that we are *not* suggesting that these questions are all necessarily things people *need* to know to be able to make useful or worthwhile responses to these issues. Some facts, in this respect, are clearly more pivotal than others. We shall return to this in our conclusion: at this point, we want simply to record what people knew, what they didn't, and, crucially, how these things might be responses to media coverage.

All the questions in the index were multiple choice, offering between two and five possible answers. The average number of correct responses remained remarkably constant – and fairly low – across the two surveys, decreasing marginally from 5.0 correct responses in April to 4.9 correct responses in October (around 38 per cent in both surveys). On the basis of this, it is clear that overall levels of public understanding are fairly low, especially when one considers that the average score is not much higher than it would have been – given the multiple choice format – had people been guessing arbitrarily throughout. We should note, however, that the shape of responses do suggest *a degree* of understanding, albeit limited, in some areas.

What is, perhaps, more surprising, are the scores amongst those with more science education, or more education generally. While those with more education did better, the difference between those with more and less education was not as great as might have been expected.

Table.13		
Level of Education	Averages Score	
	April	October
No formal qualifications	4.2	3.9
GCSE/O Level	4.6	4.4
A Level/Higher/B-Tech	5.3	5.3
Degree or equivalent	6.3	5.9
Postgraduate	6.5	6.8

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

So, for example, while those with no science education at all scored between 4.3 and 4.5, those with science degrees only scored just above 50 per cent (between 6.8 and 6.9).

Table.14

Level of Science Education	Averages Score	
	April	October
None	4.5	4.3
GCSE/O Level	5.5	5.5
A Level/Higher/B-Tech	6.5	6.1
Degree	6.8	6.9

In terms of age, those between 45-54 scored highest, with the under 25s and over 65s scoring lowest. There are some interesting exceptions to this, which we will look at later in relation to climate change.

Although television is the most popular source of information about science related stories (59 per cent say it is their main source of such information⁷), the *amount* of television people watch has little effect on knowledge. Heavier television users tend to score lower, although this group also tends to be less educated. The frequency with which people watch television news also has little discernible effect, with the exception of people who watch little or no news, who do tend to score lower.

Perhaps not surprisingly, broadsheet readers did better than tabloid readers, although again, differences are not that great. Most broadsheet readers averaged scores between five and six, tabloid readers between four and five (although readers of the *Daily Star* were well at the bottom of both surveys, averaging around 3.5 correct answers).

Given the fairly low levels of knowledge overall, it is not surprising that when we asked respondents (in the October survey) if there were occasions when they 'felt confused about scientific issues', most – 79 per cent – said yes. Interestingly, those who admitted feeling confused knew slightly more (4.9 to 4.7) than the 21 per cent who claimed they did not!

When it came to self-assessment in relation to three issues, people were a *little* more self-aware. In each case, those who felt well informed about the issues did better than those who felt 'partly informed', with those saying they felt 'not very well' informed scoring lowest.

Table.15 “How well informed do you feel you are about...”

	Average Scores		
	Well informed	Partly Informed	Not very well informed
Climate Change	5.9	5.1	3.7
Cloning/Genetic Medical Research	6.2	5.7	4.5
MMR	5.5	5.2	4.0

⁷This is followed by 22 per cent who nominate newspapers as their main source, seven per cent say radio, five per cent the internet, four per cent magazines, two per cent books and two per cent say their friends. Newspapers top the list of second favoured sources (45 per cent, followed by television (25 per cent), radio (11 per cent), friends (five per cent), the internet (five per cent), magazines (four per cent) and books (three per cent).

Once again, however, the differences are not great, all of those groups claiming to be well informed scoring an average less than 50 per cent. This highlights the problems in testing knowledge *purely* through self-assessment (an increasingly common practice) revealing as it does the gap between *claiming* to be informed and actually being informed. While self-assessment might be useful in measuring people's self-confidence, such measure do not, on their own, tell us what or how much people know.

Table.16 “Are there times when you feel confused about scientific issues in the news?” (Oct. only)	
	Average Score
Yes	4.9
No	4.7

If most people are sometimes confused about scientific issues, who do they blame? Chiefly, according to half the people in our survey, the complexity of the scientific issues themselves. Yet how difficult is most of the basic science that makes it into the news? While science can, like any discipline, be very difficult, most of the questions in our public understanding index were at a fairly basic level. So, for example, the ‘greenhouse effect’, in which greenhouse gases accumulate to prevent heat from escaping from the Earth’s atmosphere, is a fairly simple concept to understand. As an idea, it is not much more complex than understanding, say, the offside rule in football (let alone the difference between, say a 4-4-2 and a 3-5-1-1 formation). And yet most people (16 per cent in the April survey, 17 per cent in the October survey) were simply unaware of the workings of the greenhouse effect, assuming, instead, that greenhouse gases thinned the ozone layer (a response we shall look at in more detail when we look at the public understanding of climate change).

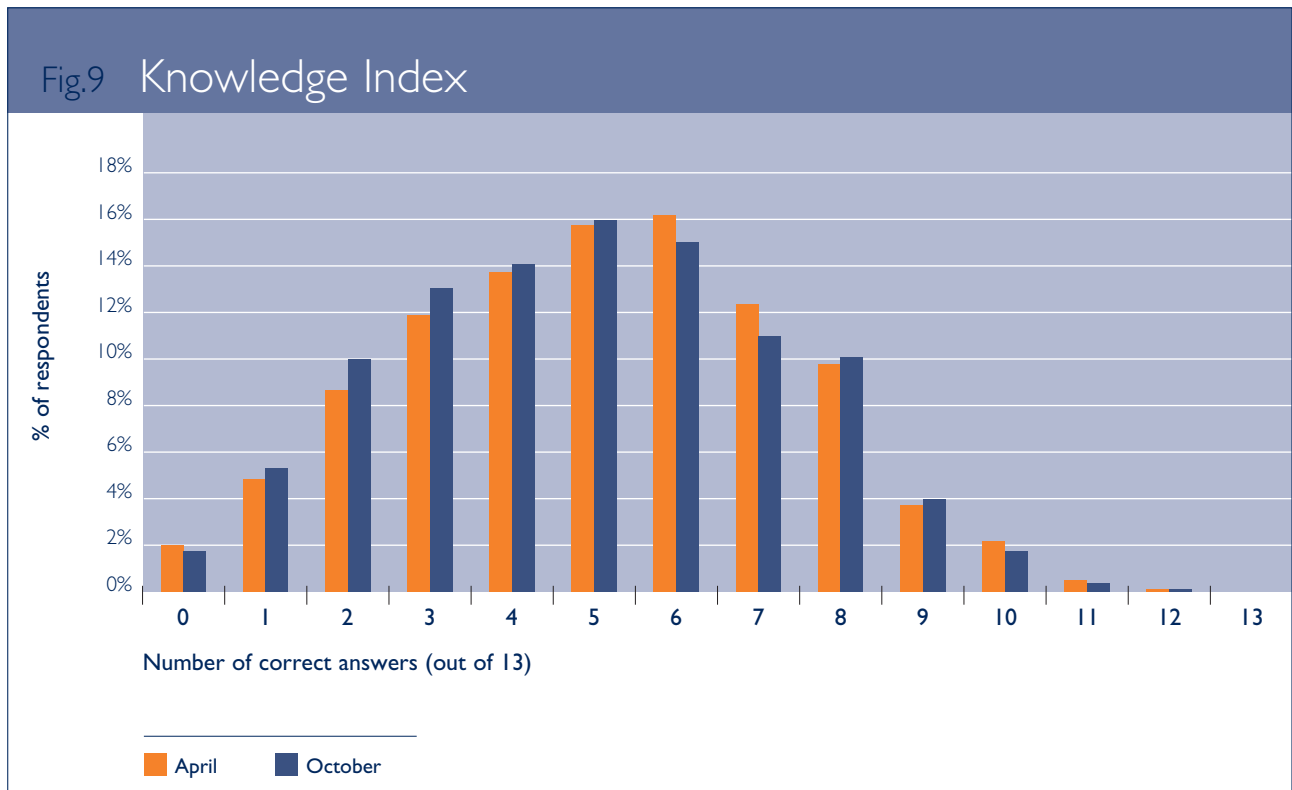
Table.17 Main reasons for feeling confused about scientific issues in the news			
	First reason	Second reason	Total reasons
Complexity of scientific issues	49%	20%	55%
Media coverage	22%	30%	42%
Personal lack of interest	15%	9%	19%
Business propaganda	7%	17%	18%
Government interference	6%	19%	19%
Not answered	1%	5%	1%

The second most nominated source of confusion was the media, and it is to the role of the media that we now turn.

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

WHAT DID WE LEARN FROM MEDIA COVERAGE BETWEEN APRIL AND OCTOBER?

The simple answer would *appear* to be simple – we did not learn very much that we didn't know before. As Figure 9 suggests, patterns of knowledge or ignorance are remarkably consistent across both surveys.



In terms of question by question comparisons, most differences between the two surveys fall within a three per cent range. Only five knowledge questions showed shifts of five per cent or more from April to October. We found:

- a seven per cent increase of those who *correctly* identified a forest as an example of a 'carbon sink' (up from 51 per cent to 58 per cent);
- a five per cent increase of people *incorrectly* identifying 'less rainfall in winter' as a predicted outcome of climate change (from 19 per cent to 24 per cent), although correct responses ('more rainfall in winter') only dropped by one per cent (from 53 per cent to 52 per cent);
- a seven per cent drop in those who *correctly* stated that the bulk of evidence suggested no link between the MMR vaccine and autism (from 30 per cent to 23 per cent), with a 14 per cent increase in those stating *incorrectly* that there was 'equal evidence on both sides of the debate' (up from 39 per cent to 53 per cent);
- a seven per cent drop in those *incorrectly* stating scientists had recently cloned a human being (from 16 per cent to nine per cent – although the shift here was a seven per cent increase in 'don't knows' rather than towards a correct response);
- a six per cent increase in those *correctly* identifying the treatment of disease as the main focus of stem cell research (from 60 per cent to 66 per cent), with a five per cent drop in those *incorrectly* identifying the creation of identical copies of human beings as the main focus (from 11.5 per cent to 6.5 per cent).

Most of these shifts are still too small to be anything other than mildly suggestive. The only discernible pattern in these responses is a small shift in the understanding of stem cell research, away from fears about the cloning of human beings, and towards an awareness of the use of stem cell research for treating disease (a point we shall take up shortly).

Overall, however, most increases and decreases in knowledge are minor and scattered fairly arbitrarily. This suggests that, despite fairly persistent media coverage of these issues, there is no significant increase in public understanding. This does *not* imply, however, that the media coverage has had no impact on public understanding, merely that *any impact on knowledge is fairly consistent over time*. This finding is very much in line with other studies of public opinion, which tend to find that, unless subject to major media campaigns, changes are gradual and long-term (see, for example, Page and Shapiro 1992). For those wishing to influence public understanding, this not only requires remaining (to use current political jargon) 'on message', but doing so in way that establishes or fits within the overall framework of news reporting.

We shall develop our understanding of the media's role when we look in more detail at knowledge of the three issues, when some interesting patterns emerge. As we shall see, the framework for understanding an issue may develop fairly quickly in a burst of coverage (as with MMR), or with repetition of longer periods of time (as with the other two issues). This presents a real challenge for anyone seeking to influence public opinion.

THE MEDIA AND PUBLIC UNDERSTANDING OF CLIMATE CHANGE

Our analysis of media coverage suggested that this was an issue that received more attention in the broadsheets than the tabloids, with *The Guardian* and *The Sun/News of the World* being at the two ends of the spectrum. It is notable, then, that in the October Survey 83 per cent of *Guardian/Independent* readers felt that climate change 'was something we should be concerned about', compared with only 55 per cent of *Sun* readers. A significant proportion of readers would therefore appear to be following their newspaper's lead in their levels of concern, or else have selected a newspaper in line with their own preoccupations.

More profound, perhaps, is the way *media content is generally reflected in the public understanding of climate change*. In short, people *are* aware of the issue, and most people are able to link climate change to the destruction of forests and carbon dioxide emissions. But few people can explain the *process* behind this link, and as a consequence, see climate change as a consequence of a whole hotch potch of environmentally sensitive issues. Whether this *matters* or not, in terms of people's ability to contribute to discussions about the climate change, is an issue we shall take up later. Our concern at this point is the way in which media coverage is reflected in public understanding.

As we have seen, media coverage *does* pay attention to the proposed causes of climate change (55 per cent of stories make some reference to the causes), but only in cursory way. So while greenhouse gases are mentioned in four out of ten newspaper articles, the *greenhouse effect itself* is rarely explained. It is perhaps not surprising then, that confronted with a list of possible causes, most people tend to respond with a rather cavalier list. Most of the issues on this list are matters of environmental concern, but some have little to do with climate change (see also Bell 1991: 239, for a discussion of knowledge of the causes of climate change).

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

Table.18 “As far as you know, which of the following are causes of climate change?”

	April	October	Average
Destruction of forests	70%	73%	71%
Nuclear power plants	44%	45%	44%
Carbon dioxide emissions	65%	67%	66%
Air pollution	71%	74%	72%
Hole in the ozone layer	66%	64%	65%
Don't know	6%	5%	6%

On the surface, the number of people who see the hole in the ozone layer or nuclear power plants as causes of climate change is difficult to explain: this is *not*, after all, a claim made in media coverage. But the fact that *so many people make these links* tells us something about the way people learn from the media.

Other research on the relationship between news and public understanding suggests that most people consume news rather inadvertently, and hence only take in certain aspects of a story. They also find it hard to follow the often truncated narratives of news – which unlike other stories, tends to start with the climax of a story before giving any history or background – and hence a great deal of information passes people by. The information that *does* stick, in this context, is often based on often repeated associations (Lewis, 1992; 2001). People then use what information they have to make sense of the world – what has been called ‘low information rationality’ (Sniderman, Brody and Tetlock, 1991) or ‘information short-cuts’ (Popkin, 1991).

In the case of climate change, this involves turning associations (between environmental problems like the thinning ozone layer and global warming) into *causal* links. In the last few years, media reports have often mentioned global warming and the ozone layer in the same breath:

“A new satellite which will provide scientists with a kind of health check for the earth was launched today. The satellite, costing £1 and half billion, will orbit earth for the next 5 years studying things like the hole in the ozone layer and global warming” (ITV News, 1st March, 2002).

“WHEN British engineers pioneered the industrial revolution and the world's first great factories 200 years ago, their eye was on progress and profit – not pollution. But scientists now believe it put us on a collision course with nature, which will see the destruction of many aspects of life on earth. Hundreds of millions of cars now spew out poisonous gases. Cities belch smoke up into the ozone layer, while distant conferences sit and discuss what to do about it. At the heart of the debate is the effect of ‘global warming’ and the ‘greenhouse effect’, caused by us producing too much carbon dioxide from burning fossil fuels. If addressed quickly enough, we might start to slow the process of the planet getting hotter” (The Daily Mirror, 29th March, 2002).

Neither of these examples assert a causal connection, and *yet in the absence of any other explanation offered*, most people tend to assume one. This is suggested more clearly by the response to a question asked in both surveys about the greenhouse effect. The erroneous idea that greenhouse gases effect the climate by thinning the ozone layer outnumbers correctly responses (they 'prevent heat from escaping out of the earth's atmosphere') by more than three to one. Bell also found that people often attributed rising temperatures to ozone depletion, which he describes as a 'classic case of meltdown between events with similar mental scripts' (1991: 245).

Table.19 “Which of the following explains the way that greenhouse gases affect our climate, they...?”

	April	October
Directly warm the earth's surface	13%	17%
Thin the ozone layer	54%	53%
Prevent heat from escaping out of the earth's atmosphere	16%	17%
Evaporate cloud cover	2%	2%
Don't know	15%	12%

While those with more science education were more likely to get the answer right, the figure still rises to only 24 per cent for those with a formal qualification in science (GCSE or above). And the percentage of correct responses overall is notably lower than the 25 per cent who claimed to be 'well informed' about this issue.

One could argue that ignorance of the technicalities here are less important than a more holistic understanding of the environment. Thus, for example, one could argue that people are right to understand the thinning ozone layer *and* the greenhouse effect as linked, in the sense they are both environmental problems caused by industrialisation and human activity. We shall return to this issue in our conclusion: for the time being, what interests us about these responses is what they reveal about way media coverage (whether it means to or not) creates explanatory frameworks.

Interestingly, the age group *most* likely to get this particular question right was the one with the lowest scores overall – the 18-25 year olds. Those in this age group with more education did particularly well, 22 per cent those with A-Levels and 37 per cent of those with a degree answering correctly. This suggests that schools have recently included a scientific explanation of global warming in their teaching, with a considerable degree of success.

General lack of certainty about the causes of global warming is also reflected in the difficulty people have in connecting the local with the global, thereby understanding how the daily choices in their own lives might be linked to climate change. So, for example, although a number of stories linked global warming to the phrase 'fossil fuels', few explained what this meant, and less than two per cent of the articles mentioning climate change in our study made any reference to how the public might contribute to reducing the rate of climate change.

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

A rare attempt in our sample to deal with this type of issue is made by *The Observer's* travel editor Jeannette Hyde, as follows:

“one seat on a flight from the UK to the US is responsible for as much global warming from carbon dioxide emissions as one average driver using a car in the UK for a year” (17th April, 2002).

While it is very difficult to be definitive about environmental impacts, many climate change scientists have argued that flying goods around the world tends to involve the burning of more fossil fuels than buying local produce, thereby contributing to climate change. Since this is a good example of how people's everyday choices may have an impact on the issue, as well as one which reveals a degree of understanding of what fossil fuels are, we asked people in our surveys to make such a choice.

Table.20 “In a supermarket which of these choices would have the **Least** impact on climate change?”

	April	October
Buying organic apples from New Zealand	26%	23%
Buying non-organic apples that are locally produced	40%	44%
Don't know	34%	34%

The word 'organic' is undoubtedly a source of confusion in this respect, since it is generally *associated* with environmentalism, suggesting, once again, that for around a quarter of our sample, associations may be standing in for causal relationships⁸. The answers do suggest, nonetheless, that more people (more than four in ten) were aware enough of the role of fossil fuels to make the hypothetical choice for local produce.

In some instances, 'low information rationality' *does* push a majority towards the correct response. The concept of a 'carbon sink' may have been familiar to a minority following post-Kyoto negotiations between the US and Europe, but it is not a term widely used in media coverage. Nonetheless, there was enough information in the following question for most people to work out what it meant.

⁸We are aware that the use of fossil fuels in the production and transportation of pesticides in the production of the non-organic apples may complicate this comparison. While it is possible that those choosing the organic option were making such a calculation, we think it more likely that those who are aware of the role of fossil fuels in global warming would have picked the first option.

Table.21 “Some countries agree the best way to deal with climate change is to find ways of absorbing carbon dioxide, this is known as a carbon sink. Which of the following is the best example of a carbon sink?”

	April	October
A forest	52%	58%
A toxic dump	8%	7%
A wind farm	4%	2%
A landfill site	6%	4%
Don't know	31%	28%

Since the association between deforestation and climate change is already well established (partly by long-running campaigns to save rain forests), ‘forests’ become the most plausible response for a majority of respondents.

Our news study also suggested that the news media pays considerable attention to the *consequences* of global warming, particularly in the British context. To test how widespread knowledge of these consequences is, we asked a question with a correct response that is, in some ways, counter intuitive. Hence the predicted increase in winter rainfall might seem, for some, to contradict the idea of ‘global warming’ (for British people, wet and cold weather are often seen to go together). Nevertheless, most people in both surveys gave the correct response.

Table.22 “Which of these is a predicted climate change for the UK?”

	April	October
Less rainfall in winter	19%	24%
More rainfall in winter	53%	52%
No effect on rainfall	5%	4%
Don't know	23%	19%

So if the news tends to ignore the processes behind global warming, it appears to be much more instructive in creating an association in people's minds between climate change and increased rainfall. This fits, once again, with news values, in which the dramatic flooding in recent years has been linked with climate change.

Climate change has become a major international political issue in recent years, and the surveys included a question to examine whether one of the main points of conflict in international negotiations on climate change is common knowledge.

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

Table.23 “The Kyoto Protocol aims to get countries to agree measures to reduce the threat of climate change. Which of the following is opposed to the Kyoto Protocol?”

	April	October
European Union	3%	4%
USA	52%	48%
UK	2%	1%
Mexico	4%	3%
Don't know	40%	45%

This is an issue that has received a moderate amount of media coverage, and around half our respondents get it right. Answers here might also be influenced by attitudes to the Bush presidency. What is more notable about this response is the comparative *absence of incorrect* assumptions. This appears to be one of those areas that people either feel they know or they don't – over 90 per cent of responses are either correct or 'don't know'. The fact that this is unusual is indicative of the *process* by which people learn from news: this is one of the few questions that does not involve answers where associations people draw from media coverage might steer them in the wrong direction.

Overall, the relationship between media coverage and public understanding on this issue demonstrates both the media's power to inform and, inadvertently, to misinform. On the one hand, most people have clearly learnt a number of things from the media coverage of this issue, but the way people absorb information from the news means that they are also inclined to mistake thematic links for causal links. This, in turn, has made people concerned about climate change, but much less clear how it works.

THE MEDIA AND PUBLIC UNDERSTANDING OF THE MMR CONTROVERSY

As we saw in the coverage of the story itself, the MMR issue is often compared to the BSE/CJD crisis, both stories involving potential risks to the public initially denied by both government and mainstream science. And there is no doubt that the BSE controversy framed much of the MMR coverage. Andrew Wakefield may be something of a voice in the wilderness, but, pitted against a phalanx of government officials and experts, journalists were also unwilling to discount the possibility that he *may* be right.

We found, first of all, that many of the key moments in the narrative did get across. Indeed, in many ways this story was the most successful of the three at communicating key themes. In particular, the specific link between MMR and autism was repeated in most stories on this issue, and most people (two out of three of our respondents in both surveys) were consequently aware of it.

Table.24 “Some recent research has suggested there might be a link between the MMR vaccine and which medical disorder?”

	April	October
Blindness	3%	4%
Dyslexia	2%	2%
Down's Syndrome	8%	7%
Autism	67%	66%
Don't Know	21%	22%

Leo Blair's role in the story was also widely covered and widely known – producing one of the highest percentages of correct answers in both surveys (66 per cent in April and 70 per cent in October)⁹.

Table.25 “Which of the following statements is true...?”

	April	October
The PM's son, Leo Blair, has had the MMR vaccine	23%	17%
The PM's son, Leo Blair, has not had the MMR vaccine	8%	11%
The PM has stated that this is a private matter	66%	70%
Don't know	3%	3%

Quite why the Prime Minister's involvement produced such a high percentage of correct responses is less obvious. While mentioned in many stories (32 per cent in our sample overall), it was by no means the most prominent aspect of the coverage. It is possible that the human interest value of the Prime Minister's personal involvement in the story made this information more memorable. But we should not overlook the *importance* of Tony Blair's position in the story. For people confused about who to trust, this was an important indicator of the government's faith in its own position. In a nutshell, was the government's support for MMR deeply felt or merely tactical and strategic? Leo Blair might, therefore, be reasonably seen as a test of the government's confidence in its own position.

⁹ Because this question is not, strictly speaking, knowledge of science or science related policy, it was not included in our public understanding index.

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

This point alerts us to the importance of *narrative* in communicating information. Tony Blair's involvement was significant because it came at a key stage in the narrative, made all the more compelling by the degree of suspense surrounding it¹⁰. If Leo Blair *had* been given the MMR vaccine, our findings suggest that the Prime Minister's refusal to disclose this information (while understandable on a personal level) was, in public health terms, a mistake. It kept open the possibility that the Prime Minister had reviewed the evidence and decided *against* the MMR jab, which can only have added to people's fears.¹¹

As we have established, many media reports gave voice to both sides in the ensuing debate about the safety of the vaccine. This was sometimes a debate between scientists, and sometimes a debate between scientists or public health officials and concerned parents. The role of parents in this balancing act allowed anecdotal evidence from parents with autistic children to enter the discussion – which, while not authoritative as scientific evidence, is powerful rhetorically. Indeed, scientists or public health officials cannot have relished debating people who not only commanded immediate public sympathy, but whose own children were, apparently, testimony to the risks involved with vaccination.

If some media reports did point out that the *weight* of scientific evidence suggested the safety of MMR, this was not, apparently, the *impression* created by the coverage. When asked about the scientific evidence, many people (25 per cent in April, falling to 20 per cent in October) felt that Wakefield's speculative claim was actually *backed* (rather than contradicted) by most research, while the most popular response was to say that there was 'equal evidence on both sides'.

Table.26 “Which of the following statements is true...?”

	April	October
The weight of scientific evidence currently suggests a link between MMR vaccine and autism	25%	20%
The weight of scientific evidence currently suggests no link between MMR vaccine and autism	30%	23%
There is equal evidence on both sides of the debate	39%	53%
Not answered	6%	4%

¹⁰ See Lewis, 1991, for an analysis of the importance of narrative codes in communicating news.

¹¹ One should not forget, of course, the way in which John Gummer's attempt to assuage fears about beef by feeding his children burgers during the BSE crisis appeared to backfire. The Prime Minister's standing and image is, however, probably more credible and authoritative.

This indicates that the traditional 'balanced' approach taken by many reports seems to have been what lingered in most people's minds: indeed, the impression of an equally divided body of research on the controversy hardened between April and October, rising from 39 per cent to 53 per cent. This increase of 14 per cent was the biggest overall shift in our knowledge index, and suggests a degree of confusion early on in the story, with the 'balanced' framework becoming more dominant as the story developed.

What we see here, once again, is a distinctive pattern of learning, whereby people absorb a dominant media framework, and then use it to make suppositions. So even where reporters spell out the relative weight of evidence, as this BBC report did:

"parents...have to decide who to trust – either the vast array of medical experts here and abroad who are convinced MMR is safe or Dr Wakefield who has the vocal support of a minority of parents" (BBC News, 7th Feb, 2002).

what appears to *get heard* is merely that there are two bodies of evidence. In this instance, this encourages a movement away from *both* the correct answer and the most obviously incorrect answer, and towards a misleading and decidedly uncertain middle ground.

Another often repeated aspect of the story – the idea that the take up of MMR was falling fairly rapidly – also seems to have hit home. When asked how much take up was falling (at a time when evidence suggested a fairly small overall decline), a plurality overestimated, with less than one in six people giving the correct response. Once again, this suggests that people are not necessarily responding to the details of media content – claims about the overall decline were rarely technically inaccurate – but to a simpler association in which the repetition of the theme of declining take-up (the third most prominent theme in our sample of the coverage) led to an assumption over-estimating that decline.

Table.27 "The MMR vaccine was first used in the UK in 1988. Research published in 1998 caused the first controversies surrounding the vaccine. Since that time the number; of children vaccinated with MMR has..."

	April	October
Fallen by half	20%	20%
Fallen by quarter	31%	26%
Fallen by a smaller amount	17%	15%
No significant change	6%	5%
Don't know	26%	34%

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

We do not know, as yet, what the longer term implications of this story are for the decline in take-up of the MMR vaccine, although our survey offers some clues. When respondents were asked what choice they would make, about half opt for the MMR vaccine. For many respondents, of course, this is merely a hypothetical choice. Nevertheless, this does suggest that while it remains the most popular option, there has been a serious loss of confidence in the vaccine. The decline from 53 per cent in April to 47 per cent in October is, perhaps, a particularly worrying trend for public health professionals.

The 'separate vaccines' option – the second most recurrent theme in media coverage – is the most popular alternative, favoured by around a third of respondents in both surveys.¹²

Table.28 “If you were making a decision on whether to vaccinate your child against measles, mumps and rubella, what would you choose?”

	April	October
MMR vaccine	53%	47%
Three separate injections	30%	31%
No vaccination	4%	5%
Don't know	13%	18%

What lessons might be learned from this? Journalists clearly felt that they acting in the public interest, while the desire to question officialdom, in whatever form it takes, is manifestly a healthy one. And the popularity of the 'separate vaccines' option suggests that journalists were aware of the public health risks of non-vaccination.

The problem, in retrospect, was that the debate was *not*, on the whole, about the key scientific aspects of the controversy. The fact that the empirical evidence provided by Dr Wakefield did not involve the vaccine at all (implicating the measles virus, *not* the MMR combination) received very little discussion. In short, the subsequent publicity given to the single vaccine occurred despite there being no empirical evidence to support it. The use of anecdotal evidence from a selective (and unrepresentative) group of parents might also be regarded as unhelpful for such an important matter of public policy.

These points matter, because the coverage clearly shaped the way many people understood the issue, and appears to have led to a loss of confidence in the vaccine in Britain – while confidence remains high elsewhere. And the public health consequences of an increase in measles, mumps and rubella infections are very serious indeed.¹³

¹² Although it is worth adding that respondents were not asked to pay more for this option.

¹³ A point graphically made in February 2002 by Dr Liam Donaldson, the Chief Medical Officer, and later by a science museum exhibition and website on the issue.

Given the risks involved following a loss in public confidence, should journalists subject the claims of maverick scientists like Wakefield to more scrutiny before reporting them? This raises a more general question about the coverage of science, which we put to people in our October survey.

Table.29 “If a scientist makes claims that go against the great majority...how do you think the media should approach these claims?”

	October
Wait until other scientists confirm the findings	48%
Give prominent coverage because it is news	34%
No opinion	18%

Perhaps surprisingly, nearly half felt that when scientists go against the grain (as Wakefield has), the media should *wait* until other studies confirm those findings before covering it. This reticence may seem odd, particularly since this issue does not involve issues of privacy, and since such work may already be in the public domain through publication in reputable journals. But it speaks to the degree to which many people feel the need for expert *guidance* on scientific issues. As this parent put it, writing in *The Sunday Times* (on February 10th): ‘I hadn’t gone on the internet and surfed my way across every single website on MMR. I don’t have a science degree either, so I hadn’t read every study ever published in a medical journal.’ The choice, for her, came down to trusting advice from her GP, who she felt was in a better position to evaluate the evidence than she was.

This brings us, perhaps, to the difficulty at the heart of coverage of a health scare like MMR. The story appears to have created doubts in many people’s minds about the safety of the MMR vaccine. And yet, unlike a decision to avoid beef, eggs or any other ‘suspect’ foodstuffs, avoiding the MMR vaccine increases the risk of potentially harmful disease. It was difficult, in this context, for most parents to know what to do for the best (other than opt or campaign for single jabs, a solution without any empirical evidence to justify it) or who they might to seek guidance from. Tony Blair’s refusal to disclose his own decision on MMR, in this context, made the gap between confusion and guidance much more difficult. While for many science stories this might not be a problem, in this case there are direct consequences for public health.

For the purposes of this study, however, what is striking is how successfully the main themes of the media coverage formed the building blocks for public understanding. This was not, after all, a major, headline grabbing story. Yet the consistency of the coverage, the coherence of the narrative, and the connection to a broader public interest made much of it memorable – a point we shall take up later in the conclusion.

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

THE MEDIA AND PUBLIC UNDERSTANDING OF CLONING AND GENETIC MEDICAL RESEARCH

The topic of cloning and genetic medical research has received a great deal of research in terms of the public understanding of science. The Wellcome Trust, in particular, (an independent research-funding charity that aims to improve human and animal health) has played a key role in researching public attitudes towards cloning.

Like many such studies, we found a high degree of public uncertainty. Of the three issues under scrutiny in our study, this would appear to be the one most people find esoteric. While most people claimed to be 'well' or 'partly' informed about climate change and MMR, more than two thirds in our October survey (68 per cent) admitted to feeling not very well informed about this area of scientific research.

Table.30

October	MMR	Climate Change	C/GMR
Well informed	28%	25%	8%
Partly informed	40%	48%	24%
Not very well informed	32%	27%	68%

This may well be partly a response to the way the fact that this remains very much a 'science' story. Our media analysis suggested that the cloning/genetic medical research story is the most likely of the three to involve scientists as sources and the least likely to provoke engagement in newspaper editorials or letters pages.

Interestingly however, when asked questions about the *scientific* aspects of the story our respondents did *not* do conspicuously worse in this area than the other two. What does stand out, in terms of our knowledge index, is the consistently high number of 'don't knows', in response to questions on this issue. In our October survey, for example, the percentage of 'don't knows' in response to questions on this issue never dropped below 26 per cent (while three questions on the other two issues produced 'don't knows' of five per cent or less). In short, if people are more confident than they should be about their knowledge of climate change and MMR, they are much more tentative about cloning and genetic medical research.

So, for example, close to half our respondents were aware that one the key developments in biotechnology in recent years has been the mapping of the human genetic code.

Table.31 "Recently scientists have made a significant discovery in biotechnology that will have a profound effect on the future of scientific research, can you tell me what happened?"

	April	October
Mapped the human genetic code	47%	45%
Cloned a human being	16%	9%
Grew a human kidney in a laboratory	7%	9%
Don't know	31%	37%

And most people are aware that the main aim of stem cell research is to create cells to research the treatment of disease.

Table.32 “Stem cells are an important part of biotechnology research; can you tell me the main focus of this type of research?”

	April	October
To create identical copies of human beings	12%	7%
To create types of cells for use in research on treating disease	60%	66%
To eliminate criminal behaviour in genetic make-up	2%	1%
To create flowers with less fibrous stems	1%	1%
Don't know	25%	26%

Both the questions also indicate a small but interesting shift, between April and October, away from the association with the more stereotypical images of cloning. Thus the percentage assuming that the key development in biotechnology was to have 'cloned a human being' dropped from 16 per cent to nine per cent, while those assuming the main focus of stem cell research was to 'create identical copies of human beings' dropped from 11.5 per cent to 6.5 per cent. By contrast, those associating stem cell research with the treatment of disease increased from 60 per cent to 66 per cent.

This suggests that some progress may have been made since the Wellcome Trust's 1998 report *Public Perspectives on Human Cloning*, which used focus groups and in-depth interviews to see how attitudes were 'influenced by the provision of extra information'. They found that the public's acceptance of research on cloned embryos was 'dependent on there being direct medical benefits' – something our study suggests there is now an awareness of.

Overall, our analysis of media coverage found the presence of both the 'concern' and 'great promise' frameworks in the coverage (Kitzinger and Reilly, 1997). It is possible that while they do not appear to be capturing the public imagination, the sheer repetition of 'great promise' stories is beginning to seep through, thereby strengthening the association between cloning and genetic medical research and the treatment of disease.

The presence of the 'concern' framework, on the other hand, is most clearly revealed in relation to questions of public policy, in which public ignorance is widespread. The House of Lords decision to permit experimentation on cloned embryos in late February was covered by all the major media, and yet most people were not only unaware of this, they assumed that such things were *not* legal in Britain. In both surveys we asked whether the government allowed UK scientists to 'clone human embryos', and only around a quarter said yes (28 per cent in April, dropping to 22 per cent in October), while around twice as many (46 per cent and 48 per cent) said no.

Table.33 “Is the following true or false: The UK Government recently decided that UK scientists are permitted to clone human embryos?”

	April	October
True	28%	22%
False	46%	48%
Don't Know	30%	31%

THE MEDIA AND THE PUBLIC UNDERSTANDING OF SCIENCE

Thus not only are most people *unaware* of public policy in this area, the presence of the ‘concern’ framework is still palpable enough for many people to assume the government could *not* have sanctioned this kind of research. Indeed, in this case, recourse to the ‘concern’ framework appears to have increased slightly between April and October.

We were aware that the phrase ‘clone human embryos’ is particularly powerful in triggering the concern framework, so in October, we also asked essentially the same question using different, less obviously evocative phrasing (removing the words ‘clone’ and ‘embryo’ and substituting it with phrase ‘make exact copies of human cells’). While this did appear to reduce the assumptions of the concern framework somewhat (by around six per cent), the overall direction of responses remains the same.¹⁴

Table.34	“Is the following true or false: The UK Government recently decided that UK scientists are permitted to clone human embryos?”	“Is the following true or false: UK scientists are currently permitted to make exact copies of human cells?”
True	22%	28%
False	48%	42%
Don't Know	31%	31%

Thus it appears that while the ‘great promise’ framework informs an understanding of where the science is moving, the ‘concern’ framework comes to the fore in discussions of public policy. This suggests that many people have some way to go in connecting the realms of science and policy, the former being seen as generally positive, the latter being burdened by images of cloned human beings (a development most people clearly oppose).

Policymakers in the public understanding of science movement often argue that the more science the public knows, the more supportive they will be on this issue (a point debated in some of the academic literature). Either way, it seems likely that since most people have such little confidence about their knowledge in this area, attitudes are clearly far from entrenched. They appear to depend on whether people are thinking with the ‘concern’ framework in mind, or whether the ‘great promise’ framework is more to the fore. To test this, both surveys contained two questions to gauge people’s *attitudes* towards genetic science. In April, these were asked first; whereas in October, they were both deliberately placed *immediately after* the question in which a majority had stated that the main aim of stem cell research was the treatment of disease.

What we found was that a fairly small change in question order produced a significant shift in response *away* from the concern framework towards the great promise notion. In the first survey, when asked out of the blue, ten per cent more people found these trends worrying than encouraging. In the second survey (two thirds having just answered a question linking genetic research to the treatment of disease), the change in context appears to reverse the response, with ‘encouraging’ outscoring ‘worrying’ by nine per cent.

¹⁴ Ignorance of policy in this area was also reflected in a question about the ownership of genetic information, only a quarter of respondents being aware that such information is in both the public and private domain.

Table.35 “There have been a number of advances in genetic research. On balance do you regard these developments as...?”

	April	October
Encouraging	34%	42%
Worrying	44%	33%
Neither encouraging or worrying	22%	24%

Similarly, the number of people concerned about the regulation this research drops by 12 per cent in the second survey, from 50 per cent to 38 per cent.¹⁵

Table.36 “Looking at these scientific developments in genetic science is the UK Government doing enough to regulate their potential abuse?”

	April	October
Yes	18%	18%
No	50%	38%
Unsure	33%	44%

In both cases, it appears that the more knowledge people have of the overall drift of this research, the more encouraged they are by developments in this area. This is confirmed when we break down responses to these questions. In the April survey, for example, when most people were more worried than encouraged, those with any science education were 19 per cent more likely to find the research ‘encouraging’ rather than worrying. (54 per cent versus 35 per cent).

This does not mean that the media or the public have no cause for concern: the ethical boundaries of such research are clearly important matters for public discussion. What matters here is that the concerns people have are based on a broad understanding of the risks and potential of medical science. And despite people’s lack of confidence about their knowledge of this issue, our survey suggests that the coverage *has* reported the medical benefits of such research and that this coverage shows signs of forming part of the public understanding.

The challenge, for scientists, policy makers and journalists, is to move away from the dichotomies of the great promise and concern frameworks towards a more integrated approach, whereby we can decide what kind of scientific research we should support and which we should not. To this end, we would make the following suggestions:

- Scientists, policy makers and journalists should find ways of engaging the public more in this story without resorting to ‘wacky science’ stories about things such as the cloning of prehistoric creatures. Some television and newspaper articles, for example, have attempted to inject stories about the medical science with human interest.
- At the same time, there is still much to be done before people feel confident about this issue. While media – including the tabloids – *have* attempted to explain the science (and to connect the dots between words like ‘stem cells’ and ‘cloning’), these points will bear a great deal of repetition if the public are able to construct a coherent set of associations with which to make sense of it all.

¹⁵ Needless to say, in both surveys most people are clearly unaware of what the Government is or is not doing, and their answers must be seen in that context.

CONCLUSIONS

We now return to three questions central to our inquiry. First, what do we, as a public, *need* to know about climate change, MMR and genetic media research? Second, what have most of us learnt from media coverage about these issues? And third, to what extent does our study suggest a *model* of media and public understanding which might be used to create a more informed public? Since the science based stories we have tracked each have their own distinctive features, we will begin by considering them case by case, before suggesting some more general conclusions.

Climate change is part of a long running news story, told by a mix of scientists, politicians, environmentalists and interest groups. If the idea of the greenhouse effect in causing global warming was once seen as controversial, we now see the weight of scientific opinion confirming it. This movement towards consensus is generally reflected in media coverage (with a few dissenting voices).

Media coverage of climate change often refers to its causes, and there is a fairly high degree of public awareness that human activities such as deforestation and fossil fuel emissions are said to cause climate change. What is less apparent in news coverage is a focus on the scientific process involved, such as the nature of the greenhouse effect. The absence of this explanation is reflected in public understanding: most people clearly don't know what the greenhouse effect is or how it works.

This is not, perhaps, surprising. What is more interesting is how people use information to *construct* an explanation. Ideas with little media presence – such as the mechanics of the greenhouse effect – are unlikely to filter through, and yet many people still feel able to make knowledge claims. They appear to do so on the basis of the presence of often repeated associations in media coverage: in this case, between the thinning ozone layer and the greenhouse effect. Thus what is, in media coverage, merely a juxtaposition (under the general heading of human-made environmental problems) undergoes a cognitive leap in public understanding, so that it is understood as a casual relationship.

Many scientists would feel that this is a problem, and that people ought to know the simple mechanics of the greenhouse effect. But does it really matter if they don't? From the perspective of democratic citizenship, it could be argued that such knowledge is unnecessary. For citizens to understand and act on the issue, they only need to be aware of the *causes and consequences* of climate change, so that they are in a position to judge what measures might be taken to combat it.

On this count, our study does suggest that certain repeated themes about causes and consequences are filtering through, although there is also a degree of confusion that appears to come from lumping environmental problems together. This may make it difficult for many people to judge the specific merits of climate change proposals. Some policy makers might argue, for example, that the connection many people make between nuclear power and climate change is fallacious and thus profoundly unhelpful.

But one could also argue that if people are somewhat indiscriminating in their assessment of the relationship between environmental problems – from air pollution to nuclear waste – the rather muddled picture that emerges does have a certain coherence. Most people *are* able to make links between a range of human activities that have a negative environmental impact. If past generations happily embraced industrial consumerism in blissful ignorance of the environmental consequences, they no longer do so with quite the same disregard.

And yet it remains questionable how far this awareness translates into active citizenship. Most people, when prompted, express concern about climate change and felt the government should do more to tackle it. However, when polls ask people to say, unprompted, which issues concern them, environmental issues barely register (in a Mori survey in December 2002, environmental issues came 19th on the list of issues facing Britain, below trade unions and inflation). In this context, we would suggest that if there is a gap in media coverage and public understanding of climate change, it is *not a simple absence of scientific understanding*. The problem, we would suggest, is more a question of emphasis.

Firstly, while the predictions coming from the UN committee on climate change (amongst others) are dramatic and catastrophic, most of the misery is likely to fall on countries in the third world. The effects of climate change on Britain are seen as far less alarming. While the media often discuss the consequences of climate change, media coverage on this issue – as on many others – is often somewhat parochial, with many casual references to its more benign effects. This may explain why the issue is not generally seen as as important. This may also partly explain why broadsheet readers, whose newspapers have a more international focus, are more concerned about this issue. The challenge here is to make the sheer scale of potential global damage that climate change may inflict a major and recurrent news story. An emphasis upon the specifics of the science of global warming is not likely to be especially helpful in this context.

Second, most people need practical rather than technical information. The widespread use of scientific shorthand – notably terms such as ‘greenhouse gases’ or ‘fossil fuels’ – *assumes* rather than *communicates* an understanding of the causes of climate change. At the risk of simplifying the complexities of environmental impacts, it would be more helpful to use more direct language, to specify the kinds of activities that most contribute to climate change and what might be done to limit them.

Of the three stories we looked at, the **MMR** debate most clearly became a news story in its own right. The story’s script was undoubtedly influenced by the ghost of the BSE controversy. Was this another case, reporters’ asked, of mainstream science and the government rushing prematurely to the defence of the status quo? The story followed a widely repeated pattern, in which a maverick researcher and concerned parents questioned scientific officialdom, with the Prime Minister and his young son becoming personally involved as the government resisted calls, amidst declining public confidence, to offer an alternative to the MMR jab.

Our study revealed that the main elements of this story – the alleged link between MMR and autism, the Prime Minister’s refusal to disclose whether his son Leo had been given the MMR jab and subsequent the fall in public confidence – became widely known. Indeed, the extent of public knowledge on this issue demonstrates the power of the news media to inform. What made this story stick, we would suggest, was the consistency of the messages across different media and the speed with which it became a matter of public interest rather than simply a debate between scientists.

The downside, in this instance, was that the overall framework used to tell the story was so powerful that it created a perception of a divided scientific community with two conflicting bodies of research. This perception was undoubtedly exacerbated by Tony Blair’s refusal to comment, which, however justified, made the Government’s endorsement of the MMR jab ring hollow. Most people were thus unaware of the flimsiness of the link between MMR and autism (based, as it is, on a speculative claim rather than any empirical research) and that the great weight of research has failed to find any such link.

There is much to debate here about the media coverage of an issue in which a decline in public confidence (unlike the BSE case) actually creates new public health risks from outbreaks of measles, mumps or rubella. It seems fair to say, in retrospect, that the scrutiny of those supporting MMR was not matched by a rigorous examination of the case against it. Our main concern here, however, is what it tells us about the role of the media in public understanding. In short, the consistent telling of a story – particularly one with echoes of other stories – clearly influences public understanding.

CONCLUSIONS

And it is the broad themes of the coverage – rather than the details – that establish the building blocks for people's understanding and opinions. There are also important questions about the way in which the government and others arguing in favour of the single jab pursued their argument. Did they make best use of individual and 'emotive' cases, like their opponents. Were scientists willing to set aside their distaste for the cruder aspects of the debate in order to convey their point of view not only clearly, but consistently and repeatedly?

We saw much less consistency in the media coverage of **cloning and genetic medical research**. Coverage here, by contrast with MMR, tends to be dichotomous, focusing on either the medical potential of stem cell research or the ethical risks associated with cloning. The 'great promise' or 'concern' frameworks both have their own well-rehearsed conventions, one focusing on cutting edge medical breakthroughs and the promise of healing currently untreatable conditions, the other pointing with alarm to the Frankenstein excesses of irresponsible scientists. Accordingly, although many people confess to a lack of confidence about this issue, they appear to be aware of both potential and risk.


When it comes to public understanding of Government policy on this issue, our survey suggests widespread ignorance of what is or is not permitted – even though the House of Lords ruling on this issue in 2002 was given modest but fairly widespread media coverage. Indeed, public ignorance on this issue demonstrates the extent to which details of a story can pass people by. As we have seen with the other two stories, public understanding comes from the generality of often repeated media frameworks rather than one-off stories.

Are the public well informed enough to contribute to the debate about what the Government should sanction in this field? Since public opinion on this issue is clearly influenced by the context in which it is discussed (we were able to manufacture a significant shift towards an optimistic view simply by a small alteration to the order in which we asked questions), it would not appear to be particularly well-grounded. And yet surely this is an issue in which society as a whole – rather than a group of experts – should decide where to draw the line?

The irony is that this was, in many ways, the most science-driven story of the three we looked at. It was much more likely to be reported by a science or specialist correspondent, and much more likely to include scientists as sources. And although there were more stories, overall, on this issue than the other two, the public don't feel informed as a consequence. What this strongly suggests is that *more science in the media does not lead to greater public understanding*. On the contrary, it may be that, for better or worse, the best way to engage the public is actually to make it *less* of a science story.

What emerges from our analysis of all three stories is a much clearer sense of the relationship between the media coverage of science and public understanding.

- The news media clearly play a role in informing the way people understand science. Our study suggests that most people are aware of the main *themes* or *frameworks* of media coverage of science related stories. Information that is subsidiary to these themes, be it part of the background to a story or information that does not recur (such as the passing of legislation) is unlikely to get across.
- These themes or frameworks are then used as building blocks for people to make sense of an issue. This can, in practice, be a fairly crude cognitive process, and while these building blocks can be put together in ways that facilitate public understanding, many people ignore the fine print and assume connections between things simply because they are often juxtaposed in media coverage. Similarly, a journalistic convention (such as the balancing of two views) may, if repeated often enough, be interpreted literally as reflecting parity of research evidence.

- 
- People are more likely to become engaged in a science story if it appeals to a broader public interest. This is particularly the case if the story has a straightforward and consistent narrative (as the MMR story did). In these cases, key moments in the narrative (such as Tony Blair's reluctant role in the MMR story) may be especially significant in public understanding.
 - We find little evidence to support the idea that the presence of more science, scientists and science specialists in the media will increase the public understanding of science. On the contrary, a 'science for science's sake' approach seems the one least likely to generate public engagement and therefore public understanding.
 - Following on from this, we would suggest that the idea of *public interest* is central to engaging the public in science stories. We need to ask what it is important for citizens to know about science in a democracy. In short, why should people be interested in science if what they think has no effect on a broader policy level? If there is to be greater public accountability in support for science – which most people say they want – it is therefore important to establish what kind of information is necessary for people to make a valid contribution. What matters here, we would suggest, is not so much the science itself, but establishing clear connections between science, policy and the broader public interest.

APPENDICES

APPENDIX A

Current technology available to university researchers is both labour intensive and time consuming. Researchers are required to watch hours of television programmes to find references and this is particularly taxing when researching longer periods of time, ie across a number of months. As a result, research primarily focuses on newspapers and omits television, which is problematic when surveys consistently show people turn to television first for their news. Research is also carried out across television programming, and simplified technology would improve the time taken to research hours and hours of say, daytime television. Researchers identify the range of media reporting about specific areas of science; 'genetic science receives little attention on the front page of the newspapers or in TV news reporting, it may be the subject of dramatic speculation in science fiction and futuristic drama. These representations may be important sources of popular imaging around the risks and benefits of such science.' (Kitzinger, pg. 58) In a recent survey 50 per cent of the public said they regularly or sometimes learn something from topical comedies and 25 per cent refer to chat shows. (Hargreaves & Thomas, pg. 55) 65 per cent identified television as their main source of news compared to 15 per cent for newspapers as their main source and 16 per cent identified radio as their main source of news. (ibid, pg. 44-45) The Science Media Centre's national survey in March 2002 found that 82 per cent stated that television was the most commonly used medium, with TV news, documentaries and current affairs programmes seen as the most common specific sources. When asked which source of information influences their 'views about science issues or scientific research and its social and ethical implications' 39 per cent answered TV documentaries and current affairs whilst 38 per cent answered TV news.

New technology is offering an alternative to hours in front of a television with a pen and paper. Technology such as that from the British company Dremedia offer software that can locate footage and snippets and manage archives. However, this technology comes at a price. To purchase software that would record and manage one channel would cost approximately £35,000, add to this hardware costs at £5,000 and the total would come to £40,000. Multiply £40,000 by the number of channels storing electronic files – the latter quite costly. These costs are, of course, constantly shifting and, generally, falling. This is a highly competitive market.

American researchers searched closed captioning signals by using a text-recognition programme to search the caption log for keywords. When signalled, the computer saved both the video file and the caption to its hard-drive. Their conclusions state the technology was 'solidly successful' but revealed 'several problems' pointing to misspellings as a problem and the lack of captions on some broadcasts and commercials. (Greenberg and Lewenstein)

Given the emphasis upon 'media literacy' in the Communications Bill currently before Parliament, there is a clear need to understand better the technological demands of modern media research and to encourage the growth in a market of products aimed at media researchers.

APPENDIX B

A street survey was conducted in Swansea, Bromley, Maidstone, Salisbury (Taunton in first survey, changed due to newly introduced council charges), Birmingham, Liverpool, Skipton, Glasgow, Swindon and Newcastle. A total of 1,035 interviews were carried out in April and 1,037 interviews in October and spread evenly between the locations above. All interviews were conducted on the street around the busy areas of the city and town centres. The interviews were nationally representative in terms of gender, age and occupation. Data production and interviews were conducted by Research and Marketing Ltd.

APPENDIX C

Each climate change story was coded for the following information:

- Inclusion/exclusion causes of climate change
- Inclusion/exclusion effects of climate change
- Greenhouse Effect explicitly defined
- Greenhouse gases mentioned
- Carbon emissions/Fossil fuels/coal/natural gas/oil explicitly as causes
- Actions public can take in terms of reducing speed of climate change
- Confusion with ozone layer
- Kyoto Protocol mentioned

Each cloning/genetic medical research story was coded for the following information:

- How human/animal relevant research not explained
- Stem cells defined
- Relevant science explained in fair detail
- Journalist states research used to treat serious disease
- Cloning presented as scientific advance
- Article about genetic medical research
- Rational behind research explained
- Celebrity mentioned

Each MMR story was coded for the following information:

- Single vaccines mention
- Vaccination levels dropping mentioned
- Autism/Bowel Disease mentioned
- Past mistakes made (BSE/Foot and Mouth) therefore government will make mistakes again
- Statement: 'MMR safe in 90 countries'
- Statement: 'MMR is safe according to...'
- Dr Andrew Wakefield mentioned
- Leo Blair/Prime Minister's son mentioned

BIBLIOGRAPHY

- Allan, S. (2002) *Media, Risk and Science*, Buckingham: OUP
- Bauer, M. W. et al. (2000) Public Knowledge of and Attitudes to Science: Alternative Measures That May End the 'Science War' *Public Understanding of Science* Vol. 25 No. 1 pp. 30 – 51
- Bell, A. (1991) *The language of news media* Oxford: Basil Blackwell
- Bell, A. and Peter Garrett (Eds.) (1998) *Approaches to media discourse* Oxford: Blackwell
- Blum, D. and M. Knudson (1997) *A Field Guide for Science Writers* Oxford: Oxford University Press
- Britt, R.R. (2002) NASA Scientists Call British Media's Asteroid Hype Unethical Rubbish available at www.space.com/scienceastronomy/asteroid_scare_020729-1.html
- Bulkeley, H. (2002) Common knowledge? Public understanding of climate change in Newcastle, Australia *Public Understanding of Science* Vol. 9 No 3 (July): 313-333
- Condit, C.M. (1999) How the public understands genetics: non-deterministic and non-discriminatory interpretations of the 'blueprint' metaphor *Public Understanding of Science* Vol. 8 No 3 (July): 169-180
- Dearing, J.W. (1994) Newspaper Coverage of Maverick Science: Creating controversy through balancing *Public Understanding of Science* 4, pp. 341-361
- Department of Trade and Industry (2000-2001) *Excellence and Opportunity: A Science and Innovation Policy for the Twenty-First Century*, Department of Trade and Industry
- European Commission (2000) *Science, Society and the Citizen in Europe* Belgium: European Commission
- European Commission (2002) *Science and Society Action Plan* Belgium: European Commission
- Europeans, Science and Technology (2002) *RTD Magazine for European Research* www.europa.eu.int/comm/research
- Evans, G. and J. Durant (1995) The Relationship Between Knowledge and Attitudes in the Public Understanding of Science in Britain *Public Understanding of Science*, 4 pp.57-74
- Fowler, G.L. (1999) The Human Genome Project – what's the public got to do with it? *Public Understanding of Science* Vol. 8 No 3 (July): 153-159
- Friedman, S.M. et al (1999) *Communicating Uncertainty: media coverage of new and controversial science*, New Jersey: Erlbaum Associates
- Greenberg, J and B.V. Lewnstein (2001) *Using Closed Captioning to Archive Science and Technology on TV: A Case Study* <http://visitservice.web.cern.ch/VisitsService/pcst2001/abstracts/Greenberg.doc>
- Grove-White, R. et al (2000) *Wising Up: The Public and New Technologies* Lancaster: Lancaster University
- Hansen, A. (1994) Journalistic Practices and Science Reporting the British Press *Public Understanding of Science* 3: pp. 111-134
- Hargreaves, I. and Ferguson, G. (2000) *Who's Misunderstanding Whom? Bridging the Gulf of Understanding Between the Public, Media and Science*. London: ESRC
- Hargreaves, I and J. Thomas (2002) *New News, Old News: An ITC and BSC Research Publication* London: ITC BSC
- Hipkins, R. et al. (2002) *Commonsense, Trust and Science* New Zealand: Ministry of Research Science and Technology
- Hornig Priest, S. (2001) Cloning: a study in news production *Public Understanding of Science* Vol. 10 No 1 (January): 59-69

- INRA Europe (2000) *Eurobarometer 52.1: The Europeans and Biotechnology*
Available at <http://www.europa.eu.int/comm/research/pdf/eurobarometer-en.pdf>
- Kallerud, E. and I. Ramberg, (2002) The order of discourse in surveys of public understanding of science
Public Understanding of Science Vol. 11 pp. 213-224
- Kitzinger, J and J. Reilly (1997) The Rise and Fall of Risk Reporting' *European Journal of Communication* Vol. 12 (3)
pp. 319-350
- Kitzinger, J. (2000) Media templates: patterns of association and the (re)construction of meaning over time
Media, Culture and Society Vol. 22 (1): 61-84
- Kitzinger, J (1999) Researching risk and the media, *Health, Risk and Society* 1(1): 55-69
- Lewis, J. (2001) *Constructing Public Opinion: How Political Elites Do What They Like and Why We Seem to Go Along With It*.
New York: Columbia University Press
- Loder, N. (2002) *So You Want to Be a Science Writer?* London: Association of British Science Writers
- Logan, R. (2001) *Science Mass Communication* *Science Communication* Vol.23 No. 2, pp135-163
- Mazur, A. (1981) Media Coverage and Public Opinion on Scientific Controversies *Journal of Communication*
Vol. 31: 106-115
- Mills, H. (2002) *Private Eye: Special Report: MMR Measles, Mumps, Rubella The Story So Far* London: Private Eye
- Ministry of Research Science and Technology (2002) *Commonsense, Trust and Science* New Zealand
<http://www.morst.govt.nz/publications/commonsense.html>
- Mulkay, M. (1994) Embryos in the news *Public Understanding of Science* Vol. 3 No 1 (January): 33-51
- Nelkin, D. (1987) *Selling Science, How the Press Covers Science and Technology* New York: W.H. Freeman and Company
- Office of Science and Technology and The Wellcome Trust (2000) *Science and the Public: A Review of Science
Communication and Public Attitudes to Science in Britain*
- Peter Peters, H. Mass Media as an Information Channel and Public Arena.
Available at www.fplc.edu/risk/vol5/summer/peters.htm
- Popkin, S. (1991) *The Reasoning Voter: Communication and Persuasion in Presidential Campaigns*
Chicago: University of Chicago Press
- Rampton, S. and J. Stauber (2001) *Trust Us, We're Experts* New York: Penguin Putnam
- Ramsey, S. (1994) Science and Technology: When Do They Become Front Page News? *Public Understanding of Science*
Vol. 3: 71-82
- Scanlon, E. et al (Eds.) (1999) *Communicating Science: Contexts and Challenges* London: Routledge
- Science in Society: Advice to the Office of Science and Technology from the BA* (2002) London: British Association
- Science Media Centre (2002) *Consultation Report* London: Science Media Centre
- Scientific Alliance (2002) *Science and the Environment: A Survey of Public Opinion* London: Scientific Alliance and Mori
- Sniderman, P., R. Brody and P. Tetlock (1991) *Reasoning and Choice: Explorations in Political Psychology*
New York: Cambridge University Press

BIBLIOGRAPHY

- Turney, J. (1996) *To Know Science is to Love it? Observations from Public Understanding of Science Research*. COPUS Reports
- Turney, J. (1998) *Frankenstein's footsteps: science, genetics and popular culture*, New Haven: Yale University Press
- United Nations (2001) *What's Worrying Britain: A UN Sponsored European-wide Survey on Social Concerns* London: UN and Mori
- Uhlmann, V., C M Martin, O Sheils, L Pilkington, I Silva, A Killalea, S B Murch, A J Wakefield, JJ O'Leary (2002) Potential viral pathogenic mechanism for new variant inflammatory bowel disease *Molecular Pathology* No. 55: 84-90
- Wakefield, A.J., et al. (1998) Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children *The Lancet*, Vol. 351, Issue 9103, 637-641
- The Wellcome Trust (1999-2000) *The Role of Scientists in Public Debate* London: Wellcome Trust and Mori
- Wilkins, L. (1993) Between facts and values: print media coverage of the greenhouse effect, 1987-1990 *Public Understanding of Science* Vol. 2 No 1 (January): 71-84
- Wilson, K.M. (2000) Drought, debate, and uncertainty: measuring reporters' knowledge and ignorance about climate change *Public Understanding of Science* Vol. 9 No 1 (January): 1-13
- Zehr, S.C. Public representations of scientific uncertainty about global climate change *Public Understand. Sci.* 9 No 2 (April 2000) 85-103

Magazines/Newsletters/Journals

British Medical Journal
BMA News
The Lancet
Nature
New Scientist
Public Understanding of Science
Science
Science and Public Affairs (British Association Newsletter)
Wellcome News (Wellcome Trust Newsletter)

Government Reports

Including:

The Public Understanding of Science – W. Bodmer 1985
Wolfendale Report – 1995

Office of Science and Technology Scrutiny Report 2002 – Seventh Report of Session 2001-2002

Science and Society, House of Lords Select Committee on Science and Technology, Third Report

Also

http://library.wellcome.ac.uk/resources/ob_sciencesurveys.shtml
for a list of surveys concerning public attitudes towards science



Economic and Social Research Council
Polaris House
North Star Avenue
Swindon SN2 1UJ
Telephone: 01793 413000
Fax: 01793 413001
E-mail: exrel@esrc.ac.uk
<http://www.esrc.ac.uk>

The Economic and Social Research Council is the UK's leading research and training agency addressing economic and social concerns. We aim to provide high-quality research on issues of importance to business, the public sector and government. The issues considered include economic competitiveness, the effectiveness of public services and policy, and our quality of life.

The ESRC is an independent organisation, established by Royal Charter in 1965, and funded mainly by the government.

ISBN 0-86226-291-7