Social Contexts and Responses to Risk Network (SCARR)

Science fiction fears? An analysis of how people use fiction in discussing risk and emerging science and technology

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1. Introduction

'Beware Frankenstein foods', 'The Clones are Coming', 'Nano Robocop threat'. These are the sort of headlines which populate the media landscape. A great deal of concern is often expressed by policy makers about such pervasive references to fiction and their impact on public discussion about emerging science and technologies such as GM crops, 'therapeutic cloning' for stem cell research or the development of nanotechnology. Key science organisations and leading scientists accuse fiction of being a corrosive influence on science literacy, undermining rationality, confusing the public and obstructing 'objective debate' (see Kitzinger, submitted). Evocations around 'Frankenstein foods' are accused of stoking irrational resistance to genetically modified crops. Films about armies of cloned automatons are blamed for public concern about therapeutic cloning. Images of 'Grey Goo' drawn from science fiction scenarios are seen to promote fear of nanotechnology. But what is the evidence for such accusations against fictional media and what can analysis of people's talk about science and fiction add to the discussion?

Any cursory glance at media representations might seem to confirm many scientists' and policy makers' criticisms. Film makers use technologies such as cloning or genetic research as themes in horror or science-fiction dystopias (See Haran et al., 2008) and these threatening themes or images are also borrowed by documentary makers and news journalists. Documentaries about genetics or nanotechnology, for example, use dramatic images resonate of 'Jurassic Park' or 'The Terminator' and press reports about scientific advances are frequently accompanied by images borrowed from fiction. [i] Headlines in newspapers such as the UK's Daily Mail regularly dramatise concerns about the future of science and technology with references to 'Grey Goo Armegeddon' (*Daily Mail* 22 January 2003) or 'Harvest of the Damned' (*Daily Mail*, 6 May 2004). Accompanying illustrations used in a range of newspapers display tiny nanobot robots or factories where rows of cloned babies are farmed. Frequent references to science fiction are embedded in the articles themselves. Our analysis of six months UK press reporting found that references to fiction were present in 9% of articles about GM crops (e.g. the term 'Frankenstein Foods'); 13% of articles about human genetics (e.g. references to 'Brave New World') and 26% of articles about nanotechnology (including references to 'Prey' or 'Star Trek') (Hughes et al, 2008). (See also Nerlich et al., 1999, Anderson et al., 2005 for examples of other studies which have documented the same phenomenon).

For some commentators science fiction references are evidence of the huge challenges facing scientists and innovators. Huxford, for example, talks about the problem of science fiction in his discussion of the coverage of cloning. He writes of 'anti-science themes intrinsic to science fiction' (Huxford, 2000, 187) as well as citing work on how much of science fiction is informed by 'technophobia' (189), 'science phobia' (190), 'regressive impulse[s]' (190), 'an atavistic impulse to glorify an earlier golden era' (190) and 'deeply conservative impulses in which science and technology represents the threat to "radical change" '.(189). In his view, science fiction is 'indelibly stamped' with such themes. 'The basic undercurrent in popular science fiction', is, he writes, 'the fear of science itself' (193). [ii]

The concern about the impact such fictional images have on the public often seems to be confirmed by research talking to 'real people'. Research interviews, or even in-passing conversations, with members of the public reveal that people frequently reference science fiction in their discussions of science. In the 20 focus groups conducted for the study reported here, for example, discussions about GM crops, stem cell research and nanotechnology were populated by references to a wide array of books and films. This included not just the most classic reference to 'Frankenstein', but also 'Brave New World', '1984', 'Boys from Brazil', 'Alien', and 'The Fly' – as well as a host of other films or programmes such as 'A.I.' (the child robot given emotional responses) or 'The Truman show' (about a baby owned by a TV corporation and born into a starring role in a reality TV show, without his knowledge). In fact, between them, research participants identified by name more than 40 different books or films which, they felt, had some pertinence to discussion of the emerging technologies

However, this working paper argues that crude summaries of the pervasive nature of references to fiction in public discourse can provide an over simplistic, and potentially misleading, picture of how fiction resources discussions about science. This article critically unpacks ideas about the role of fiction in discussions of science and takes a close look at how references to fiction function in talk about the risks and benefits of science.

We start by providing an overview of the academic work in this field and setting the theoretical and empirical context for thinking about how

people relate to fictional texts and reference. We then present a detailed analysis of how fictional references were used in our 20 focus groups discussions and 45 interviews. Our focus is on examining how talk about fiction operates in context of a group discussion, what function it serves, and how it is used in debate.

The analysis highlights how science fiction imagery and metaphors are important resources in talk, and can *sometimes* be a primary source of an image of a technology. However, we demonstrate how science fiction references are used with distance, humour, and irony as well as with conviction and show how reference to fiction is usually brought into *dialogue* with information from news reporting. Thus, for example, people may simply reiterate a 'Frankenstein image' without question in support of their argument, or they may work to *overcome* negative fictional associations - especially if they are convinced of the benefits of a technology because, for example, news reports link it with consumer or health benefits. We argue that, in fact, science fiction references can even be used to *discredit* fears, rather than to bolster them (because such fears are made to appear ridiculous and fanciful). We also show how science fiction can serve to resource positive *hopes* about the future of science and technology in some circumstances. Our research leads us to conclude that the extent to which appeals to fiction such as 'Frankenstein' operate as a negative force against a new technology has less to do with fiction, or fundamental ideas about the nature of the science, than the initial branding and framing of that technology in the news media. We conclude by arguing that the science fiction image of the technology is less important than the social and political context in which the technology is placed by news reports concerning, for example, who is developing the technology and why .

2. A brief review of existing literature on fiction and science: the absent but implied audience

There is now a well established and vast body of work exploring the media representation of science both in the news and in popular culture. Key texts such as Nelkin and Lindee's *'The DNA Mystique'*, Van Dijk's *'Imagenation'* and Turney's *'In Frankestein's Footsteps',* all published in the 1990s have helped provide strong foundations for burgeoning work in this field, much of which has specifically focussed on the representation of science in fiction. This has included examining images of scientists in literature and film (e.g. Fliker, 2003, Haynes, 2003, Haran

et al., 2008, Weingart, 2003) and tracking the changing face of science in fiction over time and across diverse fictional genre (Haran et al., 2008; O'Riordan 2008). Few novels or films have escaped critical scrutiny – with articles dedicated to examining everything from *Jurassic Park* (Stern, 2004) to *Gattaca* (Kirby, 2000) and *The Island of Dr Moreau*, (Kirby, 2002; Jorg, 2003). Over and above this focus on fictional texts themselves, several researchers have explored the *interface* between such fictions and factual reporting. This work includes, for example, examining, how references to science fiction are used in news reports and parliamentary debates about science (Jensen, 2008; , Nerlich, et al 1999; Cook, 2005, Huxford, 2000, Anderson et al., 2005, Lopez , 2004, Huxford, 2000, Cook, 2005; Mulkay, 1996; Willams and Kitzinger, 2005. Stern, 2004: 366-367).

What is noticeable in this mass of literature, however, is how often actual everyday audiences, the 'lay public', are marginalised from the discussion. Ordinary people may sometimes be invoked as *subject* to the influence of such fictions but, with a few honourable exceptions, they are rarely consulted or studied in their own right. Very little work addresses how audiences actually relate to fictional narratives, images and metaphors. The scarcity of such work (or its marginalisation) is clear in the composition of 'special issues' and 'overviews' around this area of research. For example, the special issue of *Public Understanding of Science* concerned with 'perception and representation of science in literature and fiction film' included 10 fascinating articles. However, in spite of its expressed concern with 'impact' and how science is 'perceived by media audiences' (Weingart and Pansegrau, 2003: 227) there is not a single paper presenting work on audience perceptions. Similarly, Bell's book – *Science, Technology and Culture (2006)* - addresses the full field of analysis of science and technology in films and other forms of popular culture – but includes nothing on audiences. The terms: 'audience', 'impact', 'influence' and 'effects' are not in the index. This gap is perhaps deliberate, but begs the question about how to theorise the significance of the representations analysed. The series editor, Stuart Allan, simply writes in the foreword: 'One need not invoke a language of causative media 'effects' or 'impacts' to acknowledge the formative ways in which we draw upon media representations – factional and factual alike – to help us make sense of scientific controversies.' (Allan, 2006, pv11)

In the vast majority of work, then, the general audience is either absent, or is simply *implied* or asserted through formal approaches based on theories about deep psychoanalytical structures or the power of metaphors. For example, an article entitled: 'The influence of popular cultural imagery on public attitudes towards cloning' (Nerlich et al., 1999) includes no work with the 'public'. In spite of this, the authors include assertions about influence, declaring, for example, that the article will: 'show how dystopian sci-fi stories, films, and images influence public attitudes' and that 'the fusion of science fiction and science fact in the media has changed public attitudes' (Nerlich et al., 1999: 4). They conclude that 'stories and metaphors surrounding cloning and genetic engineering make it almost impossible […] to see Frankenstein foods other than as descendants of the "triffids".' (Nerlich at al, 1999: 2).

In fact, the qualitative work which does empirically explore the reception of science reporting or science fictions often suggests that 'impacts' are less powerful, or less straightforward, than such assertions imply. The research conducted by Corner et al. (1990), for example, highlighted the diverse way people may interpret images and narratives about nuclear power (Corner et al., 1990). Condit's detailed analysis of how people work with metaphors such as 'blueprint', suggests the power of metaphors may be exaggerated (Condit, 1999) and work by Reid (2008) and Haran et al (2008) highlight similar complexities in how people negotiate their own identities and beliefs in relating to media representations of cloning (Haran et a;, 2008). Even the empirical work most often cited as evidence of the impact of fiction, a research report published by the Wellcome Trust in 1998, is much more cautious about 'impact' than some secondary citations of it sometimes suggest. The Wellcome Trust research notes that discussions in 10 focus groups about cloning were 'punctuated' by negative references to science fiction. However, the authors are careful not to present this as evidence of effect. 'Classic stories such as Frankenstein..', they note, 'were not referred to in detail, but were often simply cited as examples [...] to describe participants' concerns' (Wellcome Report, 1998 section 2.2.). Popular culture, they say, helped 'to *express* public attitudes', but, they add 'it would probably be an over interpretation of the findings to suggest that detailed aspects of the plots of these films and books were being applied. An alternative suggestion would be that such references are used in a metaphorical manner' (Wellcome Report, 1998, section 6.2, our emphasis).

Such cautions conclusions are more in keeping with the large body of audience reception research which has grown out of the discipline of media studies more generally over the last few decades. Stuart Hall's 'Encoding/Decoding' model provided a key foundation stone for investigating how media representations inform public understandings (Hall, 1981). Such work has highlighted the complex negotiations between audiences and texts which serve to construct meaning (see Eldridge et al., 1997).[iii] This is not to suggest that the media are *insignificant* – merely that textual analysis alone is insufficient if one is fully to understand how media influence does (and does not) operate or if one wishes to interpret the significance of references to different media texts in people's everyday talk. Clearly different disciplinary approaches have different strengths and weaknesses, and empirical research is not always the answer. However, we would argue that, at the very least, audience work can usefully *complement* textual analysis to enrich our understanding of the role of media representations in public debate.

3. Our research approach

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The audience research reported here is part of a larger project involving three strands. Firstly we interviewed key players in the debates about new technologies (e.g. leading scientists and NGOs). Secondly, we analysed six months of media coverage. Thirdly, we conducted focus groups with diverse 'publics' (with follow-up interviews with 43 individuals). (For full project summary see Hughes et al., 2008). As this article draws primarily on our focus group material it is this method which will be outlined here.

Focus group sample: Our focus group study was conducted in the UK. Our sample was mainly made up of 'ordinary folk' covering a wide range of demographic variables (age, class, gender, ethnic identity) and covering other dimension we thought might be relevant to the topic under discussion (e.g. rural versus urban for discussion of GM). Most research participants had no particular interest in the topic. However we also included some 'special interest groups' (e.g. workers from a conservation charity discussing GM). Groups were conducted across England and Wales. There were 133 participants.

Group composition: some involved pre-existing groups, some involved strangers. All groups were mixed sex with one exception (a Muslim

women's discussion group). The number of participants within each group ranged from 5 to 8.

Group process: Ten groups focussed on GM and 10 on stem cell research for the first half of the session. Most groups were then also invited to discuss the other two technologies as well. This approach – getting the *same* group to discuss the *different* technologies was an adaptation on the original design of our research that we developed after doing the first three groups. It involved extending the length of each focus group from one hour, as originally planned, to two hours. This proved a particularly valuable adaptation as it allowed us to explore how the *same* people shifted ground as they discussed *different* areas. Crucially, for the purposes of this article, the research design allows us to explore how fiction was differently mobilised in relation to each of our three different topics.

Facilitation and questions: The groups were facilitated by either Jenny Kitzinger or Emma Hughes (with the other researcher also present as assistant and observer where possible). Broad questions were used at the start of the group to explore how research participants defined the issue, the language they used, and to identify spontaneous recall and reference points. Research participants were asked what they knew about the science/technology in question, how they knew about it and what they thought about it. Towards the end of discussion more prompting was introduced and participants were, where appropriate, also invited to work with pictures taken from the TV news coverage of that issue to construct, and critique, a 'typical' news bulletin.

Analysis of focus group discussions: The focus groups were tape-recorded, fully transcribed and coded in detail. The analysis examined knowledge, sources of information and view of risk and benefit. We also looked closely at factors influencing different attitudes toward the risk of emerging technology and the way in which concerns were expressed. A second sweep of analysis focussed in detail on themes such as ideas about nature or how people used references to science fiction (e.g. every explicit or implicit reference to fiction, including every use of the work 'Frankenstein' or a phrase such as 'brave new world').. We were interested in paying attention to the dynamic nature of debate – and how different arguments worked in the group. The approach adopted was designed to focus less on what people 'think' as if this were a static snap shot than to explore *how* they think, and what they think 'with'

Supplementary follow up one-to-one interviews: phone interviews were conducted with 45 of the focus group participants after the group discussion in order to explore their view of the group discussion and identify anything they wanted to add, and any impact that participating had on them.

4. Findings

References to fiction (or at least the metaphorical use of the titles of books and films) spontaneously arose in group discussions of emerging technologies. However, they did so to a different extent, and in different ways, in relation to different technologies. The following discussion addresses:

> - how references to fiction were used in relation to each of our three different topics (nanotechnology, GM and stem cell research/'therapeutic cloning')
>
> - the extent to which fiction seemed to resource *fear*
>
> - the extent to which fiction seemed to resource *hope.*

4.1. *How references to fiction are used in relation to* the three different types of science and technology

References to 'Frankenstein' science were common, but not all pervasive, in the focus groups. The term was spontaneously raised in about half the groups. Frankenstein references were sometimes used as a short hand to describe the dangers of crossing boundaries or artificially creating life. At other times such references are used to illustrate ideas that scientists are always pushing boundaries and can be arrogant, greedy and ambitious or just incautiously curious. The Frankenstein image was linked to ideas that scientists may enjoy playing god, and are ingeniously (and often unwisely) tampering with nature and leading us into the unknown. Not surprisingly Frankenstein was particularly vividly linked with human cloning – especially via the image of reproductive cloning:

> Cloning frightens me too …. I like imagine, like Frankenstein, you know, they're going to make this new person. (Group 14)

Frankenstein was less likely to be used in relation to nanotechnology, and, even when it was used in relation to GM crops the reference tended to be in passing, with a reiteration of the term 'Frankenfood'

> All these crops are engineered in a lab and you think, a bit like Frankenstein, he was like made up in a lab and that's why they gave it that name I think. (Group 7)

Alternatively the phrase 'Frankenfoods' was also used by a few participants to dismiss fears on GM – it was used to epitomise the ludicrousness of some of the anti GM arguments:

> Olive: Franken foods. Which always makes me laugh because it's so ridiculous.
> Facilitator: Why do you think it's ridiculous?
> Olive: Well, I just think because a few years ago when it was all going on it was a lot of scare mongering and everyone sort of monster carrots are going to chase us down the streets and it's just kind of – gives a kind of a comical image of the whole GM thing in my opinion.(Group 10)

Beyond the shorthand and largely metaphorical, references to Frankenstein discussed above there were also frequent references to other books or films. However, there was a marked difference in the extent to which such texts were recalled, and the ways in which they were mobilised, in relation to the three topics that were the subject of our research.

Nanotechnology: Fiction was routinely identified as a key reference point for nanotechnology – indeed it was often the first (and sometimes the only) source people could recall. Asked whether they had ever heard of nanotechnology one individual simply replied that nanobots: 'rebuilt Red Dwarf' [Grp9]. Another commented that the Borgs, in Star Trek use nanotechnology to strengthen their bodies [Grp15] a third recalled that 'tiny, miniscule robots' were used on Star Trek to 'heal the android.' [Grp 8]. Several research participants referenced the film: *The Fantastic Voyage*: 'They shrink the submarine… and it goes through the human body.' Others referred to an episode of Dr Who which featured 'some sort of futuristic medical Nanotechnology' [Grp4], 'films' in which you see 'people are injected with the little chip thing that kind of floats around your body' [Grp3]. Others mentioned a range of fictional outlets including an episode in the film *'I Robot'* and Micheal Crichton's dystopian science fiction novel: *Prey*.

The image of nanotechnology promoted through fiction was thus identified as mixed. People recalled some threatening science fiction images – such as grey goo nanobots taking over the world. However, these were often treated with amusement. Prince Charles's uptake of the grey goo scenario was presented by some research participants as laughable and books or films which portrayed nanobots running amok were dismissed as unconvincing. One woman's partner was currently reading 'The Swarm', and far from making her worried, she said, it made her giggle:

> They [nanbots] are terribly bad, yes. I've only had snippets read to me. They're trying to get in the car and they're trying to work out how to get through and I thought: 'why don't they just go through the keyhole or the air vent system. It's pretty easy to get in a car. If the manure smell can get in, I'm sure nanobots can!' (Group 11)

By contrast, people knew of many *positive* science fiction images of nanotechnology - with a strong association with useful inventions and radical medical treatments. These images were often taken more seriously. Partly through reference to science fiction, nanotechnology was linked to medical benefits (e.g. microsurgery) and consumer goods (such as miniaturised computer technology).

The only group to express strong reservations about nanotechnology were a group of Muslim women. They referred to science fiction images of technology that could identify people on sight – and they immediately linked this to their experiences as Muslims in the post 9/11 world – talking a length about hostility and suspicion of Muslims and changes to legislation in response to terrorism. In this context they indeed feared the potential of nanotechnology to be used in the service of a 'Big Brother' State.

Stem cell/ cloning: Discussions of stem cell research and human cloning were, compared to discussions of nanotechnology, much more likely to be led by news stories. It was factual, rather than fictional media that were identified as people's primary source of knowledge. For example, research participants often talked about celebrities (such as Christopher Reeve) campaigning in favour of stem cell research and recalled news reports about religious opposition. However, talk of cloning also generated frequent references to a wide range of fictional texts. Research

participants recalled *Gatacca (*a story of genetic policing and discrimination), *The Island* (in which clones are farmed and murdered for their organs), *Godsend (*where the cloned child develops an evil streak) and *Boys from Brazil* (where a rogue scientist tries to produce another Hitler). Sometimes the term 'cloning' immediately prompted them to think about fiction such as *Brave New World*. As one research participant commented:

> The thing it [cloning and stem cell research] instantly made me think of is [...] *Brave New World*, you know, [...] the whole making people into alpha, beta, gamma, and giving them roles, instead of letting them choose. It instantly makes me think of that to be honest. (Interviewee 14)

However as the caveat 'to be honest' suggest, thinking in this way was often seen as 'ignorant' or 'emotional' rather than rational and individuals either presented themselves as struggling to overcome such associations, or were challenged by other group members. Sometimes the link with fiction was not explicitly challenged, but seemed to be undermined by the flow of conversation as others quickly reasserted the positive face of the technology. Thus, for example, the group quoted below, linked stem cell research to the iconic image of 'the ear on the mouse' and to 'Frankenstein science'. However, they were keen to overcome their concern and welcomed the positive outcomes that might be imagined

> F1: It is creepy [the image of the ear on the mouse] but they shouldn't have done that because that makes you think of Frankenstein and that makes you think of creating horrible monsters. Because that was a monster that poor thing.
>
> F2:   I've got a friend whose little boy was born with no ears - and they actually made ears. And they didn't create them but they made his ears and he's got false ears. But imagine now what we could do if they've got this stem cell.
>
> F: It's interesting.
>
> F: It's tremendous. (Group 15)

It should also be noted that even a film such as Boys from Brazil may not be read as entirely negative. Two people who had seen the film, for example, said they had found it more *reassuring* than worrying:

M1:   The actual idea in there [Boys from Brazil] was probably okay in my eyes, it was just the way he went about it was wrong.

Facilitator: So it didn't make you anti the idea of cloning?

M1:   No, it was just the person that he was trying to clone. If he was trying to clone a *good* person, maybe, you'd look at a different angle.

Cloning did not worry them, they said because

F1:   The Boys from Brazil, I think at the end of the day they actually said 'yes, you want to create this evil person, but he isn't actually *fundamentally* evil'. It was this *nurture* thing as well. It was his life experience. And there was pretty much just a boy there growing up, doing his thing, and you really could not reproduce this bad person.

Facilitator: So having seen the film, you actually think it's more -

F1:   A *positive* message, that the evil will not out, the good will out. (Group 11)

GM crops and food: The role of specific fictional representations of GM is very different, and references to fiction were less common and seemed less significant. News reports (e.g. of demonstrations against GM) dominated discussion of this topic. Science fiction was very *rarely* mentioned in this context. Indeed, even when prompted at the end of the discussion, people were hard pressed to identify any fiction about genetic modification of plants. There were a few mentions of '*The Day of the Triffids*' or the film '*Solent Green*' ('we're running out of like on certain proteins so they use human beings' [Grp3]). When pressed people in three groups also suggested that *Jack and the Beanstalk* might have involved a genetically modified bean. The extracts below illustrate typical responses to being prompted to discuss fiction in relation to GM:

Facilitator: And are you aware of any fictional representation of GM crops? [silence]So, sort of, films or books or anything really?
Elaine: Absolutely none.
Quincy: Fiction, fiction, no.
Danielle: Wouldn't say so, would you? [Group 9]

Facilitator: And are any of you aware of any fictional representations of GM crops? Is there anything…
Ted: Fiction?
Talos: Fictional?
Ibrahim: No.
Clara: No.
Talos: No.
Ted: Well, I suppose when you say fictional–…Do you want it in a book?
Facilitator: In a book, yes, in a book,…in a play, in a film…
Ted: The Day of the Triffids.
Facilitator: Yes, Day of the Triffids.
Talos: Yes.
Ted: It's going back a few years.[...] Well you could say Jack and the Beanstalk, couldn't you? [laughter] Well you could do, couldn't you? (Group 8)

It is interesting to consider why science fiction was not referenced by participants discussing GM in the way that it was in discussions on stem cell research and particularly nanotechnology. This is an area we intend to investigate further but possible considerations are a lack of GM specific fictional representations of (compared to, for example, the plethora of human cloning fictions). It could also be that those representations which exist have failed to capture the imagination of participants or that the personal link participants felt to the issue of GM (either through their food or landscape) meant they did not feel the need for recourse to science fiction. What GM food 'means' for them as an individual is much more apparent than stem cell research or nanotechnology where they might turn to fiction to help consider some of the wider political implications of the technology.

As if is 'The Triffids' offers a 'scarey' message, *Jack and the Bean* stalk a rather more optimistic one (the bean allows Jack to obtain the golden goose!). However, both were dismissed as rather irrelevant – the plot of the Triffids was ludicrous, and *Jack and the Beanstalk* merely a fairy tale. Films about modified plants were dismissed as featuring 'the attack of the killer tomatoes' [Group 10] or being 'low budget'. As one research participant commented:

> [I]f its going to be like plants, they do something like walk or something, and it would be so stupid … just be like a really low budget sci-fi film. [Group 3]

Such films were not identified as containing any relevant ideas or images Indeed, when one person mentioned '*The Day of the Triffids*' as a film about GM, another member of the group suggested that it was pretty irrelevant:

> In terms of the image, I hadn't thought about Triffids, sort of that is plants killing other things in that sort of manner. It [the scarey thing] is more to do with probably the crop driving a large multinational's profits. Because once you've got the crop you can only use their chemicals anyway, [....] That sort of globalization, who's really running the world, um…a reasonable number of these companies have probably got a larger turnover than most countries in the world. [Group 4]

What is clear from this analysis is that the three emerging technologies are differently resourced by science fiction. Nanotechnology which has a relatively low news profile, is largely recognised (if at all) through science fiction portrayals or analogies. By contrast, cloning, which, since Dolly the sheep, has been subject to extensive news coverage, is largely discussed in relation to such factual reporting, but is also closely linked with a range of fictional representations of genetic engineering and cloning. The third emerging technology, GM crops/food has a very different profile – it rarely features in fiction, and is much more associated with 'hard news'.

Relating this to people's attitudes toward the technology reveals an interesting finding. The technology *least* directly resourced by specific fictions (GM) is the one which prompted *most* disquiet in the groups. The technology *most* strongly linked to science fiction (nanotechnology) is the one that caused *least* concern. Clearly it is important not to generalise about science fiction causing people to resist emerging technologies.

4.2. Are people influenced by science fiction fears? 'It turned angry'

Most research participants self consciously position themselves as 'intelligent' media consumers who know the difference between fact and fiction. They displayed their knowledge of different genres and the demands of narrative tension in shaping the dystopian images of science

in the media. As one commented, a film would not be a box office success if all the clones turned out to be nice people or if the nanobots were just helpful around the house.

Most professed to be immune to being influenced by the fears promoted by so much fiction. However, a few felt they might be emotionally and subconsciously influenced and they were certainly prepared to believe that other people (e.g. children, or less mature consumers) might have their attitudes shaped by 'scare-mongering' fiction.

At the same time as designating many films as 'stupid' or 'mere entertainment', some research participants, however, argued that the future of science was unpredictable and anything might happen

> Unbelievable isn't it, between Norman times and now. So if we look at another 1000 years down the road we will look to those people exactly as the Norman people look to us. And 2000 years in the future and 3000 years, who knows. You know, you might be able to say, okay, I'll have a new brother today. I'll go to the shop and buy one. You don't know do you. Okay, to us it seems stupid, but 3000 years down the line it may not be.

Science fiction thus opened up consideration of currently unimaginable possibilities that might occur in the future. It could also provide useful 'political' rather than 'factual' information. Some films about genetics or cloning were discussed respectfully as having some degree of 'social realism' or thought-provoking content (e.g. GATTACA).   It was welcomed as a form which 'get's you thinking' and engages you because you are watching for pleasure [Grp 6]. However, the warning messages contained within some fiction about science was rarely allowed to stand on their own as just cause for concern. People warranted their concern that such fictions 'could come true' by linking it to a wide range of real historical events. This included references to: scientific and medical mishap (thalidomide, Porton Down, BSE, mixamatosis); the military uses of scientific discoveries (the nuclear bomb) and the atrocities committed in Nazi Germany. They also talked about the effects of inequalities (global organ trade, unequal access to drugs on the NHS) and the difficulties of international regulation alongside the problems caused by globalisation ('coca-cola has taken over the world') or global competition ('Iran buying nuclear secrets').

In addition, they also linked concerns about the potential truth of speculative fiction by talking about the unethical impulses generated by the desire to protect ones own ('as a mother you'd do anything for your child') and hence the dangers of consumer eugenics or a creeping erosion of ethical standards, combined with reference to the 'slippery slope' they had witnessed in their own life time (illustrated, for example, by a critical discussion of women in their 50s and 60s having assisted pregnancies). Finally, the Iraq was also a frequent reference point, with people using the invasion of Iraq as an illustration of government secrecy in the UK and a lack of democratic accountability. Most of our research participants were thus clear that while science fiction might dramatise such fears, and help them to imagine how technologies might play out under certain conditions, it was historical or contemporary *facts* which warranted their concern.

People's discourse about what they take (or do not take) from fiction has, of course, to be treated with caution. In some cases it may be useful to treat such talk less as a direct insight into the true impact of fiction, and more as a performance of identity (for analysis of people's talk in this way see Kitzinger, in preparation). Rather than take people's explicit and generalised statements about the impact of fiction alone as evidence, it may, therefore, be equally (if not more) important to examine the *implicit* way in which fiction seemed to resource reactions, talk and understanding. Certainly in discussion of factual media people often explicitly express scepticism (e.g. 'I don't believe anything I read in the papers') but then go on to use news reports uncritically to underpin their arguments (see Miller et al., 1998). Does the same thing happen with fiction? Here it is important to reflect on questions such as: In spite of their declared sophistication do people actually *confuse* fact and fiction? In spite of their expressed *rationality*, do the emotional responses provoked by science fiction seem to influence them? In spite of their declared general scepticism do they still treat fiction as a valid form of knowing in some respects?

The answer to the first of these questions is that research participants did display some uncertainty about what technology currently made possible, and what was merely speculative. However, this was not just in the direction that those denouncing 'science fiction induced fears' might expect. Confusion about the present state of affairs in relation to the technologies under discussion was often linked to excessive *optimism* rather than pessimism. It was also clearly resourced by *news* reporting rather than just fiction. In particular, research participants believed that

stem cell research had already delivered treatments and cures – crediting it, for example, with providing face and limb transplants. Such beliefs are hardly surprising in light of the promisory discourse adopted by many pro stem cell research experts over the last ten years (see Williams and Kitzinger, 2005). [iv]

There was only one group of research participants who clearly confused fact and fiction in the way so often highlighted by scientists and policy makers when they complain about the detrimental impact of science fiction. This group was a challenge for the facilitator (JK) because they had not even heard of stem cell research. When asked to think about what it might involve they deduced it must involve research on the stems of plants. They were also not familiar with the term 'therapeutic cloning' which the facilitator then introduced to try to prompt recognition. They did, however, associate 'cloning' with Dolly the sheep, and, then drew on images from science fiction to imagine what 'cloning' must be about in relation to humans. This was the only group in which anyone admitted to uncertainty about whether or not a fictional film was based on a 'true story'. The discussed a film about a boy who was cloned 'it turned nasty'.

This was also the only group of people to present an image of cloning entirely drawn from science fiction images – particularly through their assumption that a clone would be a same age and identical copy of the original without an individual personality. They made comments such as 'with a clone it is a reproduction of that same person' and argued that, unlike a natural twin, a clone would 'speak' and 'think' the same things and 'blink' at the same time [Grp18] . Toward the end of this session this group asked the facilitator to explain stem cell research to them. They responded to the explanation by concluding that they had been misled by fiction and requesting 'education'.

> They [scientists] have got to remember that they've got to educate people like us and show us different. Until we're educated by the scientists who want us to believe in them, all we're getting is all these cloning films that will educate us. [Group 18]

We have quoted from this group at length because they most closely conform to the stereotype sometimes promoted by scientists and policy makers about the ignorant public. Certainly such misinformation does

exist, but this was the only group in our entire sample of 20 groups to display this level of confusion.

This leads us into another question, seldom raised by concerned proponents of new technologies – are people influenced by the hopes for technology represented in some science fiction?

4.3. Are people influenced by science fiction hopes? 'Beam me up Scotty'

Although research participants often disowned 'science fiction fears' they simultaneously sometimes argued that fiction could sometimes provide reasonable predictions of the future of technology. The examples they gave were overwhelmingly presented as positive or exciting. This was often linked to a positive discourse about either health/medicine or travel/communication. These three research participants, for example, conjure up positive images of technology drawn from sources ranging from James Bond movies and Star Trek, to the film 'Face Off'.

> M1: I saw somebody interviewed yesterday about James Bond and they said, 'you know, it's fantastic, when I was a child he was using all the things I actually use now, and that's probably twenty, twenty five years ago.'
>
> F1: The same thing is true with Star Trek, isn't it? [inaudible]
>
> F2: It's like that film, Face Off, with Nicholas Cage and John Travolta …
>
> M1: Yes, and you thought that was ridiculous.
>
> F2: But now it's happening …
>
> M1: And now they can transplant faces. [Group12]

The 'horror' element of fictional stories from the past were dismissed in favour of celebration of medical progress as other members of this group joined in the discussion.

> F3:   [Nanotechnology] Is it like the *'Magnificent Journey'*[v]?
>
> M3:   They shrink the submarine.
>
> F3:   Well it's like Star Trek isn't it.[…]
>
> F1: I think some guy's had a hand transplant as well, hasn't he?
>
> M1: Yeah, you can have arm transplants and …

F1:   Yes when he's lost his arm.

M1: These are things that you would never imagine actually happening, you know, they were fantasy. […] but *now*, I mean now they can actually do it. (Group 12)

Although any of these 'science fiction' style advances might be misused, they were generally to be welcomed. Such discussion was explicitly placed within a general context of medical progress in most groups.

Ibrahim: As time moves on people will get more receptive to these new ideas and they don't find it, you know, they're frightened. Ted: Well at one stage people were scared of flying, weren't they? Ibrahim: Yeah, you know, I mean it's just – it's just a natural progression, isn't it? People accept new developments and the younger generation accept it easier. (Group 8)

Such evolution was usually welcomed. People made comments such as 'most probably three quarters of us would be dead by now without vaccination' [Grp11] or 'a lot of us wouldn't be here now if it wasn't for scientists doing research on probably some of the illnesses we've had in our lifetime that would have killed us 100 years ago' [Grp13]. People spoke about decimation of previous generations by diseases such as TB ('especially in the poorer classes, they expected - they had nine, ten children and eight of them would die with TB'. [Grp11]). Several spoke about having benefited from treatments available to people now that were not available even a generation ago (e.g. heart by-passes, IVF, hip and knee replacements).

This general discourse of medical progress was sometimes linked to a wider view of exploration, and values of the time which inhibited pushing boundaries. As one commented: 'three hundred years ago, it was wrong to sail towards America because you could fall off the end of the world' [Grp12]. Resistance to medical advances were thus framed as 'unenlightened'. As one declared' when penicillin was invented […] there was an outcry against that' and another member of her group added his reflections on 'Victorian times' .

M: Yes, if you look at a lot of the medical inventions, for want of a better word, in Victorian times, a lot of them were 'oh, it's going against God', 'down with the origin of species' and things like that,

'survival of the fittest'. They'd just say 'oh, that's all wrong'. But now, because we're more enlightened, it's changed. […]

F: we'd still be in the dark ages wouldn't we (Group 11)

Similar views were presented in relation to technical progress – in the past people were scared of travelling by train or aeroplane. Several people noted, for example, that mobile phones first featured on Star Trek, and were now a reality. Travel to the moon and satellite navigation were also cited as evidence that science fiction could become science fact.

What was striking about discussions about the future possibilities of science and technology was how often they were underwritten by an underlying discourse of progress combined with the belief in technical fixes for current predicaments – problems of parking loomed large!

Research participants made implicit and explicit links with positive science fiction visions of the future. One young woman, for example, linked nanotechnology to a film 'I, Robot' starring Will Smith which she described as a film in which 'humans are still human', but shows 'robots taking over and everything gone digital.'

So your car is a robot, [...] You get to where you're going, the car door opens, you have to do nothing, just walk out and that's it, it's locked. And parking, you don't have to park no more. You know, it's just robots sort of doing it. (Group 16)

She thought this might be a plausible vision of the future and several members of this group (all in their teens) were very positive about this declaring 'I'm definitely in favour of it.' and adding 'You'd use 'serve yourself' Tesco checkouts wouldn't you?' [Grp16]. Similar visions were evident in other groups too. Some explained that they felt that science fiction images had been realised in their own lifetimes:

F8: I've seen one of them construction programmes, there is an taxi now they've started to build that, you know, it's like a railway and it's your own personal taxi, you just get in, you type in where you want to go, stick in your credit card and go [...]

F6: You don't need to worry about parking or anything else.

F8: You just, get to go to the train station, get your own taxi [...] you can get off whenever you want.

F6: Brilliant! (Group 17)

This helped to justify the improvements they thought they might see in the future

I think a lot of these things [science fiction novels and films], there must be some sort of element of truth there somewhere, otherwise we'd just sit there and go: 'That's absolutely bloody ridiculous'. I mean half the time you *do* think 'that's absolutely bloody ridiculous', but there's also this kind of uncertainty, a part of you that thinks: 'Ooh, one day maybe yes'. You know, instead of having to worry about traffic jams you'll just stand in a pod and go: Right I'm going to work. Ding, ding, ding, ding. There's your coordinates. Off you go, and there you are. (Group 12)

M3: If you look at the films of the '60s or '70s, everything that was science fiction then is now fact or run of the mill now. Like they used to have the films about going to the moon, I mean, that's like not an *everyday* occurrence, but, I mean, that's something that wouldn't shock anybody now. And, like in Star Trek they used to have those flip phones, *everyone's* got those now. Whatever they come up with in films now, we'll be using in 20 years time.

F4: It's like when you see all those cable cars flying round. That's going to happen in the future.

Facilitator: So fiction can kind of predict what's going to happen?

F4: Yeah, I think so. [...]

M3: I think the film exaggerates it a bit but then, [...] the next thing you know then, we can do anywhere in the world - bounce off satellites. I mean, satellites were never heard of. I mean, they can't teleport anyone yet but – 'beam me up Scotty!' (Group 13)

What is striking in the above analysis of how people relate to the hopes and fears presented in science fiction is that a concern about social *misuses* of technology are often combined with an extremely *optimistic*

view of technical possibilities. This was often grounded in an underlying positive discourse about progress. A technical fix to many current problems - particularly the pressing problems of health, transport and parking - were positively anticipated. Such progress was 'interesting', 'fascinating', 'tremendous' and 'brilliant'. It might not be achieved in their life times, but the possibilities were endless and were welcomed: 'Beam me up Scotty'!

Conclusion

Science fiction is often stereotyped as a negative force in relation to the public acceptance of advances in science and technology. However, our research suggests the need to develop a more nuanced understanding. Firstly, there is a need to take into account how different types of science and technology gain a different profile in fiction – the image of nanotechnology, for example, is different from the image of cloning. Secondly it is important to acknowledge the *positive* image of techno-fixes offered up by some mainstream science fiction Thirdly, our research demonstrates that people are not simply victims of the text – but actively consume and negotiate with fictional representations. Even the most dystopian science fiction does not, therefore, necessarily promote fear and, if anything, there is even an asymmetrical assessment of science fiction. It was the *benefits* of the future of science and technology as imagined in fiction which were repeatedly identified as 'realistic', 'possible' and 'fantastic' in our focus groups, while the potential negative risks were more often viewed as 'fanciful', 'laughable' and 'fantastical'.

Finally it is important to acknowledge the way in which science fiction scenarios are brought into dialogue with information gleaned from the news and a wide range of other cultural resources. For all the talk of 'Frankenstein food', for example, science fiction is not 'to blame' for resistance to GM. Many of our research participants were suspicious of GM but this was because of the way it was branded/framed as led by industry (e.g. Monsanto), epresenting a foreign invasion (US onto UK) and seen as imposed not chosen (e.g. the perceived lack of democratic consultation around the introduction of GM). People worried about the environment, and, even more about food ('I want to know what I put in my body') and GM had become associated with 'junk food' and e-numbers. Resistance to GM was also linked with a wide range of dearly held values. These ranged from ideas about family responsibilities and

ideals of community ('it's important to sit down for a proper, shared meal, not just pop a food capsule in their mouth') to notions about Britain and the countryside (including the significance of national identity and the special nature of the British landscape and framing traditions). Distrust of government policy in relation to GM was also underwritten by people's understanding of past food issues (e.g. BSE). Against the backdrop of this array of influences/concerns, the role of science-fiction was almost entirely irrelevant.

In conclusion we would argue that it is inappropriate and unhelpful to argue that science fiction inevitably feeds fear of 'scientific progress'. This is an inaccurate generalisation and locates the wrong 'enemy'. It can also help support an unreflective dismissal of public fears as merely 'science fiction induced'. This, in turn, allows commentators to sidestep the wide range of questions people would like to see addressed about the rationale for, and control over, scientific development. (see Hughes et al., 2008, Kitzinger, under review). Science fiction is a genre descriptor that covers a vast array of different texts (books, films and TV series). These various science fictions are just *one* set of resources among many used in debates about emerging technologies. We hope that this working paper has highlighted some of the complex issues involved – at the level of both text and audience reception.. We also hope that it has identified how science fiction is brought into dialogue with other factors, ranging from the framing of new technologies in the news to questions of identity and citizenship.

References and bibliography

Anderson A., Allan S., Petersen A. and Wilkinson C. 2005. The framing of nanotechnologies in the British newspaper press. *Science Communication* 27, no 2: 200-220

Bainbridge, William. 1983. *The space flight revolution*: a sociological study. Malabar, Florida: Kreiger Publishing Company.

Barker .M and Brooks, K (1998) Knowing Audiences: Judge Dredd: Its Friends and Luton, UK: University of Luton Press,

Barker, Martin and Julian Petley (eds) 2001. *Ill effects*: the media/violence. 2nd edition. London: Routledge

BMA [British Medical Association] 1999. *Human 'cloning': a discussion paper for the World Medical Association.*
www.bma.org.uk/ap.nsf/content/humancloning [accessed 2/6/08]

Cobb M. and Macoubrie J. 2004. Public perceptions about nanotechnology: risks, benefits and trust. *Journal of Nanoparticle Research 6* no. 4: 395-405.

Condit, CM. How the Public Understands Genetics: Non-deterministic and Non-discriminatory Interpretations of the "Blueprint" Metaphor. *Public Understandings of Science,* 8, No 3 (July 1999), 169-180

Cook, Guy. 2004. *Genetically modified language: the discourse of the GM debate.* London: Routledge.

Corner, J, Richardson, K, Fenton, N (1990) *Nuclear Reactions* (University of Luton Press, Luton.

Eldridge, J, Kitzinger, J & Williams, K (1997) *The Mass Media and Power in Modern Britain,* Oxford University Press

Gerbner, G. 1987. Science on television: How if affects public conceptions. *Issues in Science and Technology* 3, no. 3: 109-115.

Gieryn, Thomas F. 1999. *Cultural boundaries of science: credibility on the line.* Chicago: University of Chicago Press.

Hall, S (1981) 'Encoding and Decoding in television discourse', In Hall S et al., Culture, Media, Language: working papers in cultural studies 1972-79. London, Hutchinson.

Haran, Joan. 2007. 'Public consultation has been high jacked', Paper presented at Cesagen day workshop: Feminist Issues in Contemporary Biopolitics - a CESAGen dissemination seminar series, 'Getting beyond the usual suspects', September 14th, in Cardiff University, UK.

Haran, J., Kitzinger, J., McNeil, M. and O'Riordan. K (2008) *Human cloning in the media: from science fiction to science practice.* London: Routledge.

Hughes, E., Kitzinger, Jenny, Murdock, G (2008) *Media Discourses and the Framing of Risk,* SCARR Working Paper no 27. University of Cardiff

Huxford, J. 2000. Framing the future: science fiction frames and the press coverage of cloning. *Continuum: journal of media and cultural studies* 14, no 2: 187-13.

Jensen, E. 2008. The dao of human cloning: utopian/dystopian hype in the British press and popular films. *Public Understanding of Science* 17, no. 2: 123-143.

Keller K. 2007. Nanotechnology and society. *Journal of Nanoparticle Research* 9: 5-10.

Kirby, D. 2000. The new eugenics in cinema: genetic determinism and gene therapy in GATTACA. *Science Fiction Studies* 27, no. 2:1-18.

Kirby, D. 2002. Are we not men? The horror of eugenics in The Island of Dr. Moreau. *Paradoxa* 17: 93-108.

Kirby, D. 2003. Reflections: science in the cultural context. *Molecular Interventions* 3, no. 2: 54-59.Kirby D. and Gaither L. 2005. Genetic coming of age: genomics, enhancement, and identity in film. New Literary History 36, no. 2: 263-282.

Kirby, D. 2008. Cinematic science. In *Handbook of Public Communication of Science and Technology*, ed. M. Buchhi and B. Trench., London: Routledge.

Kitzinger, J (under review') Questioning the sci-fi alibi: a critique of how 'science fiction fears are used to explain away public concerns' , *Journal of Risk Research*

Kitzinger, J. and Williams, C. 2005. Forecasting science futures: legitimising hope and calming fears in the stem cell debate. *Social Science and Medicine 6,* no. 3: 731-740.

Kitzinger, Jenny., Lesley Henderson and Andrew Smart. 2002. *Media coverage of the ethical and social implications of human genetic research,,* Final report for The Wellcome Trust. London: Wellcome Trust.

Macnaghten P., Kearnes M. and Wynne B. 200p. Nanotechnology, governance and public deliberation: what role for the social sciences? *Science Communication* 27, no. 2: 268-291.

Miller, D., Kitzinger, J, Williams, K and Beharrell, P. (1998). *The Circuit of Mass Communication: Media Strategies, Representation and Audience Reception in the AIDS Crisis.* London Sage/.

Michael, M. and Carter, S. 200. The facts about fictions and vice versa: public understandings of human genetics. *Science as Culture 10*, no. 1: 5-32.

Mulkay M. 1996., Frankenstein and the debate over embryo research. *Science, Technology and Human Value*s 21, no 2: 157-176.

Nerlich, B., Clarke, D. and Dingwall, R. 1999. The influence of popular cultural imagery on public attitudes towards cloning. *Sociological Research Online* 4, no. 3: 1-14.[www.socresonline.org.uk/4/3/nerlich.html, accessed 2/6/08]

Nottingham, Stephen. 1999. *Screening DNA: exploring the cinema-genetics interface* [http://ourworld.compuserve.com/homepages/stephen_nottingham/dna2.htm, accessed 15 July 2008]

O'Riordan, K. 2008. Human cloning in film: horror, ambivalence and hope. *Science as Culture* 17, no 2: 1-18.

Reid, G (2008) *'Replicating meaning? Audience response to a BBC drama-documentary about human cloning'.* Cardiff University, Cardiff.

Rose, C. 2003. How to teach biology using the movie science of cloning people, resurrecting the dead, and combining flies and humans. *Public Understanding of Science* 12, no 3: 289-296.

Stacey, Jackie forthcoming. The cinematic life of the gene. Raleigh: Duke University Press.

Stern, M. 2004. Jurassic Park and the moveable feast of science. *Science as Culture* 13, no 3: 347-372.

Turney, Jon. 1998. *Frankenstein's footsteps: science, genetics and popular culture.* New Haven: Yale University Press.

Turney, J (ed) Engaging Science: thoughts, deeds, analysis and action. Wellcome Trust. Pp44-50

Wellcome Trust. 1998. *Public perspectives on human cloning.* London: The Wellcome Trust.

Wilmut, Ian and Roger Highfield. 2006. *After Dolly: the use and misuse of human cloning.* London: Little Brown.

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[i] The flagship BBC documentary 'Horizon', for example, used such imagery in its report on nanotechnology: Horizon, The Dark secret of Hendrick Schon, BBC2 3/4/2004)

[ii] Some of Huxford's statements are problematic in our view on several counts. He over generalises about the role of science fiction and ignores

the vast body of work on science fiction and emancipatory discourse (e.g. around feminist science fiction). He also disregards the positive representation of science in series such as Star Trek and fails to engage with debates about the definition of 'anti-science' or discussion about changes in sci-fi representations over time (see O'Riordan, 2008)

[iii] There are many excellent and in-depth studies of film audiences which in theory would have provided a resource for this article. However, these tend to focus on fans, and questions of engagement or identity. They are less interested in questions of influence. Barker and Brooks' study of Judge Dredd, for example, explores audience pleasures, but has nothing to say about Judge Dredd as a representation of a clone (Barker and Brooks, 1998)..

[iv] Similarly rather than thinking fiction was 'fact', people were more likely to believe that 'fact' was fiction – most notably the idea that embryos could be created without sperm, through some type of electrical stimulation, was assumed to be fantasy by several participants.

[v] Actually she means the 'Fantastic Voyage'