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Role Models in the Media: An Exploration of the Views and Experiences of Women in Science, Engineering and Technology

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About the UK Resource Centre for Women in SET

Established in 2004 and funded by DIUS, to support the Government's ten-year strategy for Science and Innovation, the UKRC works to improve the participation and position of women in SET across industry, academia and public services in the UK. The UKRC provides advice and consultancy on gender equality to employers in industry and academia, professional institutes, education and Research Councils. The UKRC also helps women entering into and progressing within SET careers, through advice and support at all career stages, training, mentoring and networking opportunities.

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Contents

Acknowledgements	i
Executive summary	ii
Chapter 1: Introduction	1
Chapter 2: Research methods	4
Chapter 3: The impact of the media on women’s career choices	9
3.1 Reflecting on the lack of role models.....	9
3.2 Positive images of women in SET recalled by our research participants	10
3.3 The media’s more general role in encouraging interest in SET	10
3.4 Age and changing television production/ consumption.....	13
3.5 Other influences: families, mentors and events.....	13
3.6 Conclusion.....	14
Chapter 4: Positive and negative representations of women in SET	15
4.1 A lack of representation.....	15
4.2 Negative representations	16
4.3 Positive representations	19
4.4 Some contradictions, ambivalence and reflections.....	21
4.5 Conclusion.....	29
Chapter 5: Recommendations	30
5.1 Increased visibility for women in SET	30
5.2 Fewer stereotypes and more diversity.....	31
5.3 Change the way careers within SET are represented	32
5.4 Promotion of SET in general	36
5.5 Translating suggestions into action?	37
References	39
Endnotes	42

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Executive summary

This research was commissioned by the UK Resource Centre for Women in Science, Engineering and Technology (UKRC). It examined the views/experiences of those working/training in Science, Engineering and Technology (SET). Data was collected from 86 women through questionnaires, interviews and focus groups. Our findings show that many women in SET would like to see:

- **More, and more *diverse*, representations of women scientists.** Many women grew up without positive images of women in SET to support their choice to pursue training/careers in this area. They would like to see more representation of female scientists working in diverse areas and from diverse backgrounds and at different career stages. They would also like to see a routine acknowledgement of SET as a field for women through portrayals of female characters who 'just happen' to be scientists.
- **Diverse sites of representation.** Our research participants call for representation of women scientists in a range of sites (e.g. museums, novels and websites) and formats (from documentary and biography to film and TV drama). They would also like to see more quality SET programming for children/young people including significant roles for women.
- **Promotion of SET in less macho ways.** Interviewees wanted innovative representations of SET that could show the different motivations which inform interest in SET (whether that is curiosity or the desire to solve a social problem) and explore new ways of explaining scientific principles (e.g. using more 'female-friendly' metaphors). Some research participants also said they would like to see media representations which demonstrate that you do not have to be super-confident to pursue training in this area and which illustrate the possibility of work/life balance in SET, the team work and inter-disciplinary cooperation involved and the *range* of careers that can be pursued.
- **Challenge to stereotypes.** Our research participants wanted to see representations which avoided recycling stereotypical images of female scientists (e.g. frumpy or sexy, over-emotional or cold, victimised or 'bitchy').
- However, conflict or ambivalence was also expressed about whether images of women in SET should be 'aspirational' or 'realistic', the extent to which motherhood should be addressed or how the potential problems of being a woman in 'a man's world' should be explored. Some interviewees also expressed ambivalence about the extent to which women in SET should be portrayed as glamorous and were wary of imposing a new 'feminine' norm on women scientists through efforts to promote a more 'female-friendly' image.

The report concludes by reflecting on the challenges for those who produce campaign/education materials and the need to work actively with the mass media to develop a range of 'positive' representations of women in SET.

Chapter 1: Introduction

This research report is part of a series of four reports examining issues around the representation of women scientists in the mass media. The reports were commissioned by the UK Resource Centre for Women in Science, Engineering and Technology (UKRC). Established in 2004 and funded by DIUS, the UKRC works to improve the participation and position of women in Science, Engineering and Technology (SET) across industry, academia and public services in the UK.

There are major issues around training, recruitment, retention and promotion for women in SET. Girls/women are less likely than boys/men to opt to study SET subjects both at school and university (Rees, 2001; Murphy and Whitelegg, 2006; Roberts 2002). For example, women make up only 24% of computer science undergraduates, 22% of physics undergraduates and 14% of engineering and technology undergraduates (Women and Work, 2006). Even after training women are less likely than men to develop a career in SET, particularly in the most traditionally male-dominated sectors. For example, women comprise fewer than 13% of ICT and just 5% of engineering professionals (UKRC, 2005 figures). Even if women pursue a career in SET they are also less likely than men to be promoted to senior positions right across the sector. For example, women compose less than 6% of the most senior grade staff in SET in institutions of Higher Education across Europe (European Commission, 2006).

The mass media may have a crucial role in either reinforcing, or challenging such gender segregation and inequalities. The media have long been recognised as key players in society: helping to define people's sense of taken-for-granted normality as well as sometimes facilitating social change (see Eldridge et al., 1997). The media can also be an important source of 'role models'. Role model theory suggests that representations of women in SET may be important in showing young people that women can develop successful careers in science, engineering and technology. Experimental and survey research shows that the media 'exert a demonstrable impact on children's occupational knowledge and role identification' and that 'previous experience with (or information about) a successful woman in a traditional male occupation decreases gender bias in evaluation and selection decisions made by both student and professional judges' (Phillips and Imhoff 1997: 35, 41).ⁱ

The problem, however, is that some of the media have, at least in the past, presented scientists in general in a negative light (e.g. the 'evil' or 'mad' scientist), and the media have specifically ignored or misrepresented female scientists. (Throughout this report, we use 'scientist' as a general term to refer to anyone working within science, engineering or technology.) Studies of news reporting, for example, highlight the way in which female scientists have been marginalised or framed through stereotypes about femininity (Shachar, 2000; Haran et al., 2008; Nelkin, 1995, 19-20). Studies of advertising show that the figure of a woman is sometimes used to underline that an item of

technology is 'easy to use' or that a scientific claim is 'simple to understand' and that women are less likely than men to be framed as active 'experts' (Barbercheck, 2001; Ware and Stuck, 1985; Marshall and Bannon, 1988; White and Kinnick, 2000; Raphael et al., 2006: 776-77). Even profiles of famous women in newspapers or magazines can subtly undermine their status. One study, for example, showed that such profiles presented scientific research as requiring certain 'masculine' attributes and that high-profile women working in the field were portrayed as extraordinary and an emphasis placed on their roles as wives and mothers (LaFollette, 1988).

Recent evidence in relation to the representation of scientists in film and TV drama presents a more mixed picture. On the one hand Flicker (2003) charts the role of the female scientist in 20 feature films as: 'old maid', 'male woman', 'naïve expert', 'evil plotter', 'daughter or assistant' and 'lonely heroine'. Other research suggests, however, that film and TV drama can be a space in which more positive images can emerge – with several scholars drawing attention to the female scientist-hero and some overviews highlighting the representation of powerful women holding key positions within SET (Steinke, 2005). However, even when women are represented in these positions their interaction with male colleagues may still be portrayed in ways which reinforce traditional assumptions (Steinke, 2005). Perhaps the most positive assessments of media representation have recently emerged in relation to TV drama – around series such as '*Silent Witness*', which features a female forensic pathologist. In fact this series has been credited with encouraging women into the field (SEMTA, 2005:16).ⁱⁱ

It is against this background that the UKRC commissioned the Cardiff University School of Journalism, Media and Cultural Studies to conduct a study examining the media presentation and representation of women in SET – with a particular focus on recent media representations in the UK. This included studying how women scientists were portrayed in newspapers, in film and on television. It also included talking to press officers to explore the role they might play in promoting positive representations of women in science. The research as a whole resulted in four reports. The research summarised in this first report examines the views of women in SET about media coverage.

Originally this interview/focus group investigation of women scientists' views about the media was designed to help contextualise our analysis of the press, TV and film representations. In particular we wanted to use women's views about the media to help us select the TV programmes or films for closer analysis. In practice the data which emerged from talking to women in SET was so rich and complex that we decided to transcribe the interviews and analyse them in their own right. It was then decided to present findings from this analysis as a separate report. However, this report can still usefully be read in conjunction with the other parts of the study (see Reports 2, 3 and 4),

as well as other work commissioned by the UKRC to Liz Whitelegg and her colleagues at Open University on children's science programming¹.

This report is structured as follows:

- Chapter 2 presents our research method;
- Chapter 3 explores how women felt that media representations had impacted on their *own* choice of career/training;
- Chapter 4 reports their views on the 'positive' and 'negative' representation of women in SET;
- Chapter 5 summarises recommendations for how SET in general, and women in SET in particular, might be presented in ways which could help to address gender inequalities.

¹ Liz Whitelegg and her colleagues at Open University are running a complementary project, which is also funded by the UKRC (copy of the report can be obtained from the UKRC: info@ukrc4setwomen.org).

Chapter 2: Research methods

This research was designed as a small, qualitative study to explore the opinions and experiences of women within SET. The focus was on the impact of the media on women's own training/career choices and their general views about the media representation of female scientists. In total, we collected and analysed the views of 86 women training or working in SET.

Recruitment: Three data collection methods were employed for this project.

- A brief questionnaire was distributed via the UKRC and Intellect Women in IT internet mailing lists.ⁱⁱⁱ This led to 39 returned questionnaires.
- Follow up interviews were conducted with 14 of the questionnaire respondents. An additional 12 interviewees were also obtained by approaching prominent women in SET and by snowball sampling. In particular we asked interviewees if there was a colleague they thought might present a *different* opinion from their own. This was to ensure our sample represented a diverse range of views. A total of 26 interviews were conducted.
- We complemented the above data collection methods by also conducting 6 focus groups involving an additional 35 participants. Four of these focus groups were recruited via contacting departments that ran programmes in science, engineering and technology (these involved undergraduates, postgraduates and some lecturers). Two focus groups were arranged through the Women's Workshop in Cardiff.^{iv} These groups involved 'returners' (women who were seeking to return to a career in SET after leaving the sector or taking a career break).

Sample range: As this was a mainly *qualitative* study we aimed to include a *range* of research participants, rather than aiming for a huge statistically representative study. We targeted research participants working in a wide variety of SET fields, ranging from computer science to physics, from neuroscience to engineering and from astronomy to nanotechnology. We also aimed to include women at different stages of their career. Our sample included both women 'in training' and those in established and senior posts. Some of our interviewees had an extremely high public profile and/or extensive experience of training and mentoring other scientists. Tables 1a and 1b present basic details of our research participants.

We also tried to include women with diverse socio-demographic profiles. Most of our interviewees were in their mid 30s to mid 50s, but some were in their early twenties (in the focus groups). Some had children, others did not – and motherhood (or the decision not to have children) was often mentioned as relevant to their careers and their perspective on media representation. Some interviewees talked about their family background - most who volunteered this

information seemed to come from middle-class backgrounds and often had a parent, or other close family member, working in SET (this was often indicated as a highly significant factor in their pursuit of a career in SET). One interviewee raised an issue around disability; another discussed being a lesbian working in SET. Two women talked about issues related to being ethnic minority British scientists and 6 had moved to the UK from other countries (e.g. Eastern Europe and Asia). Issues raised in this context included being subjected to cultural stereotypes (e.g. being a 'hard working' Asian), and assumptions related to skin colour or having a name which was assumed to be 'foreign' (e.g. one woman being asked whether she had permission to work in the UK, in spite of being a British citizen). In the report that follows we have tried to draw out any differences which emerged in women's assessment of the media that were linked to their different personal or professional experiences and/or socio-demographic characteristics.

Details of research participants*

Table 1a Interviewees (women working within SET)

Code	Discipline**
Interviewee 1	Electrical Engineering
Interviewee 2	Computer science
Interviewee 3	Physics
Interviewee 4	Biophysics
Interviewee 5	Physics
Interviewee 6	Neurobiology
Interviewee 7	Engineering
Interviewee 8	Earth Science
Interviewee 9	Civil Engineering
Interviewee 10	Maths
Interviewee 11	Agriculture & Forest Science
Interviewee 12	Neuroscience
Interviewee 13	Biochemistry
Interviewee 14	Manufacturing Engineering
Interviewee 15	Construction
Interviewee 16	Zoology
Interviewee 17	Biology
Interviewee 18	Computers (IT)
Interviewee 19	Neuroscience
Interviewee 20	Science & Engineering
Interviewee 21	Engineering
Interviewee 22	Physics/Biology
Interviewee 23	Biology
Interviewee 24	Computer Programming
Interviewee 25	Geology
Interviewee 26	Biochemistry

*In order to preserve confidentiality we are not presenting any information beyond their ID code and their area of SET.

**Discipline refers to the area in which women trained, or (if a radical shift has been made) in which they now specialise.

Table 1b Focus group participants (women training/returning/teaching within SET)

Code	Discipline	Position within SET
FG1:Pt 1*	Physics	Lecturer
FG1:Pt 2	Physics & Astronomy	Researcher
FG1:Pt 3	Physics	Science communicator
FG1:Pt 4	Astronomy	Researcher
FG1:Pt 5	Astrophysics	Researcher (PhD)
FG1:Pt 6	Physics (Education)	Science Communicator
FG2:Pt 1	Science (student)	Researcher (PhD)
FG2:Pt 2	Biology	Researcher (PhD)
FG2:Pt 3	Science	Researcher (Post Doc)
FG2:Pt 4	Genetics/development	Lecturer
FG2:Pt 5	Transgenics	Lecturer
FG2:Pt 6	Science	Lecturer
FG2:Pt 7	Science	Researcher (PhD)
FG2:Pt 8	Physiology/medicine	Lecturer
FG2:Pt 9	Genetics	Researcher (Post Doc)
FG2:Pt 10	Science	Lecturer
FG3:Pt 1	Physics	Leaver/Returner
FG3:Pt 2	Clinical Engineering	Leaver/Returner
FG3:Pt 3	Brewing	Leaver/Returner
FG4:Pt1	Ecology/Zoology –	Leaver/Returner
FG4:Pt2	Biochemistry	Leaver/Returner
FG4:Pt3:	Zoology	Leaver/Returner
FG5: (Pt 1, 2,3 & 5)	Civil & Environmental Engineering	Undergraduates
FG5:Pt4	Medical Engineering	Undergraduate
FG5:Pt6	Civil Engineering	Undergraduates
FG5:Pt7	Environmental Engineering	Undergraduates
FG6 (Pt 1,2,3,4,5&6)	Information Technology	Undergraduates

*This notation indicates Focus Group 1, participant 1.

Questionnaire respondents: Questionnaires 1 to 18 came from Intellect women in IT internet forum therefore working in computers and 19 to 25 from the GetSet women data base. Data from questionnaires is identified by the code 'Q' followed by a number.

Questions explored with research participants: We asked respondents what had inspired them to go into SET and whether the media had played any role in encouraging (or discouraging) them; what they liked and disliked about media representations and what they would like to see change in the future. We also asked if they had any experience of dealing with journalists or being profiled in the media.

Analysis: Our interviews and focus group discussions were transcribed and systematically coded to ensure we were able to examine any reference to a particular theme across the entire data corpus and make meaningful comparisons. Coding included, for example, indexing every example of a media representation which a research participant identified as particularly 'positive' or 'negative', and also referencing whether this was from a film, TV drama, newspaper report or documentary. Other codes recorded, among other things, what inspired them to pursue SET as a career, personal experiences in the work place, and direct experiences of appearing on the media. Our analysis included examining patterns and recurring themes, but also using deviant case analysis – i.e. we draw attention to examples of an *opposing* view being expressed, even if that was only from one research participant.

Presentation of data: Our findings draw on data gathered from a wide-ranging sample of 86 women using largely qualitative methods. The views expressed by these research participants reflect a range of the views and experience of women across SET. Our research sample should not, however, be treated as *statistically* representative. In our analysis, therefore, we draw attention to broad patterns across the sample by indicating that 'most' or 'a few' women expressed a particular point of view, however we avoid presenting exact numbers (e.g. '2 out of 3 women thought x') as this could be misleading. As indicated above, deviant case analysis is also used to note minority as well as majority views. Further targeted research would be needed to explore minority perspectives in more depth.

Confidentiality: Some of our interviewees were happy to be identified, others were not. In order to ensure maximum anonymity for those who wished it, we decided to assign every research participant a unique code. We provide no other information apart from their area of SET (even where they were, in fact, willing to be identified).

Chapter 3: The impact of the media on women's career choices

This chapter presents women's views on the impact of media representations on their own choice of career/training. It explores the (lack of) role models for women while they were growing up and examines how media coverage of SET in general fed their interest in SET, as well as (briefly) identifying the other factors which influenced their choice of training/career. We also highlight the importance of programmes such as *Tomorrow's World* for the current generation of women working in SET and address emerging evidence of a *changing* role for the media as younger generations engage with the multi-channel media environment.

3.1 Reflecting on the lack of role models

Many women commented that, when they were growing up, there was a complete absence of media role models to support their desire to go into SET. 'I actually felt personally discouraged as a woman to train in SET by media representations', commented one woman, 'the scientist or engineer in these great jobs was almost always a man.' (Q11 – Information Technology)
'I don't feel children's TV programmes considered SET for women in the 70's/80's' commented another, adding 'neither did my career teacher...but that's another story.' (Q1 – Information Technology)^v

"I actually felt personally discouraged as a woman to train in SET by media representations"

As girls they often felt the 'odd one out': 'I think it started at school since doing three A-level sciences', commented one interviewee, 'I always felt myself as sort of a "not normal female", I've sort of accepted that, and I don't care at one level'.

"I think it started at school since doing three A-Level sciences....I always felt myself as sort of a 'not normal' female"

Many women felt this lack of representation had undermined them. Others however argued that it had no impact on them personally 'I don't take too much notice of the media' (Interviewee 1 - Electrical Engineering). Several women emphasised that they were happy non-conformists. One, for example, commented that she did not feel the need for 'positive role models' as she had, in any case, always been 'a bit of an iconoclast [...] I was one of the first punks! I desperately wanted to be different'. Another argued that at least the lack of representation was 'realistic' and therefore prepared her for the struggles she would subsequently face in a male-dominated profession.

"Eventually I just figured if I wanted it [a career in SET], and I did, it would be very tough. But fair dues, that is the reality of society – so if anything it [media

lack of representation of women in SET] helped set my expectations accurately on just how tough it would be.” (Q11 – Information Technology)

Others, however, pointed out that even if they themselves had been ‘tough enough’ to ‘tough it out’ – it was important to develop a more inclusive approach for the future which drew in a wider range of talent.

“I wonder whether, if there is a passionate interest in SET, women will find a way to get into a career in SET anyway. But the thing is, how many others, if they were introduced to or exposed to more positive images of women in SET when they were growing up, might have found a latent interest?” (Q10 – Information Technology)

3.2 Positive images of women in SET recalled by our research participants

Not surprisingly, given the perceived absence of role models noted above, very few women were able to identify *positive* media images of women that had inspired them to train in SET or encouraged them in their career. Those that did identify such role models sometimes mentioned female presenters on programmes such as *Tomorrow’s World*. (See section 3.3 below for further discussion). Others talked about the importance of outstanding women from history. One scientist said it helped to hear about women such as Marie Curie and Rosalind Franklin. Another had been inspired by reading the biography of Dorothy Hodgkin: ‘She was a Nobel Laureate, a mother, very political as well as doing awesome science in a traditionally very male dominated field, so she was one hero that stood out’ (Interviewee 12 - Neuroscience). This interviewee had also learned about another leading figure in SET, Mary Somerville, because her college was named after her. This inspired her to read about Somerville’s life and in turn spurred her own ambition.

“She was a Nobel Laureate, a mother, very political as well as doing awesome science in a traditionally very male dominated field, so she was one hero that stood out”

3.3 The media’s more general role in encouraging interest in SET

More generally our research participants described being inspired by representations of science, regardless, or in spite, of gender. Science fiction novels and TV series were important to some. Several spoke of their enthusiasm for *Star Trek*. In response to the question: ‘So, what made you want to become a scientist?’ one interviewee simply replied ‘*Star Trek*, I was interested in all the space stuff and I could get that on *Star Trek*’ (FG1: Pt5 - Astrophysics). Another even recalled a specific episode which had prompted her interest:

“...it was the episode with a bunch of Vulcans were doing a blood transfusion, I was there going: ‘but mum the blood is not the right colour’. And after that I sort of got interested in haematology and that led to biology basically.” (FG4: Pt1 – Ecology/Zoology)

Others recalled sci-fi novels as having been important. One woman, for example, enjoyed the novels of Arthur C Clarke, 'I liked to read descriptions of worlds in which there were fancy machines' (Interviewee 20 – Science and Engineering). Another ended up reading the science fiction novels belonging to her older brother.

"There were people in his science fiction books called boffins who solved problems [...] I wanted to be a boffin. I wanted to wear a white coat and big glasses. I could see that the boffins were well spoken of, and with a lot of respect, so I thought 'I want to be a boffin.'" (FG4:Pt3 - Zoology)

Inspiring television presenters were also identified as crucial. Our research participants had fond memories of individuals such as Jonny Ball (presenter of the *Think* series 1977-1984), David Attenborough, Desmond Morris and latterly, Robert Winston. Programmes about SET aimed at children and young people were identified as particularly important.

"There were children's programmes..., is it 'How to?', it basically makes science accessible to children it was like sort of a junior school science experiment, they took things that you [...] take for granted and show how it works, and I think they did that in a really interesting way, that was very accessible. [...] The media gave me the confidence to realise that there were other people like that who had the same interests, and that there was a lot out there to discover." (FG4: Pt1 - Ecology/Zoology)

"The media gave me the confidence to realise that there were other people [...] who had the same interests, and that there was a lot out there to discover"

However, the one TV programme that really stood out was *Tomorrow's World*. This long-running BBC series showcased new (and often wacky) developments in the world of science and technology. First aired in 1965, it ran for 38 years until it was axed at the beginning of 2003. The enthusiasm with which women recalled this programme was often quite palpable.

"Tomorrow's World was one of my key programmes, I was a geek when I was a kid!" (Interviewee 18 - Computers)

"Tomorrow's World was a huge influence [...] I loved that, [...] it was fascinating. [...] Tomorrow's World was the highlight of our family telly viewing definitely." (FG 3: Pt1 - Physics)

"There was Tomorrow's World, that was inspirational, with Raymond Baxter, yes, that was fantastic, and they did have a woman on there – I can't remember, when I was older, what's her name, Judith Hann, ooh, it's all coming back!" (Interviewee 17 - Biology)

"I have just remembered, Tomorrow's World when I was growing up usually had a female presenter, that was quite part of my life." (Interviewee 12 - Neuroscience)

"Tomorrow's World, was a huge influence... Tomorrow's World was the highlight of our family telly"

Seventeen of our 26 interviewees recalled *Tomorrow's World* as a significant programme for them when they were growing up. The fondness and excitement with which some scientists discussed *Tomorrow's World* stood out over and above discussion of any other programme and is worth noting in its own right (we return to this in section 3.4).

The significance of having female presenters on *Tomorrow's World* was often mentioned only *in passing* (as illustrated in the quotes above); however, this factor did seem to have been important in some women's pleasure in the programme. Some made explicit comments suggesting that it was helpful to see a woman in the role of being able to explain science. The particular persona or style of communicating of some of the female presenters had also been important. One interviewee, for example, vividly recalled how encouraged she had been by one *Tomorrow's World* presenter. Asked whether it mattered that this presenter was female, this interviewee replied: 'Oh yes, I got the impression she was *sharing* this with us, but the men were *telling* us' (Interviewee 20 - Science and Engineering). Some of the women who presented *Tomorrow's World* were also explicitly identified as 'good role models' as the discussion below demonstrates.

Pt4: Whatever happened to Phillipa on *Tomorrow's World*?

Pt3: She had some babies.

Pt2: She is a really good role model.

Pt3: She was definitely a role model for me.

Interviewer: What made you think she was a role model?

Pt3: She was sharp, she wasn't particularly beautiful, she knew what she was talking about, she explained things clearly.

Pt4: She also had this human thing about her, she would say this is a technological thing, (that probably a boffin made) yet we are going to get this; and she would explain how it is going to affect you. And I remember thinking "wow!". (FG1)

"She would say this is a technological thing, (that probably a boffin made) yet we are going to get this; and she would explain how it is going to affect you. And I remember thinking 'wow!'"

3.4 Age and changing television production/ consumption

Before rounding off this section we would like to comment on a striking finding about how women of different ages discussed the media. It was very noticeable that older research participants became very animated in discussing TV series such as *Tomorrow's World*. They often talked about the communities of discussion which revolved around such programmes. As the quote used earlier showed, they made comments such as that it was: 'the highlight of our family telly viewing' or spoke integrating the programme into their worlds - 'that was quite part of my life'. However, some of our younger research participants seemed to lack these reference points when mentioning programmes from the 21st century. This observation deserves unpacking as any media strategy needs to consider consumption contexts.

Participants in the focus groups comprised of undergraduate SET students had difficulty recalling *any* science programmes, either current or those they watched in their childhood. Some could not recall SET programmes, even when prompted. They also did not report watching TV 'as a family.' (In contrast to earlier generations many households now possess more than one television). As children growing up in a multi-channel universe, they could not identify 'classic' family programmes and some had avoided factual programmes altogether. They were more likely to watch cartoons or programmes on the non-terrestrial channels (e.g. Cartoon Network or Nickelodeon). The programming available on the non-terrestrial channels was often on 'kids' channels, and their schedules were full of American cartoons in contrast to the perceived more earnest programming on the BBC or ITV. Indeed, programming on the traditional terrestrial channels was disregarded by some who viewed it as programming they might be 'forced' to watch instead of channels they would actively *choose* to watch.

In contrast to earlier generations there was also a clear emphasis on the fact that children could select their own programmes as well as the knowledge that there was a great deal of choice. Participants spoke of selecting their own television viewing without input from parents or other family members.^{vi} For younger participants who grew up with much wider media worlds, they were more likely to consider television as 'entertaining' rather than as educational. If they wanted 'information' then they would go elsewhere, like the internet or to family and friends who were in SET.

3.5 Other influences: families, mentors and events

Finally we should note that, across the board, our research participants often described other influences over and above the media – and they usually felt these had been more important. For example, asked about the role of the media, research participants often made comments about their family background instead. One woman, for example, explained:

"It wasn't the media [which influenced me], it is a cultural thing. It was my family: my grandfather was a doctor, my sister studied biochemistry."
(Interviewee 25 - Geology)

School and work experiences were also discussed at length – inspirational teachers and mentors were key (see Phillips and Imhoff, 1997). Many of our interviewees also had a parent working in SET and this seemed a highly significant factor (see also Bilsker et al., 1988 in Phillips and Imhoff 1997). Indeed, Leslie et al. conclude that the power of parental background is of utmost importance as they demonstrate ‘the feasibility of science and engineering careers, that becoming a scientist or an engineer is a reasonable expectation, in a word, that it is efficacious’ (Leslie et al., 1998, see also Davey and Stoppard, 1993; Mau et al. 1995; Serbin et al. 1993).^{vii}

Some research participants also mentioned the impact of particular scientific events (e.g. the launch of a space rocket). Such events are, of course, themselves brought to people’s attention via the media (e.g. the televising of the rocket launch and the in-depth interviews with astronauts). Nevertheless it is important to see the media as just one factor operating among many other, often more obvious, factors influencing choices of training and career.

3.6 Conclusion

Many of the women we interviewed had developed a career in SET in the face of a severe lack of female role models and some felt they had had to ‘tough it out’. Female presenters on TV programmes about SET had helped support their desire to pursue a career in SET, as had generally ‘inspiring’ and ‘engaging’ cultural representations ranging from biographies of famous women to science fiction novels and from *Star Trek* to news reports of moon landings. A special place was held by the programme *Tomorrow’s World* – a place that may not have been filled for the current generation of young women training in SET (although we await the findings of the OU study by Liz Whitelegg and her colleagues to have data on children growing up now). This raises the question of how some equivalent inspirational mode of address might be developed for young people growing up today. Any such initiative would need to take into account 21st century conditions of production and consumption, and new media formations (e.g. the fragmentation of the audience, a multi-channel environment, and the developments in new media).

The implications of these findings for creating positive representations of, and for, women in SET are summarised in chapter 5. Before moving to recommendations, however, we also need to consider our research participants’ broader views about what defines a ‘good’ or ‘bad’ representation of a female scientist, and this is the subject of the next chapter.

Chapter 4: Positive and negative representations of women in SET

This chapter explores what our research participants enjoyed reading/watching and what they felt constituted a 'positive' or 'negative' image of women in SET. It also highlights some of the ambivalence or conflicting views around this issue.

4.1 A lack of representation

Most of those who participated in our research felt there was still a general lack of positive media representation of women in SET.^{viii} As one commented: 'certainly they are not represented in a sense that would inspire school girls to take up science' (Interviewee 19 - Neuroscience). However, a few high profile cases were mentioned as exceptions to the rule. Our research participants often mentioned Susan Greenfield (Director of the Royal Institution of Great Britain) or referred to individuals such as Kathy Sykes (presenter of *Rough Science* and a Professor of Science Communication). Particular films and crime dramas on television such as *CSI* and *Silent Witness* were also discussed. This latter programme was repeatedly mentioned as offering a positive, and unusual, role model.

However, such high profile representations of women in SET were clearly identified as exceptions, and the fact that the *same* examples were repeatedly mentioned is, perhaps, testimony to their rareness. The representation of women may have improved since some of our interviewees were growing up (in the fifties, sixties and seventies), but, on the whole, there was still perceived to be a relative culture of invisibility for women in SET, certainly in any area beyond the biomedical field. As one commented: 'It seems like that is the only place that strong women are allowed though, [is] like in medicine or forensics' (FG1). The lack of ethnic diversity in the representation of women scientists was also identified as a problem. This was not raised spontaneously, but when prompted, one woman commented that there were very few representations of female scientists from ethnic minorities: 'a lot of Asian people are represented as doctors in dramas for example in *ER*, [...] [but] with regard to other areas of science I don't see much media portrayal of ethnic minorities.' (Interviewee 25 - Geology)

Women called for *more* representations of women, more *diversity* in the images on offer, and a '*normalisation*' of women in SET. Several interviewees commented that they would like to see women in SET presented, in-passing, as unremarkable. As one interviewee commented:

"There are programmes which aren't about SET but which characterise men as doing some sort of jobs, and women doing others. In Friends the women are caterer, masseuse, and fashion designer. The men are palaeontologist, actor and one in an office with computers. We could just have one of the women be a scientist." (Interviewee 20 - Science and Engineering).

Other research participants commented that they would like to see women scientists portrayed in programmes such as *Eastenders*, *Sex and the City*, *Skins*, *The OC* or *Hollyoaks*.

“In ‘Friends’ the women are caterer, masseuse, and fashion designer. The men are palaeontologist, actor and one in an office with computers. We could just have one of the women be a scientist.”

It should be noted, however, that a few women differed from the general consensus about the ‘under-representation’ of women in SET. One for example, commented:

“If engineering is represented they do focus on the women quite a lot, so they do pretend that there is quite a lot in there; yeah I think we are quite well represented for the amount there are.” (FG5: Pt3 – Civil and Environmental Engineering)

Such comments are not, necessarily, in direct opposition to the views of other women quoted above. Rather, such comments were sometimes made in relation to a particular *type* of outlet. For example, interviewees commented on the relatively high profile given to women in construction industry advertising or as characters in crime drama. Alternatively, a few interviewees clearly wished to place their views about female representation in the context of their own position against any form of ‘positive action’. One interviewee, for example, felt that given the actual number of women in SET there was an appropriate level of representation. She wanted to make it clear that, in her view, there should not be ‘artificial’ efforts to inflate the public profile of women.^{ix}

In general, however, our research participants felt that the media representation of women in SET in the media could be usefully improved. They were concerned not only about ‘invisibility’ but also about the nature of the representations that were promulgated. The following sections examine women’s criticisms of negative representations, explores the type of representations they *wanted* to see, and examines areas of ambivalence or conflict.

4.2 Negative representations

The media were criticised for sometimes presenting women in SET as socially incompetent, victimised, and somehow de-feminised. The media were also accused of sometimes framing women in SET in terms of feminine stereotypes and introducing a token female scientist simply as a love interest with a supporting role.

Socially incompetent/isolated: Interviewees complained that women in SET are sometimes portrayed as rather socially inept and ‘lacking social skills’ (Interviewee 2 - Computer science). According to our interviewees, women scientists are shown as ‘not able to deal with world very well’ (Interviewee 10 - Maths) or as ‘unemotional/cold-hearted/incapable of looking after

relationships or family' (Q11, Information Technology). One interviewee, for example, commented on a *Horizon* programme which included discussion of Rosalind Franklin and 'made her seem as an oddity, slightly a social outcast' (FG4:Pt1 - Ecology/Zoology). Others described fictional films which showed women scientists 'as virtually friendless and dysfunctional' (Interviewee 1 - Electrical Engineering), having 'emotional shortcomings' (Interviewee 2 - Computer science) or 'stereotyped as always being in front of the computer, no life and no boyfriends' (FG1:Pt3 - Physics).

The 'geek' stereotype was seen to apply particularly to the IT area of SET. This image can, of course, apply to both men and women. However, it was identified by some interviewees as particularly off-putting to women – leaving women thinking: 'I don't want to be there, I don't want to sit late into the night with a dried pizza crust and type into keyboards boring programmes' (Interviewee 18 - Computers).

"I don't want to sit late into the night with a dried pizza crust and type into keyboards boring programmes"

Victimised or 'in the firing line': Public representations of women in SET being bullied or harassed were also criticised. One interviewee commented that women scientists in fiction 'are always being shouted at. You know, they are never allowed to express their opinion' (Interviewee 15 - Construction). Another made a similar point about how female scientists appeared in news items: 'I think they tend to be given a hard time. You know, they get sort of hard questions or they get shouted down quite a bit, that sort of thing' (Interviewee 7 - Engineering). One interviewee made the interesting point that this could be linked to the fact that women are more likely to work in the PR/communication side of SET.

"Quite often if women are represented at all then they have usually been brought on to PR a story when the company has done something [wrong] [...] so quite often mopping up some problem." (Interviewee 23 - Biology)^x

De-feminised/frumpy: Several research participants also commented on the 'frumpy' or 'masculine' way in which women scientists were sometimes portrayed: 'as if to succeed in physics you have to play by the men's rules.' (Interviewee 3 - Physics). The classic cartoon stereotype was described by one woman as: 'Dull, unattractive individuals with thick black glasses, with no dress sense' (Q10 – Information technology).^{xi} Such images spilt over into how women sometimes felt they had to manage their own self-presentation. One young woman commented: 'I think if you dress too smartly, too nicely, too feminine sort of way you are at risk of not being taken seriously' (FG1: Pt1). Another interviewee, this time a very senior scientist, explained: 'most women who work in science feel [...] they have to be marginally masculine in order that their male colleagues take them seriously'. She added the observation that: 'If I wear short skirts and high heels they always think I am a secretary' (Interviewee 3 - Physics).

“I think if you dress too smartly, too nicely, too feminine ... you are at risk of not being taken seriously”

Feminine stereotype and roles: Contrasting with such ‘frumpy’ images, many interviewees also identified the ultra-feminine, ultra-beautiful and ultra-sexy stereotype as potentially equally problematic. Female scientists – as presenters on TV or as fictional characters - were, they felt, sometimes framed as ‘terribly fluffy’ (FG4:Pt3 - Zoology), ‘floozy’ (Interviewee 11 - Agriculture and Forest Science) or introduced as ‘a bit of totty’ (FG5: Pt1 - Civil and Environmental Engineering). Female scientists were often, interviewees complained, presented as ‘flirtatious’ or overtly manipulative. The character played by Jodie Foster in the film *Contact*, was given as an example of a scientist portrayed as using her femininity to get what she wants rather than the scientific basis of what her work is’ (Interviewee 7 - Engineering).

Excessive focus on the clothing and appearance of women in the public eye was often criticised (e.g. the focus on Greenfield’s mini skirt – see Report 2 for further discussion of this issue). Some of our research participants were also critical of some women in the public eye who they saw as ‘playing along’ with, or at least putting up with, this sort of attention.

“Doesn’t she [Carol Vorderman] kind of bug you the way she is like? They sort of comment before they start Countdown on what she is wearing and stuff. She really sells herself, she does that kind of fake laugh.” (FG5:Pt1 - Civil and Environmental Engineering)

In addition, magazines and factual TV programmes were criticised for sexualising women. Publications such as *GQ* and *FHM* were described by one scientist we interviewed as ‘technology porn’ implicitly trading on images which say: ‘here’s a shiny gadget and it’s being held by a woman that you’d never ever get off with in your wildest dreams but you can hope’ (Interviewee14 - Manufacturing Engineering). The gratuitous use of scantily clad women was also criticised.

“We still have scantily clad women looking glamorous and men doing macho things. Jeremy Clarkson I find entertaining but I mind that my children watch it.” (Interviewee 20 - Science and Engineering)

Indeed, one group of young scientists we spoke to had been asked to appear on a TV programme in bikinis (to demonstrate some science which apparently necessitated being in the shower). They had declined the invitation.

While some criticism focussed on *factual* representations (or the fantasies being sold in so-called ‘factual’ magazines and programmes), our research participants particularly focused on the problem of ‘über-glamorous’ scientists in fiction. One woman commented: ‘You never get the ugly computer-genius woman, you know, in *Spooks* or whatever, they’d always have to be gorgeous as well as brilliant’ (Interviewee 14 - Manufacturing Engineering). Another observed that women scientists in TV drama seemed to ‘spend more time going shopping for clothes than doing research’ (FG3:Pt2 - Physics).

Women themselves sometimes seemed to mobilise the ‘bimbo’ stereotype – in ways which might be seen by others as problematic. For example one interviewee described a character in *CSI Miami* as coming across as a ‘blonde bimbo’.

“I don’t know maybe she has brains, but looking at her she just looks and acts like a blonde bimbo ... She should be on the catwalk and not really in film like that, because that is not real.” (FG3:Pt2 - Clinical Engineering)

However, the same character has been seen by others as a ‘steel magnolia’ while the suggestion that if you looked like you ‘should be on a catwalk’ you could not be a credible scientist was a view that other interviewees resisted – not least the interviewee who had been a fashion model!

Female scientists as love interest or confined to supporting roles: Female scientists in TV drama and film were also often seen as having supporting roles, rather than being shown in charge. The *CSI* television series, for example, while being praised by some for showing very intelligent and senior women, was also criticised for always ultimately having a man in charge. Our research participants also observed that female scientists were often introduced simply to give the main (male) character a love interest.

“One of the main characters [in Star Trek] was supposed to be a woman who was supposed to have multiple degrees, she was supposed to be very experienced, very adept scientist, but she was shunted into a nursing role [...] and she never got any lines [...] All she was was a love interest for the Vulcan.” (FG4:Pt1 - Ecology/Zoology)

4.3 Positive representations

What did our research participants think made good role models, what programmes or other representations did they view with pleasure? Alongside the criticisms noted above, our research participants identified particular media representations as examples of *positive* images. This highlighted the desire to see women represented as ‘just people’, as competent and able to solve problems, as not ‘over emotional’ and as realistic and enthusiastic. Each of these is discussed below.

Women as people: Many of our interviewees simply wanted women working in SET to be represented as ‘ordinary people’ – rather than being framed through stereotypes about women. As one woman commented: ‘on telly they do seem to make women seem really womanish’ (FG5; Pt 3 - Civil and Environmental Engineering).

“on telly they do seem to make women seem really womanish”

They wanted to see intelligent female presenters engaging with science – women who would do more than just seem to be there as ‘eye candy’. Alice Roberts (presenter of the TV series *Coast*) was praised as a positive role model because she ‘is not dolled up, she is combat trousers fleece jacket, completely normal scientist’ (FG3:Pt3 - Brewing). Michaela Strachan

(presenter of *Really Wild Show*) was similarly appreciated because 'she just looked normal. You wouldn't remark about her appearance for any reason.' 'Exactly, you didn't notice her as a woman, she was a presenter on a programme.' (FG5, Pt 1 and 5, Civil and Environmental Engineering)

“she just looked normal. You wouldn't remark about her appearance for any reason”

Women as competent and able to solve problems: Interviewees also commented that they wanted women in SET presented as skilled and capable. One, for example, called for representations 'emphasising that your technical scientific skills and capacities are gender independent', adding, 'it is just perhaps the way you *use* them or *translate* them may have different style to it' (Interviewee 11 - Agriculture and Forest Science). Another research participant described how pleased she was with the television series *24* in which the IT team included women and 'there would be instances of women who were depended upon for technical things' (Interviewee 18 – Computers).

Strong women able to take care of themselves and take control could also be a source of pleasure. One woman praised the character of Emma Peel in *The Avengers* (a television series featuring secret agents in 1960s Britain). 'I don't [know] if she was a scientist but she was very much in control and dealing with scientific problems' (FG4:Pt3 - Zoology). Another enjoyed a scene in a James Bond movie:

“... where you have had the Russian woman scientist who is absolutely capable. And Bond says: 'oh gee, you don't know how to fly this thing' and she says: 'yes I do, I've actually got a pilot's license, get in and I'm flying it'. You know, there have been opportunities to portray women in capable not just floozy roles.” (Interviewee 11 - Agriculture and Forest Science)

Women as not emotionally weak or 'over emotional': The way in which scientists' emotions are represented came up in several comments. *The X Files*, for example, was praised for having a 'nice twist with the rational woman and more emotional and subjective man' (Interviewee 10 - Maths). Early examples of *Silent Witness* were similarly praised for portraying a female scientist as 'an intelligent, competent professional able to handle a potentially emotionally difficult area of work' (Interviewee 11 - Agriculture and Forest Science). The film *Contact* was identified by another interviewee as good but 'there seemed to be some assumption that as she let her emotions get "in the way" of being a scientist that was a bad thing rather than just being human' (Interviewee 5 - Physics).

“there seemed to be some assumption that as she let her emotions get “in the way” of being a scientist that was a bad thing rather than just being human”

Showing women in SET as realistic and enthusiastic: Many of our interviewees emphasised their appreciation of relatively realistic images of scientists (or women presenters fronting science programmes). They want to see women who are bright and engaged with science and not ‘over the top’ in any way. Research participants identified good role models from both factual and fictional television. The character played by Sue Johnston in *Waking the Dead* was described as ‘incredibly strong, [...] but ‘human as well’ (FG1:Pt3 – Physics) and as full of bright ideas, and a nice person, and fairly attractive, but not outrageously attractive [...] and she is very understated’ (Interviewee 21 - Engineering). Presenters such as Kate Humble (involved in presenting *Countryfile*, *Rolf’s Amazing Animals* and *Animal Park*) were also praised:

“I don’t know really if she is actually a scientist but she presents a lot of science history programmes, she is really passionate about it. I think she is a very good positive role model on TV.” (Interviewee 5 - Physics)

“She is really passionate about it. I think she is a very good positive role model on TV”

4.4 Some contradictions, ambivalence and reflections

The preceding sections provide some insights into the type of images women working/training in SET would like to see. However, this overview would not be complete without reflecting more on areas of ambivalence, contradiction or conflict. Our research participants consistently agreed that they wanted female scientists portrayed as competent, decisive, strong, ‘not bitchy’ and to be shown being treated with respect and not simply presented as ‘eye candy’. However, there was some ambivalence or disagreement about other aspects of what constituted a positive representation. Areas of ambivalence included:

- Whether images should be ‘aspirational’ or ‘realistic’;
- The extent to which representations should highlight the problems of being a woman in ‘a man’s world’;
- The extent to which women’s family lives should be addressed;
- The singling out of women at all;
- The extent to which women in SET should be portrayed as feminine.

Should images be aspirational or realistic?

Diverse research participants expressed strong and contrasting opinions about the relative merits of ‘aspirational’ images (those which offer high-achieving role models to which people might aspire) and ‘realistic’ images (those images which might be more readily achievable by the average person).

Many interviewees believed in highlighting high-achieving women – and foregrounding the huge contributions key individuals had made to SET (celebrating women prize winners, for example, was seen as valuable). Several interviewees also felt it was positive to show women who seem to ‘have it all’ (a career, a family, and glamour). Our interviewees were also often keen to challenge the image of women in SET as socially isolated or geeky.

However, promoting role models which might be too unattainable or unrealistic for the average scientist was also seen as problematic by some of our research participants. As one leading, and very high profile, scientist commented, she thought some media role models could be unrealistic and not particularly encouraging.

"I sort of see role models as almost unreachable. You know almost that - you've got somebody there who's so important, dah dah dah dah. And I think of all the negative images about role models in the media, you know, like you see the stars, the ultra-thin models, the glitzy girly stuff." (Interviewee 22 - Physics/Biology)

"I sort of see role models as almost *unreachable*"

This view was echoed by a physics lecturer who commented:

"I still think it is a problem that [...] for people to look at you as a role model woman scientist - you have to be the attractive one and a success in almost all dimensions of your career." (FG1:Pt1 – Physics)

This sort of concern seems supported by some comments from women who were training in SET. Thus, for example, one PhD student emphasised that it would be useful to show ordinary people at work in SET, not just focusing on high achievers.

"[I would like to see] much younger role models that people can relate to, role models of women as scientists at different ages and positions of authority because an older woman at the peak of her career does not appeal to me as a younger woman doing a post-doc." (FG2: Pt1 - Science)

Similar points were made by women returners – women trying to build up confidence that they have the necessary skills to return to work and that they will be *wanted* by the industry. Some told us that they yearn for ordinary images of women, those getting on and doing their job as part of a team and they spoke about how the glamorous image could be alienating. One woman, for example, was in her late 40s (and has a disability which has left her overweight). She had been out of the job market for ten years, but was now seeking to return. She was deeply depressed by the sort of images she encountered while job-seeking.

"Women engineers are represented as young, blonde and sexy. Like, looking for jobs on the web now, I've gone onto company websites. They'll often advertise, 'Look, this is one of our employees', and it is a woman, and she's always young, blonde and sexy. They don't show off their middle-aged, overweight women who are doing engineering."^{xii} (Interviewee 20 - Science and Engineering)

***"Women engineers are represented as young, blonde and sexy.....
They don't show off their middle-aged, overweight women who are
doing engineering"***

Should family life be highlighted?

The questions of representing scientists as mothers also exercised our research participants. This issue sometimes generated strong contrasting reactions. One scientist we interviewed felt that her chosen career was inherently incompatible with motherhood. Others felt it was made very difficult to be a mother and have career progression – but that this was quite unreasonable, and was certainly not inherent to the scientific process. Similarly some research participants felt that it was important to show the ways in which women juggled motherhood and work, while others felt it was wrong to highlight scientists' non-working lives, just because they were women. These different points of view sometimes informed responses to initiatives to create positive representations of women in SET. One senior scientist, for example, who said she was 'not a good role model' because she did not have children, reflected on her own experiences of being put up for awards.

“Almost every year I’m sent the application forms for [a prestigious award for high-achieving women] [...] [On the form] there’s what you’ve done in your profession but there are other boxes to fill in about your family life and all the other bits and pieces. So it’s almost like to be a ‘Woman of the Year’ - you ought to have all those pieces, which is kind of interesting really [...] It makes it slightly uncomfortable.”^{xiii}

By contrast, the perceived failure to highlight women as mothers was criticised in another initiative.

“I can tell you one thing that really annoys me if that helps. There was a magazine thing produced by the UKRC [...] it was called ‘Smart Women’ [...]. And [...] it was nothing but case studies of huge numbers of women who work in different spheres [...] I was getting terribly annoyed by the end of it because they never ever spoke about themselves, they only spoke about their job. [...] and I think there is more to life than just a job, like having kids for example. No kids were mentioned, no family was mentioned, no hobbies were mentioned, no sort of ‘we have a life beyond our job’ [...]. It is actually off-putting because the implication is you have to sacrifice everything else. And that is as negative as you can get, that you cannot have a life if you are going to be successful in science.” (Interviewee 3 - Physics)

“The implication is ... that you cannot have a life if you are going to be successful in science”

Should women be singled out?

Singling out women for positive action initiatives was another issue which received mixed comment from interviewees. A few established, senior women were adamant that this was inappropriate – and a little suspicious of a research project focused on gender.^{xiv} Others felt positive action was important but were concerned that some strategies to address women could be counterproductive because, as one experienced mentor commented, 'a lot of women actually get turned off by women-only promotion of things'

(Interviewee 21 - Engineering). This view was supported by some young women – just starting out in SET – who told us they were doubtful about any need to address issues around gender and SET – and some articulated their resistance to ‘women’s things’. However most of those who actually had experience of working in SET identified gender as an important factor – even if they had sometimes only realised this through bitter experience, or through making positive connections with other women and realising the common obstacles they faced. One woman described how she had resisted identifying/ being identified as a specifically female scientist, but now regretted this.

“When I was doing my A levels we actually had a group come in wanting to talk to female A - Level students in science and there were only three of us females doing science. And my one friend and I quite naively said ‘come on this is the twentieth century we should be taken for who we are and our ability; gender shouldn’t come into it’. So we didn’t want to get involved. Our other friend did and she got very involved with that. Looking back on it now I wish I had because I haven’t felt directly or obviously discriminated as a woman, but at the same time I have felt sort of kind of shunted to one side and ignored a bit.” (FG4:pt1 – Ecology/zooology)

“This is the twentieth century, we should be taken for who we are and our ability; gender shouldn’t come into it”

This interviewee emphasised that sometimes it took time, and experience to realise how gender could impact:

“I think that might be one of the problems with women in science. It is only in hindsight that you start being able to recognise and say ‘hang on a minute [...] none of the women got anywhere.” (FG4:Pt1 - Ecology/Zoology)

Another woman, now very senior in her field, similarly reflected on her changing perspective on the issue over the last decade: ‘I used to sort of run away from things that identified me as a woman. I used to say: “I want to get on with my job, I’m just doing my job, I’m just a person”’ (Interviewee 21 - Engineering). A third woman, also very senior, described how her perspective had changed very recently.

“I hadn’t realised until only a few years ago that it was harder to get on as a woman. I sort of think that I’d known that I had to be, subconsciously, sort of better than other people if you like, but overtly I hadn’t cottoned on to that, so I’m obviously a bit of a dimwit!” (Interviewee 17 - Biology)

This woman said she had only realised the problems for women in SET after networking with others and doing some mentoring. Listening to other experiences made her reflect on her own experiences of discrimination:

“But it hadn’t dawned on me at the time. [...] But it was too late by then for me, because I’d managed to get wherever it was I got by clinging on and what-

have-you. So yes, of course it [gender] jolly well matters, I just didn't realise it mattered." (Interviewee 17 - Biology)

Should the problems facing women be highlighted?

Another area of contrasting opinion concerned the extent to which the problems facing women in a male-dominated sector should be highlighted or ignored. Although one woman was adamant that there were no problems for women, most of our interviewees felt there were still issues to be addressed. The area of debate was about *whether* and *how* to represent the issues confronting women. Should problems be acknowledged and addressed, or was there a risk of framing women as victims and putting girls off from careers in SET? On the one hand some women felt it was misleading to suggest everything was 'hunky dory'. 'I think if it's presented as if there are no problems then [when] people get problems they'll think it's them' (Interviewee 21 - Engineering). Several of our interviewees suggested that it was important, instead, to acknowledge that it was *not* a level playing field. As one commented:

"Many women haven't thought through what a career in SET means. They pretend they're going to treat us as if we are equal to men but they don't. Girls should have more information about how things pan out. I guess I've found that men have more control over their life cycle. Men can always take an opportunity and I've just found I can't." (Interviewee 20 - Science and Engineering)

"They pretend they're going to treat us as if we are equal to men but they don't"

It was for this sort of reason that some women welcomed media representations depicting the kinds of obstacles and prejudices women might have to face. One interviewee praised the film *In The Company of Men* 'which depicts a really misogynistic work place' as well as a section in the film *Borat* 'where he exposes the real kind of underlying hatred that these young male students have got [...] I think is good to watch because it makes it kind of blatant and you are forced to think about it' (Interviewee 10 - Maths). However, this interviewee also saw such representations as potentially problematic.

"But I guess everybody watching these won't think the same things as me. Some people watching that Borat might agree with these guys, you know, so it is very hard to say that there is something that you can watch which will make people realise the problems." (Interviewee 10 - Maths)

Another interviewee also highlighted the problem of showing women as victims. She cited Rosalind Franklin as a classic example of how women become visible as 'discriminated against or are slightly portrayed as victims'. (Interviewee12 - Neuroscience). This criticism links with the concern, discussed earlier in this chapter, that women are too often framed as victims.

Further discussion of this with some interviewees suggested that they would be happy to see problems of discrimination addressed, as long as *strategies* and *solutions* were also shown.

“I think we all have to accept the problems and also accept that there are solutions to the problems, and that there are ways of getting round things.”
(Interviewee 21 - Engineering)

“I think we all have to accept the problems and also accept that there are solutions to the problems”

In this context one research participant discussed *Miss Potter*, a film about Beatrix Potter, who studied fungi and algae and was known as an expert mycologist but then went on to become a children’s writer/illustrator. Potter’s willingness to challenge women’s roles in Victorian England was seen as very positive. ‘I enjoy seeing programmes about women who are intelligent and even in a way powerful and breaks the rules’, commented this interviewee, ‘for example, I just saw the film *Miss Potter* [...] and realised that if she hadn’t gone against society’s picture of what women should be doing, we would never have had all of her literature and art work’ (Interviewee 2 - Computer science). Another interviewee praised Jodie Foster’s character in the film *Contact* because it showed a young, intelligent, scientist.

“...who believed in her capacity and went forward despite all odds and despite masculine ego and back-stabbing. I thought the role was an inspiration for girls to forge on in a domain traditionally dominated by men.”
(Q9 – Information Technology)”

For other women, however, this film shows a different image – as we noted earlier one of our interviewees saw *Contact* as portrayed a female scientist using her ‘femininity to get what she wants’ rather than relying on her scientific work.

Should women scientists be shown as ‘feminine’?

Last, but by no means least, considerable ambivalence or conflicting views were evident about whether female scientists should be framed in a ‘feminine’ way. This is a controversy and dilemma not, of course, confined to the debate among women scientists, it is also an issue from women in many fields, including in the media (Dent and Whitehead, 2004). Some of the scientists we interviewed felt very strongly that it was important that women in SET be allowed to be glamorous and ‘feminine’. One woman, for example, who had been a fashion model before becoming a computer programmer, was very critical of what she saw as the ‘real masculinising of powerful women’ in the 1990s. ‘I always wanted women to know that you can be feminine if you wanted to be feminine.’ She wanted to see images which showed that women who are in scientific or engineering fields ‘are still women’ (Interviewee 2 - Computer science). A couple of younger women were also very vocal around this sort of point expressing their desire for feminine charm, and good grooming, to be part of the image of the female scientist. ‘I prefer to see the

more feminine scientists', commented one 'when you go to conferences you see these really frightening women [...] who are [...] very manly and aggressive' (FG1: Pt3). 'I think it's nice to see women scientists looking smart', commented another 'because they just look like a dog's dinner sometimes, don't they?' (FG4:Pt2). A third interviewee suggested 'They [women scientists] [...] ought have to been given a make-over before they are allowed on TV. There ought to be a policy decision no scientist is allowed on television before they have had make-up put on' (Interviewee 3 - Physics).

By contrast other women felt alienated by an emphasis on femininity and gendered norms around 'grooming' and 'womanly charm'. They felt it was an added burden for female scientists, and reproduced a sexist emphasis on women's looks and demeanour that ultimately was both disempowering and impractical. While agreeing that being co-operative, rather than aggressive might be a welcome 'feminisation' of the field and challenge the competitiveness displayed at conferences, they did not agree with the idea that women should have to 'perform' femininity. Why should women be expected to dye their hair, for example, or spend ages putting on make up if they did not want to. Ambivalence, and some mockery, was attracted, for example, by the ubiquitous image of 'the young pretty looking girl [...] with a hard hat on and full of make-up, standing in the middle of a building site.' (Interviewee 15 - Construction). However, even if they felt such images were problematic some of our research participants saw some reasons why they might be promoted. As a woman in IT commented:

"...if we don't represent that glamour, then we cannot get away from the geekiness! So it's kind of a thorny problem." (Interviewee 18 – Computers)

Some of women's accounts of their own experiences at work suggested that challenges around appearance, demeanour and dress were complex issues to negotiate – and this coloured their views about what sort of representation they would like to see in the mass media. Women sometimes reported that how they dressed had been subject to company policy advice (in the past) and/or was subject to informal social pressure (ranging from subtle assumptions to 'well-meaning banter' or outright sexual harassment). It was clear from our research that some women employed in some areas of SET still have to work at being 'taken seriously' as women in a male dominated environment – trying to avoid being mistaken for the secretary instead of the senior scientist, counteracting a tendency for male colleagues to assume they were not really as capable as men, or dealing with sexual comments and wolf whistles.

Clothing and appearance was one way women sometimes felt they might be able to manage or pre-empt some of these problems. They described how specific negative reactions had been prompted by, among other things wearing heels, having long hair, wearing a 'skirt above the knee' or a 'v-neck jumper with a t-shirt underneath'. As one woman recounted: 'One of the boys, said to me: 'that's where you are going wrong, see [...] it's supposed to be a tight jumper with no t-shirt, showing yourself off' (FG5: Pt1). As a result of such encounters and experiences some of our interviewees were quite

reflective about their wardrobe choices – and how they tried to ‘fit in’ (for example, by wearing suits and dark colours) to ‘look like the boys’. The question of self-presentation could pose a catch-22 situation. As one woman explained: ‘it’s really hard to gauge [...] you wouldn’t want to look tarty or anything because then people will think you are not a good scientist. But at the same time you don’t want to look scruffy’ (FG5:Pt3).

Although some of our interviewees saw dress code as simply a matter of gender-neutral ‘professionalism’ or ‘personal choice’ which could and should disregard others’ assumptions (‘I dress for myself’), our research suggests that what people wear can be an important site through which gender politics are enacted. Dressing in either a ‘smart’ or ‘casual’ way, for example, has different implications for men and women which map differently onto ideas and norms of masculinity and femininity. Dressing elegantly involves expenditure of money for both men and women; however for women the code of feminine elegance tends to involve greater expenditure of *time* (from coiffured hair to make up) and can involve more complex choices, including negotiating the ‘masculine-feminine’ continuum (in contrast to the dark-suit and tie ‘uniform’ for men). Clothing defined as feminine can also be more incompatible with mobility and safety in some SET settings (e.g. visiting a site and needing to don overalls). Dressing ‘casually’, can also carry different messages depending on gender. A scruffy man may still have kudos (perhaps *especially* if he is a scientist). By contrast, a woman who is not well-groomed may be judged rather differently (especially true if she is a scientist) – as the reference to ‘dog’s dinner’ by the young woman quoted above makes clear. Above all, women in some areas of SET may be made to feel they have ‘something to prove’ both about their qualities as a scientist and as a woman, this is less true for men.

The issues here are not confined to women in SET, they also come into play in other occupations; however, women working in male-dominated fields are at the front line of some of these battles. The discomfiture and sense of being ‘out of place’ encouraged by the gender politics of dress can be a very day-to-day embodied and personal experience. Of course, interviewees’ personal views differed depending on their experience (if any) of such problems (which vary between different SET sectors) and how they analysed or tackled it (e.g. conform, ignore, evade or confront). Women had different ways of solving or trying to side-step the issue. This included developing their own ‘uniform’ or defiantly being as feminine as they wished, or simply refusing to acknowledge that there was an issue one way or the other. The clear overall finding, however is that appearance can be made to mean things for women in particular ways – and this is a significant factor in women’s experience at work, as well as informing their views about on media coverage and their pleasure or discomfiture in diverse ‘masculine’ or ‘feminine’ representations of women in SET. This issue also maps closely onto our findings from analysis of media coverage – and our interviews with women scientists who appear in the media. This is further discussed in “Gender, stereotypes and expertise in the press: how newspapers represent male and female scientists” (Kitzinger et al., 2008).

4.5 Conclusion

This chapter has explored women's views on how the media represent women in SET and highlighted specific examples that they see as 'good' and 'bad'. This has involved detailing what women in SET count as a positive or negative representation. It has also involved reflecting on some of the ambivalence or conflict around key areas and trying to place this in the context of women's broader experiences of working in a variety of often very male-dominated sectors. In this chapter we particularly explored debates around whether images should be 'aspirational' or 'realistic', how the challenges facing women in SET should be represented, whether motherhood should be highlighted and, indeed, whether women should be singled out as a category at all. We also examined different views on the extent to which an emphasis should be placed on femininity and whether 'glamorous' images of women in SET were to be welcomed or shunned. Views about this aspect of representation were clearly influenced by our interviewees' own experience of negotiating self-presentation in the work place.

The range of experiences, desires, and opinions evident from the above data can offer important insights to help inform any strategies seeking to improve media representation – or, indeed, develop special initiatives (such as exhibitions and education material). Campaign developers will, of course, have their own analysis of, and beliefs about, the right way to address the problems. They will also draw on other studies (e.g. experimental and survey research) analysing how role models might operate in practice with specific groups such as children. However, the diversity of opinion among women included in this study presents some dilemmas for how to address and enrol (or at least engage with) such a diverse constituency, and highlights the 'burden of representation' carried by any individual representation of a female scientist. Our next chapter draws together our overall findings and summarises our recommendations.

Chapter 5: Recommendations

This chapter brings together our interviewees' recommendations and combines with our own suggestions based on our analysis of the diverse opinions and experiences represented across our sample.

Our research suggests that representations of SET could be improved along four different dimensions. Changes could be made in:

- The degree of visibility of women in SET;
- The way women working in SET are represented in the media;
- The way *careers* in SET are represented in the media;
- General improvements in the way SET is represented in the media overall.

5.1 Increased visibility for women in SET

Our research suggests the need for more, and more diverse, representations of women in SET. This could include the following:

- More representation of both high-achieving and 'everyday' female scientists;
- Increased representation of women working in more diverse areas of SET (not just in the medical field);
- Increased representation of women from more diverse backgrounds (including ethnic minority women);
- The 'normalisation' of SET as a field for women through *in- passing* portrayals of women characters who 'just happen' to be scientists e.g. in soap opera;
- Representation of women scientists in diverse formats from documentary and biography to film and TV drama;
- Particular strategies to promote women in SET could usefully address both *factual* and *fictional* outlets especially as women we interviewed cited a wide range of media as relevant to their pleasure and inspiration;
- More women as *presenters* on SET programmes. Our research suggests female presenters might have a crucial role to play *whether or not* the women are actually scientists – as long as they demonstrate an ability to engage with the science;
- Quality SET programming for children and young people which includes significant roles for women. Programmes which could achieve the former status of *Tomorrow's World* could have a high impact on future generations;
- Our research also highlights that strategies to promote the visibility of women in SET *beyond* the mass media are also important. This would

include traditional means such as initiatives which highlight women's achievement in science museums, via awards and through commemorations (e.g. naming rooms and buildings after leading women in SET);

- There may also be potential in working with texts such as novels (e.g. the potential of the science fiction novel to inspire girls and boys about SET and encourage debate about social norms and the role of SET in society);
- Our research also highlights the need to engage with the *new* media. Audience fragmentation and changing media consumption patterns need to be part of any strategy to reach out to the new generation of potential scientists. This could, for example, include promoting female scientists using websites used by young people and developing techniques such as podcasts and webchats.

Increased visibility for women in SET however is not enough on its own. Encouraging the media to represent women scientists could be counterproductive in some ways unless the *quality* of those representations is also addressed see below.

5.2 Fewer stereotypes and more diversity

Our findings highlight the need to challenge particular stereotypes.

- Representations of women in SET should avoid simply recycling stereotypical images of female scientists as: socially incompetent/isolated, victimised, or only introducing female scientists as love interest or in supporting roles.
- Representations should avoid reinforcing either the de-feminised/frumpy or the feminine glamour-puss stereotypes (although there may be some room for either of these images to be positive sometimes).
- Our research participants emphasised that they would like to see women represented as competent and able to solve problems. They also often wanted women who looked 'real' or 'ordinary'. They wanted them to be enthusiastic and not framed as 'over emotional'. The role of emotion might be usefully addressed, but should not be stigmatised as 'excessive' or 'feminine'. In the view of many of our research participants women scientists should be usefully represented as 'people' first and women second.

Those seeking to promote positive representations have to engage with debates about the following:

- Whether images should be 'aspirational' or 'realistic';
- The extent to which women's family lives should be addressed;
- The extent to which representations should highlight the problems of being a woman in 'a man's world';
- The singling out of women at all;

- The extent to which women in SET should be portrayed as glamorous.

Women within SET have different views on this (sometimes shifting them at different points of their lives). Some of these differences of opinion might be resolved in individual representations. For example, if the problems facing women in SET are shown, solutions can be addressed too, in order to avoid just representing women as victims. In other cases, however, meeting diverse women's desires for positive images will only be achieved through *multiple* representations which free any individual image from the burden of serving as the ultimate representation. As one research participant concluded:

"I would like them to just have lots of images really. Because, in part, the problem is, you can't have just one image that would do everything, and one representation that would solve all the problems. [...] So I think if we could have just loads and loads of images [...] which are all different in terms of ethnicity, nationality, in terms of sexuality, in terms of disability and all those kinds of dimensions [...] you know just different people." (Interviewee 10 - Maths)

"you can't have just one image that would do everything, and one representation that would solve all the problems"

5.3 Change the way careers within SET are represented

Many of our research participants also highlighted the importance of representing all SET fields in less macho ways. They felt that more diverse representations of training/working in SET might encourage more diverse people into the field. This would include:

- Showing the diverse motivations which inform people's interest in SET;
- Exploring diverse ways of explaining scientific principles;
- Showing that you do not have to be a super-confident 'brain-box' to pursue training in SET;
- Presenting both realistic and inspirational role models;
- Showing the team work involved in SET work;
- Illustrate international and interdisciplinary co-operation;
- Suggesting that work-life balance is/could be compatible with working in SET;
- Showing the *range* of careers that can be developed after training in SET.

Each of these suggestions is expanded upon below.

Showing diverse motivation: Our research participants recommended showing the diverse motivations which might attract people into SET.

Motivation might range from intellectual curiosity to a desire to solve social problems or from a desire for prestige to a yearning to contribute to society. Several interviewees wanted the media to show the political and social significance of science.

“It could be about issues that are becoming more politically important, things such as climate change, ecology and use of resources, spreading the use of affordable medication for various conditions, and any of the issues facing us today really.” (Interviewee 12 - Neuroscience)

Exploring diverse ways of explaining scientific principles: Several interviewees wanted SET issues explained in ways that were less male-biased. As one commented, even the metaphors used could be unconsciously prejudicial.

“I was at a disadvantage at university. They would start lectures by assuming you all knew what a car engine looked like or they started talking about football and the momentum of the ball. Centrifugal forces, you’d think washing machines were an obvious choice, but no, they’d talk about motorcycles going round curves.” (Interviewee 20 – Science and Engineering)

“Centrifugal forces, you’d think washing machines were an obvious choice, but no, they’d talk about motorcycles going round curves”

The interviewee quoted above also suggested ways in which the ‘mode of address’ of programmes about science might experiment with diverse forms, appealing to diverse audiences. Perhaps, she suggested, a less ‘fireworks and gee whiz’ approach might appeal to some, and a practical emphasis might be engaging. ‘Maybe instead of all these women going in redecorating homes why not have them going in and saying this door creaks, this tap leaks, and showing how to sort them’. Linking in to an interest in ecology might also be relevant: ‘If one thing goes wrong, we throw it out. In some cases the batteries only have to run out and some people throw it! And we’re supposed to be ecological!’ (Interviewee 20 – Science and Engineering). Such practical beginnings, could, she argued lead to a population more engaged with construction and engineering principles and might encourage some young people to take an interest in SET who might otherwise consider it irrelevant to their lives.

Encourage people who lack confidence in their skills: Some of our research participants recommended showing young people that you do not have to feel ‘instinctively at home’ in SET. There are skills you can learn. You do not have to be naturally good at science or a ‘brain head’ or ‘stuck in your books all day’. This might be particularly important for anyone who lacked confidence in their abilities and particularly for those who do not come from a class/family background which supports them in believing that they have innate talent to develop a career in SET. One interviewee praised the programme *Beauty and the Geek* aired on E4. This is a game show in which male ‘geeks’ (often represented as rather gormless and socially inept) are

paired with female beauties (often represented as very fashion conscious and conforming to a 'dumb blonde' image). The men and women have to teach their partner a new skill, which will then be tested in competition against other couples. Some people might see this programme as playing with, and reinforcing, the worst type of stereotyping. However, other viewers characterise the programme as 'extreme mentoring' and one of our interviewees highlighted her very positive view of it all. *Beauty and the Geek*, she said showed young women building self-confidence during the course of the programme and scientific knowledge was made more accessible to the ordinary viewer.

"I remember watching one, and they had to make a rocket or something, a homemade rocket [...] and, at the end, they [young women] were like 'oh my god I would have never have thought that I could have ever done that before in my life'. [...] Things like that [are good at], getting [...] [people] to believe that they can do it." (FG6: Pt2 – Information Technology)

Show teamwork: Showing the teamwork involved in a great deal of science, rather than focusing on the individual hero might also, it was argued, attract more diverse people, including women, into science. 'I think it important to show that you work in mixed teams', argued one woman, 'I think showing science in action [...] that happens to include some women involved [would be good, rather] than just making a feature of one person' (Interviewee 5 - Physics). Indeed the absence of images of teamwork, and focus on individual scientists instead, could be quite irritating in both news reporting and TV drama representations.

"'Waking the Dead' is really good, but I'm finding Tara Fitzgerald as the lone woman forensic scientist in the lab really quite irritating. [...] I would like to see a more realistic portrayal of women. For example, a science drama where women and men work as a team." (Interviewee 4 - Biophysics)

Suggest the possibility of life/work balance within SET: Some research participants felt an important way forward was to show that it was possible to work in SET, and yet to have a work-life balance, and not have to be entirely consumed by one's job. This was viewed as important if more women were to be attracted into the field.

"I think there is room for some television programmes now examining the changes [...] [around] legitimacy to work-life balance. [...] We could have television programmes looking at how things are changing and really looking at how policies are being put into action and women who've actually negotiated that, or any women in leadership roles who are doing part-time working." (FG4:Pt1 – Ecology/Zoology)

Show the range of careers: Research participants also recommended showing the *range* of careers that might be pursued after training in SET (including those that might be slightly more attractive to women). Engineering for example, does not just involve being on-site wearing a hard-hat, computing can involve sales and marketing work, and many areas of SET

include management, multi-disciplinary collaboration and communication skills. Interviewees working in engineering commented that they would like to see the range of professional jobs represented:

“The overriding image of engineering is still that it’s dirty. [...] I think it should be portrayed as it is: as a profession, and being an exciting career for solving problems. I mean, engineering is just one name, but there’s millions of careers in engineering”. (Interviewee 21 - Engineering)

“I actually just opened an email this morning from a website called ‘construction photography’ and you open that up and the photo they’ve got on there is [...] this girl standing on the front, young pretty and holding a plumb level type of thing, and you think: ‘Oh God, get real!’ [...] they always show it as being in the trades and not a professional job.” (Interviewee 15 - Construction)

Interviewees working in the IT industry similarly emphasised the importance of showing the range of careers that could be pursued under this rubric. ‘When I look at the representations of IT people in TV and the media, then it is shocking’, commented one, ‘it is all geeky [...] But we in the industry know that it is not like that and that there are many jobs that require communication or listening skills, all sorts of things that don’t get represented in the media’ (Interviewee 18 – Computers). Similar points were made by interviewees from other areas of SET:

“I think they don’t realise how varied a job in science can be and where it can take them... that you can do a science degree and not necessarily end up working in a lab doing research. You could use it for all sorts of things like science journalism, science writing or other creative things as well, so it doesn’t have to just be that you are going to spend your life doing research.” (Interviewee 5 - Physics)

Displaying a wider range of SET careers might involve foregrounding some of the skills more usually associated with women, skills such as cooperation, teamwork and communication. It might also involve highlighting the international and interdisciplinary co-operation involved in SET.

Illustrate international and interdisciplinary co-operation: SET can involve important collaborations across national and disciplinary boundaries. One interviewee emphasised the importance, for example, of letting people know that ‘science can give you the opportunity to work with teams across the world and to travel, and to go to amazing places and work with scientists across the world, I think that sort of global picture is really important message’ (Interviewee 5 - Physics). Several interviewees made comments about the potential of SET careers to involve working with people from different cultures and the benefits of crossing divides between different areas of SET too. An emphasis on cross-boundaries could be linked to skills traditionally viewed as feminine. As one commented:

“A lot of the interesting sciences cross boundaries of discipline and in order to do that sort of work you have to be capable of communicating and listening, hearing what people from other disciplines are saying and not thinking you understand without exploring and making sure you do understand. [...] That’s a skill which I think men need to appreciate and not maybe be so individualistic.” (Interviewee 13 - Biochemistry)

Some reflections on generalisations: As with the previous discussion of what counts as a positive representation of a woman scientist, however, there were also some differences of opinion about the right way to represent careers in SET.

- For some women, for example, it may be important to see SET as a ‘trade’ or a ‘job’ rather than a career as that made it seem more feasible for them. Some may also value the emphasis on the practical side of the work, especially if they had come to their involvement through hands-on experience rather than a sense that they were intellectually predisposed to this sort of work. Class background and experiences at school may be a significant factor here. The ‘career’ narrative may be more in keeping with middle class aspirations and a focus on ‘intellectual’ aspects of working in SET may be more encouraging for some women rather than others.
- Similarly, displaying a more ‘women-friendly’ image of SET is not seen as the answer by everyone. Several of our research participants worried about imposing a new sort of norm on women scientists. Some female scientists want the right to be strange, eccentric and obsessive about their research - or to reclaim being a ‘geek’ as ‘cool’. Some also wanted to work in traditionally male ways, and not feel compelled to be good at communication or corralled into team work as their natural metier.
- There may also be problems in pigeonholing female scientists as ‘good communicators’ (a point further discussed in Reports 2 and 4).

The challenge for those seeking to promote positive images may be to open up diverse approaches to SET, without marginalising those who prefer a more ‘traditional’ or even more ‘innovative’ approach to their work or suggesting that being a woman scientist involves a particular set of norms.

5.4 Promotion of SET in general

In addition to the above, most of our research participants were also keen to emphasise that any initiatives to encourage women into SET needed to be part of efforts to promote more positive representations of SET overall. General strategies for improving the image of SET have been the subject of intensive research and are not of unique relevance to this particular project. Here, therefore, we do not expand on this data; we simply wish to note that our interviewees spoke of the need to:

- Create more space in the media for representing SET;
- Maintain and develop quality science TV programming;

- Encourage innovative programme formats involving SET themes/individuals;
- Encourage scientific literacy and citizenship;
- Stop trivialising science to fulfil cheap news values;
- Schedule SET programmes during ‘family viewing’ times and at different times of day;
- Challenge the negative image of particular areas of SET;
- Show how exciting science can be;
- Present more realistic images;
- Dramatise the investigative nature of science to feed into good TV drama;
- Get good science communicators on television;
- Make visible the invisible people behind the science;
- Challenge all stereotypes of ‘boffins’ and ‘geeks’.

As with the other areas we examine there are, of course, some potential tensions in the above recommendations. There could be a contradiction, for example, between showing how exciting science can be, and acknowledging the realistic ‘grunt work’ involved. These challenges mean that it is hard to identify any one perfect representation, but that a wealth of diverse representations would be welcomed.

5.5 Translating suggestions into action?

Throughout this report we have tried to avoid over-simplistic, one-size-fits-all answers. Instead we have aimed to reflect the wide range of experiences and opinions among women in SET and explore the dilemmas and contradictions this throws up. Alongside recording women’s clear appreciation, or criticism, of certain types of representation we have thus also tried to highlight how complex it can be to define what counts as ‘positive’.

We hope this research will help those who produce campaign and education materials to promote alternative, creative and inspiring images of women in SET. We may not be presenting anything very new to those with experience in this field, however we hope that the systematic overview and summary presented in this report may be a useful discussion document to help campaigners continue to navigate some of the pitfalls, reflect on their aims and continue to develop strategies to engage with diverse constituencies.

As far as the *mass* media is concerned, our analysis could be used to inform media producers, press officers and all those engaged in seeking to ensure that women in SET gain fair representation in the mass media. However, in order to be made practical, such suggestions need to be contextualised within an understanding of how the media produce news reports, documentaries, dramas and films about SET. This is the focus of our other reports – see below.

Further information:

Three other reports were produced as part of this research.

Report 2 (Kitzinger et al., 2008) compares how male and female scientists are presented in press coverage.

Report 3 (Haran et al., 2008) presents an analysis of how female scientists are presented in films and on television (including TV drama, documentaries and docudrama).

Report 4 (Boyce and Kitzinger, 2008) examines what science communications/P.R. professionals might be able to do to promote more positive representation of women in SET. It includes discussion of how to support women talking to the media.

These reports are available online at www.ukrc4setwomen.org or hard copies can be obtained from the UKRC: info@ukrc4setwomen.org.

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Endnotes

ⁱ Inspiration can, however, also sometimes be found in unexpected places. Media studies research highlights how sometimes people can take pleasure from, or identify with, unexpected characters. For example, one study showed that some Native American fans of 'Westerns' could identify with the John Wayne character in the film (the Indian-killing cowboy) seeing him as a representation of Native American ideals of being free and in touch with the land (see Eldridge et al., 1997, 150-151). Similarly, another study found that young British Asians enjoyed the (exclusively white) Australian soap opera '*Neighbours*' because it offered 'a complex metaphor for their own social worlds' (See Shively, 1992 and Gillespie, 1995 discussed in Eldridge et al., 1997: 150-152). Offering strong and positive role models of female scientists might be complemented by broader strategies which show science, engineering and technology as attractive to women in other ways. This is discussed in Section 5.3.

ⁱⁱ A SEMTA (2005) study of *Forensic Science: Implications for Higher Education* found that 8% of undergraduates, and 15% of masters students, said the media profile of Forensic Science had encouraged them to study it. Forensic Science is also regularly referred to in the news and serialised television dramas and 'docu-dramas' (usually in a crime context).

ⁱⁱⁱ The UKRC GetSETWomen database provides the media and other organisations with access to women, at various stages in their science, engineering and technology careers, who can be approached for promotional and work related opportunities. The membership was 187 when our research questionnaire was circulated (it has now, at time of going to print, increased to 700).. The other mailing list we used, Intellect's Women in IT Forum, seeks to inspire, lead and influence the action to increase the number of women in IT. Intellect Women in IT has a membership of approximately 350.

^{iv} The Women's Workshop is an established training centre in Cardiff Bay. It offers a range of training opportunities for women returning to education, training and the workplace.

^v An exception to this view point was offered by one young scientist who felt she had been very fortunate in growing up in a time and a place where there was a great deal of interest in encouraging girls into SET. She commented: 'I was born in 1976, so right from when I went to school my teachers never were anything other than absolutely thrilled that I was in sciences [...]. My teachers [...] never sort of said 'oh but you are a girl and you can't', in fact quite the opposite. [...] I think I was very lucky I do think I probably hit about the optimum. And the prominence as well of things like I remember the WISE bus coming round when I was in secondary school.

^{vi} The BBC recently announced that the series *Tomorrow's World* will not return on air. <http://news.bbc.co.uk/1/hi/entertainment/6933662.stm>

vii However, one interviewee commented, that it was the fact that her parents were both ambitious arts and humanities graduates – with high expectations for her - that actually encouraged her into SET. ‘If I showed an interest in anything non scientific my parents would scoop in and take over. I realised if I did engineering it would be my own space’ (Interviewee 20 – Science and Engineering). She feels that the fact that she was dyslexic also made her veer away from subjects such as English. Other women mentioned helping their fathers mend cars or engage in other such tasks – especially where there were no male siblings. As one commented: ‘I used to dismantle things when I was seven. It was a role I could take on because I had no brother.’ (Interviewee 20 – Science and Engineering)

viii ‘Most’ in this case means that 19 out of 26 interviewees; 21 out 35 focus group participants; and 18 out of 25 questionnaire respondents felt there was a lack of positive media representation of women in SET. We do not usually give this break down in actual figures, preferring simply to use words such as ‘most’ or ‘some’ as appropriate. See description of our method and analysis in Chapter 2 for further explanation.

ix The status of women’s perception, memories and opinions about the media is, of course, something that could be reflected upon. Talk about the media often serves as a narrative account of a point of view, rather than being an accurate assessment of patterns of media per se. Our research suggests that what counts as under-representation is debatable – it depends on what one would consider adequate representation – and this will also differ depending on the media under discussion (e.g. news media versus film or TV drama).

x In this context, we would note the growing ‘feminisation’ of some forms of science communication. On the one hand the key role played by women in this sector is to be welcomed – and is certainly helping to make women in SET visible. On the other hand, it could be a double-edged sword. The predominance of women in science communication fields could increase female visibility, and make science more accessible, but at some cost. It has the potential to decrease, rather than increase, women’s status within science. There are, we would suggest, some complex issues involved in increasing the representation of women in SET while also challenging, rather than reinforcing, stereotypes both of science and of ‘femininity’. This issue is further discussed in Report 2 in relation to women’s experiences of actually appearing in the media and Report 4 in relation to the role of women in science P.R.

xi The ‘frumpy’ image was, however, seen by some interviewees to apply equally to men and women: ‘male scientists are put across with beards and jumpers, socks with sandals and so on’ (Interviewee 1 - Electrical Engineering). It was also seen to be a problem that was not unique to SET. As this same interviewee went on to comment: ‘I don’t know how much worse it is really for ladies or how much worse it is for SET ladies than it is for perhaps lawyers or police officers in the media’ (Interviewee 1 - Electrical Engineering).

^{xii} It is interesting to note the diversity of media women are describing - ranging from industry adverts to newspaper profiles, from cinema films to TV documentaries. Any assessment of 'the media' must unpack these differences. This is an issue which is addressed in our others reports which actually analyse media coverage and explore different outlets and genres.

^{xiii} Interviewee code removed to avoid jigsaw identification. Through out this report, where codes are missing this is to improve anonymity.

^{xiv} Some could also be ambivalent about receiving awards as 'Women Scientists' rather than just as scientists. One commented, for example, 'if I'm judged professionally and somebody decides to give me a professional honour, I think that's wonderful and if it's a national or international award I think that's really nice because they're judging me with my peer group, men *and* women.' (Interviewee details excluded to increase anonymity).

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