

On being a (modern) scientist: risks of public engagement in the UK interspecies embryo debate

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In 2006, a small group of UK academic scientists made headlines when they proposed the creation of interspecies embryos – mixing human and animal genetic material. A public campaign was fought to mobilize support for the research. Drawing on interviews with the key scientists involved, this paper argues that engaging the public through communicating their ideas via the media can result in tensions between the necessity of, and inherent dangers in, scientists campaigning on controversial issues. Some scientists believed that communicating science had damaged their professional standing in the eyes of their peers, who, in turn, policed the boundaries around what they believed constituted a “good” scientist. Tensions between promoting “science” versus promotion of the “scientist”; engaging the public versus publishing peer-reviewed articles and winning grants; and building expectations versus overhyping the science reveal the difficult choices scientists in the modern world have to make over the potential gains and risks of communicating science. We conclude that although scientists’ participation in public debates is often encouraged, the rewards of such engagement remain. Moreover, this participation can detrimentally affect scientists’ careers.

Keywords: good/ethical scientist; interspecies embryos; public engagement

Introduction

“There was a time,” Hackett (2008, p. 429) suggests, “when science and technology occupied a realm of genius and wizardry, a world apart that ‘the public’ viewed with awe and admiration . . .” where experts made technical decisions in the “public interest but without public involvement.” Whether this time has passed, or ever truly existed, Hackett and others (Funtowicz and Ravetz 1993, Etzkowitz and Leydesdorff 1998, Callon 1999, Miller 2001, Nowotny *et al.* 2001, Michael 2002, Bucchi and Neresini 2008, Shapin 2008) have argued that the terms and conditions under which science in the modern world is produced, discussed, and legitimated,

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has changed. That is, the days of “closed politics” once described by Snow (1961, p. 56), where trusted scientific experts were consulted away from public scrutiny, have given way to more responsive and “open politics” (cf. Latour 2004) in which controversial topics like stem cells (Holm 2002), climate change (Hulme 2009) and genetically modified organisms (Irwin 2006) are openly debated. Emphasis has shifted, as Wilsdon and Willis (2004, p. 24) explain, to making “visible the invisible, to expose to public scrutiny the assumptions, values, and visions that drive science.” UK scientists have increasingly realized the value (or necessity) of listening to, informing, and engaging the public.

Whether tackling a perceived public crisis in legitimacy or deficit of understanding (Wynne 1995); justifying value for money or professional autonomy (Drayson 2009, Russo 2010, Radford 2011); or even extending the reach and certification of research through popularizing science (Kiernan 2003, Jensen *et al.* 2008), considerable energy has been spent engaging the public (with varying levels of success). Scientists have been encouraged to give public lectures, speak to the press, and to participate in radio and television interviews, as well as take part in consensus building exercises such as “Café Scientifique” (Bauer *et al.* 2007, Bauer and Jensen 2011). Captured here, as Burchell *et al.* (2009, p. 9) explain, is a commitment “from both government and senior members of the scientific community to real, active, meaningful and consequential public engagement and dialogue.” Coming out of the laboratory to not only discuss emerging (and potentially contentious) research but also listen to affected publics, is now key to the moral economy of modern science (Davies 2008, Cronin 2010). Lord Drayson, formerly UK Science Minister, has said that the UK government “believes that scientists have a duty – particularly when they are funded by taxpayers – to engage in the public area, to engage in communication of the challenges and the potential ethical concerns about their science” (Drayson 2009). Beyond these commitments, at once practical and ideological, communicating science can be challenging. A recent in-depth study on UK-based biomedical scientists found:

A contrast between the generally positive view within the scientific community of the benefits of public engagement and the difficulty of accommodating such activities within the already overstretched job descriptions of most working scientists. (Burchell *et al.* 2009, p. 7)

This paper aims to further problematize this “generally positive view within the scientific community.” Using the case study of the UK interspecies embryo debate, it highlights how engaging the public can lead to potential tensions, risks, and negative consequences for academic scientists who choose to participate. Three different kinds of engagement can be distinguished: communication, consultation or participation (see Rowe and Frewer 2005). For this paper, we focus on engagement as “communication” – a one-way flow of information from the sponsor to the public via the media where feedback is not sought. Drawing on interviews with key scientists who took part in a series of wide-ranging high-profile

activities during the debate, this paper explores their views, experiences, and reflections. Between early 2006 and late 2009, these scientists undertook a lengthy media campaign – writing letters and commentaries for newspapers; giving radio and television interviews; and participating in public debates with leaders from different faiths – to persuade the UK government to reverse its proposed ban on the deliberate creation of research models containing human DNA and non-human (animal) eggs, interspecies embryos. In what follows we argue that within the scientific community, interactions between science and the public can reveal competing constructions of what constitutes a “good” scientist, which in extreme cases can have undesired impacts on the professional careers/prospects of those involved.

Methods: core set reflections

The findings that follow are based on 10 semi-structured, in-depth interviews, lasting between one and two hours with senior academic scientists, hereafter referred to as scientists, averaging over 20 years’ working experience in the stem cell field. Each person was centrally involved in the interspecies embryo debate. Two interviews with leading science journalists closely involved in the media campaign are also included. Owing to the specialized nature of the debate, only a small number of scientists were actively and regularly involved. Scientists were approached according to what Collins (1999) calls the “core-set” – the densely connected group of actors whose activities in writing editorials, commentaries, and letters; taking part in televised interviews and debates; and advising policy-makers and peers marked them out as key players. Interviews took place between mid-summer 2010 and early 2011. Apart from two telephone interviews, the interviews were held in the scientists’ offices, were audio-recorded (with consent), and transcribed. Open-ended questions were used to encourage participants to describe their experiences in their own words. Participants were asked how and why they became involved in the debate; why the campaign developed and concluded in the way it did; and what reflections they had taken away. Transcripts were analyzed for emergent themes and coded accordingly (Strauss 1987).

Background: the UK interspecies embryo debate

On 1 April 2008, BBC News broadcast a UK first: the creation of a part-human part-animal interspecies embryo, also known as human admixed, cytoplasmic, cybrid or transpecies embryos. Aided by images showing how this new life form developed, the journalist explained to viewers:

... The only reason why [scientists at Newcastle University] used cow eggs is because human ones are such a scarce and precious resource. So how did they do it? An unfertilised cow’s egg was cut open by a laser. Virtually all the genetic material was sucked out. Then DNA derived from a human skin cell was injected into the egg. By using an electric shock the [interspecies] embryo started growing. It grew for three

days to 32 cells. The embryo is 99.9% human and 0.1% cow. They hope to grow them for six days to extract the stem cells inside. These are the body's master cells able to turn into any type of tissue. (Walsh 2009, p. 20)

Scientists, it was claimed, wanted to use these new entities to study diseases including Parkinson's, Alzheimer's and Motor Neuron disorders; test the efficacy of drugs; and speed up the translation of biomolecular understandings to therapies and treatments (Academy of Medical Sciences 2007). Skipping over questions posed to the classification of humans and non-humans (Agamben 2004), attention focused primarily on how these experimental models would fix a sociotechnical problem – the shortage of human eggs for research (House of Commons Science and Technology Select Committee 2007).

In early 2006, a group of stem cell scientists had held a press conference in the wake of the Hwang scandal – where advances in the use of human eggs in stem cell science had been falsified – to allay people's fears (Watts 2009). Journalists asked what scientists planned to do given concerns about the availability, and technical proficiency, of human eggs in research. Rather than use human eggs, the creation of interspecies embryos was proposed as a solution (Watts 2009). Justifying this stance, scientists discussed the ethical credentials of interspecies embryos. Less human than fully human embryos, for instance, interspecies embryos sidestep some morally contentious issues such as the use of human embryos in research (House of Commons Science and Technology Select Committee 2005). Reliance on asking women to donate eggs could also be reduced, as the meat processing industry discards thousands of animal eggs each week, significantly increasing the volume and scale of experiments. Reliance on animal models for drug testing – often described as cruel and of questionable translational merit – could also be avoided. Finally, in accordance with UK regulations, interspecies embryos would be destroyed after 14 days, would never be implanted into a woman and would exist purely within the confines of the laboratory.

Newspapers picked up the story running headlines including “Frankenbunnies,” “Moo-tants,” and “Cowgirls” (Williams *et al.* 2009), tapping into concerns around an instinctive “yuk factor,” the unnaturalness of crossing species boundaries and the challenge this research posed to the meaning of “humanness” (see Robert and Baylis 2003, Haddow *et al.* 2010, Parry 2010). Legislation at that time – the Human Fertilisation and Embryology (HFE) Act 1990 – forbade the creation of “true hybrids,” where human and non-human gametes are fertilized. Less clear was “whether cytoplasmic or cybrid embryos ... were proscribed in the same way” (Brown 2009, p. 151). In November 2006, the regulator was pushed to clarify the situation when labs at King's College London and Newcastle University submitted license applications to do the work. Despite non-human eggs retaining animal mitochondria DNA – the energy powerhouse of the cell – it was argued that the human nucleus would slowly take over the embryo's development until it was 99.9% human (House of Commons Science and Technology Select Committee 2007). If accepted, it would fall under the regulator's discretion as to whether the research was legally permissible.

Before a decision could be reached, the UK government published a White Paper: *Review of the Human Fertilisation and Embryology Act*, following a public consultation. It concluded that, “the creation of hybrid and chimera embryos *in vitro* should not be allowed” (Department of Health 2006, para. 2.85). The scientific community felt this was “unduly cautious” given such “a small-scale public consultation” (Brown 2009, p. 151). In response, an institutional alliance of learned societies including the Academy of Medical Sciences, Medical Research Council, the Royal Society, Wellcome Trust, Nobel Laureates, and senior figures in the stem cell field; charity organizations and patient groups; as well as media and legal consultants, embarked on a lengthy campaign to shape public opinion, and by extension, reverse the government’s proposed ban. Parliament took notice with an enquiry set up to hear evidence from supporters and opponents alike.

Necessity of engagement

Varying promissory (and pessimistic) futures were mobilized to influence opinions within, and beyond, Parliament. Critics, for example, questioned the creation of interspecies embryos on two fronts: the ethical grounds for, and practical utility of, the research. Is it safe to treat patients with cells containing animal DNA? Can research on animal/human mixtures really be useful for human treatments? And why were adult stem cells (like bone marrow) not being used instead? Allowing the research was also cautioned against as yet another step along a slippery slope in which human dignity is undermined, the integrity of Nature is compromised and debates over the morality of intentionally destroying human embryos are reopened (House of Commons Science and Technology Select Committee 2007). Critics’ agenda was simple: say “no” to further regulatory reproductive changes (and if possible, engineer a rethink of embryo research). Capturing the essence of what Mulkay (1993) calls the rhetoric of “fear,” Julian Savulescu, Professor of Practical Ethics at the University of Oxford, colorfully painted a picture of the consequences of unchecked science:

This is a momentous piece of legislation, which may bear directly, in the future, on the direction and perhaps even existence of humanity . . . it allows scientists to utilise the genetic heritage of the entire living kingdom on earth. Humans could benefit from the genes of any living or even deceased plant or animal. This might enable research to occur which could provide humans with the power to photosynthesise, to have the sonar of a bat, the visual acuity of a hawk, the hearing of a dog or the balance of a cat . . . It opens the door to transferring the building blocks of life, function, capacity, behaviour from other species into humans. Natural evolution would never have achieved this. (Savulescu 2008)

Supporters, in response, felt it was necessary to correct any societal misunderstandings, so that people could make up their own minds. As Professor Martin Bobrow, Chair of the Academy of Medical Sciences’ Working Party into Interspecies Embryos, put it:

I believe passionately that all scientists have a duty to ensure that people whose taxes support their research understand what is being done and what may be expected of it. Virtually all scientists I have met have strong and clear ethical standards. But our task is not to impose these on society; rather it is to ensure that the views and standards of our society are informed by a proper understanding of the science and where it may lead, and to avoid it being driven by hype or fictitious scare stories. (Bobrow 2009, p. 7)

Pro-interspecies scientists also felt compelled to act because of concerns about the future of the field. A ban would not only stop interspecies research but it might outlaw historic practices such as transgenic models – where human genes are integrated into an animal genome (Academy of Medical Sciences 2007); and prematurely close off fruitful research avenues. Committing so much time and so many professional reputations to informing public debates was even held up in the House of Lords as a bright beacon of how these scientists were good, trustworthy, and serious experts involved in a key facet of modern science – engaging the public and policymakers upstream on potentially contentious subjects:

Today in the *Times* there are three relevant articles, one of which is a letter from scientists working in stem cell science or related stem cell research. It is headed by three Nobel Laureates in medicine and physiology – Sir Martin Evans, Sir Paul Nurse and Sir John Sulston. It is signed by others such as Sir Ian Wilmut and Dame Julia Pollock. I shall not go through the whole list; 27 of the most distinguished men and women scientists. Would they do so if they did not think this was of the utmost importance? Would they put their credibility on the line as serious scientists if they did not think that this was a very important issue that they wish the Government to consider? (House of Lords 2008)

Yet in what follows, we explore how this same commitment to engaging the public and wider political actors can create a tension between what peers expect from fellow scientists and what the modern world demands of scientists today.

Promoting the science versus promoting the scientist?

A major challenge for supporters was how to make interspecies research accessible, and in turn, acceptable to a non-technical audience. To that end, TV crews and journalists alike were invited into scientists' labs to break down this complex subject and help circulate the scientists' message. Those we interviewed felt that the media coverage not only lent credibility to the research but also, as Scientist 7 explained, had other advantages as well.

I think [the media is] . . . a powerful weapon in your arsenal. And if you don't use it, you're tying a hand behind your back, because your opponent will. (Scientist 7)

Implicit here is the belief that public opinion is something that can be competed for, and more importantly, won. Over the past decade or so, scientists have increasingly accepted the importance of coming out of their labs to discuss emerging (and

potentially contentious) research, otherwise critics may do so at their expense. Research by Williams *et al.* (2009, p. 2) on the UK newspaper coverage of the inter-species embryo debate suggests that scientists' use of the media had, in this case, been effective. "Almost half of the news items (45%) . . . were broadly in favour of the research" with "pro- [interspecies] scientists [being] the source group quoted most often" (*ibid.*). These efforts attracted some criticism, however:

One of the things about science, particularly in Britain, is that it's viewed as being "slightly bad taste" to . . . promote stem cell research in such a way. (Scientist 3)

Some people in the scientific community feel for a scientist to talk to the press is undignified and demeaning. It lowers your value. So it could be people like that feel . . . I spent too much time on TV and in the news versus time on my science . . . (Scientist 4)

While Scientist 3 touched on how the cultural norms of that epistemic community tacitly discourage prolonged media interactions, Scientist 4 went further, asserting that s/he had experienced what is better known as the "Sagan effect" – named after the astronomer Carl Sagan – which suggests that, "the frequency of media interaction might be inversely proportional to scientific ability" (Russo 2010, p. 466). Such negative imaginaries can affect scientists' status and career prospects. A good example of this was the failure of *in vitro* fertilization (IVF) to secure public funds, at least initially. Scientists in the late 1960s had publicized their preliminary findings in newspapers but this was seen to have harmed their funding chances. As Johnson *et al.* (2010, p. 10) put it, "it may seem strange in these days of public engagement grants, but in 1971 medical professionals were still strongly discouraged [by their peers] from 'self-promotion,' including talking to the media." These concerns resonated particularly with Scientist 3:

So I think that a lot of the guys who sit on grant panels have viewed [University X] and perhaps myself to some extent, as doing this for very self-serving, self-promoting reasons, which couldn't be further from the truth . . . [There's this] perception that someone is trying to boost their project to be something it's not. Now that isn't something that I ever set out to do but, given the level of media interest, I could see that perhaps people on grant-awarding committees of a certain belief, would say that, "Well, you know, [s/he's] only done this to try and get additional funding." (Scientist 3)

Constructing engagement in this way blurs the promotion of the "science" and the promotion of the "scientist," the latter being criticized for downplaying altruistic motives (education, civic duty or legitimacy) in favor of more strategic and self-serving ends. Yet separating "science" from the "scientist" can be unhelpful as it propagates a false dichotomy. That is, the hopes for a new technoscientific innovation are contingent upon the credibility of its sponsor, not independent of it. The fates of both are intertwined. If the technology succeeds the profile of the scientist will, in theory, also be elevated and vice versa if the innovation fails (van Lente

and Rip 1998). Furthermore, aligning engagement with self-interest, and therefore characterizing it as of questionable moral sensibility, is somewhat misleading. Engagement can also, in a positive light, be about promoting the scientist too. Developing a high profile can help attract funding from alternative sources including charity groups and private biotech companies, which can be used to build new facilities, update equipment and of course keep researchers employed.

Engaging the public, then, is a complex matter. Mindful of the pitfalls of being seen to do too much or too little media work, scientists who observe the (old) cultural conventions of their epistemic community are faced with balancing the need to mobilize support while safeguarding future career prospects. Seeking a “right balance,” however, may be impractical because tensions between mobilizing and reputational agendas are not easily reconcilable, and thus, only serve to set up a straw man.

Selling science: dangers of “hype”

After settling on the media as the mechanism for engagement, supporters turned their attention to expectation building. Given that the competition for funding, research impact and institutional support is so intense, scientists increasingly have to do more than prove the technical/theoretical do-ability of their research. They must also preemptively shape the social and economic contexts for that research. In the interspecies debate, writing letters, commentaries, and editorials for newspapers, giving radio and television interviews, and participating in public debates, all worked to discursively construct a particular kind of future, marketplace, and consumer which spurred on social, political, and financial expectations. Although hype is commonplace in modern science (Brown and Michael 2003), if not managed carefully, scientific peers can view such efforts as exaggerating the need for change:

I was certainly uncomfortable with the stem cell scientists, many of whom are good friends . . . about them saying that we absolutely had to have this ability to mix embryos, otherwise we can't go forward, because they knew it wasn't strictly true. Now, I understand where they were coming from . . . it was a long time fighting to get as far as Parliament . . . and this was not the time now to express uncertainty and back off. But they did leave us, as a stem cell community, in a slightly difficult position, where, you know, it was really difficult to say what we needed to say, hand on heart, really fully believing it. (Scientist 9)

Investing considerable time, resources and personal/professional capital, as Scientist 9 explained, made it difficult for those involved to weigh up the impact of their actions on the field as a whole, in the long term. Overemphasizing the need for major change (especially in an area historically marked by controversy) could further damage the broader field, as Scientist 9 reflected.

I was concerned about . . . are we not arming our opponents, because . . . if you say, “We absolutely need this to progress,” and you know you're not actually going to do it, well when you're asking for it in the future, they're just going to come back and

say, “Look you insisted you needed to do this, you never did it. In fact it went off in a completely different direction. We told you that you didn’t need to do it, you insisted you did, and look what happened, who was proven right?” So I thought it was dangerous. And I still think that might be the thing that comes back to bite us really. (Scientist 9)

Overhyping the research, in this sense, can damage the legitimacy of, or trust placed in, the field (even when the majority of researchers were not involved in the debate). For example, years after the debate had finished, questions were still being asked about the research. In 2011, the UK’s *Daily Mail* newspaper ran a front-page headline: “150 human animal hybrids grown in UK labs,” accusing the stem cell community of undertaking secretive, if not slightly concerning, research (Martin and Chadwell 2011).

Fallout from unfulfilled expectations can have other effects too (cf. Brown 2003, Hedgecoe and Martin 2003, Caulfield 2005, Borup *et al.* 2006, Anderson 2007, Master and Resnik 2011). In the case of interspecies research, despite each of the labs involved submitting grant applications none secured funding. Seeking to explain why the research had failed to take off as expected, the UK’s *The Independent* newspaper ran a front-page story implying that grant reviewers had blocked funding because of moral objections (cf. Connor 2009). In response, chief executives from the Medical Research Council and the Biotechnology and Biological Sciences Research Council were forced to issue statements refuting the allegations. Implying any kind of bias, as Scientist 6 explained, only damages the future prospects of the scientists linked to the debate as well as those colleagues/institutions affiliated with them:

I was uncomfortable about being associated in any way with what looked like special pleading. And I think that’s not a good thing to do and to suggest that, you know, funding agencies . . . they bend over backwards to be independent and make sensible judgments and be meritocratic, to suggest that they were in some way, you know, scared off from acting as moral arbiters . . . I think was unhelpful . . . [and] it’s not good for the host institution when that sort of suggestion is made. (Scientist 6)

[The story] was certainly unhelpful . . . it wasn’t like the other coverage around the embryo Bill, which helped move the story forward. That was a positive message: tight regulation, scientists doing the right thing and trying to push the boundaries of research, etc. This was very negative. And was based on a total lack of facts. It had no positive outcomes whatsoever apart from it got [the journalist] a front-page story . . . But the rest of us just ended up looking stupid. (Scientist 4)

Losing control of the narrative, in this sense, is risky. While at the beginning pro-science supporters were able to proactively shape the debate, once the story developed differently from that predicted, media interest grew to explain (and potentially sensationalize) the issue. As the news story changed, scientists were cast in an unfavorable light – “as bad sports, unprofessional, or even conspirators” (Scientist 3) – in relation to their peers.

Managing expectations and their effects can be tricky. Visibility or exposure are crucial to attracting attention and mobilizing support, but investing time and resources means campaigners can sometimes lose sight of the bigger picture and the ways in which these promises or calls for change might potentially affect the wider field. Equally, if hype is successfully built, questions may be asked if the research fails to deliver what was expected, with potentially negative consequences for the way in which peers respond to the scientists involved.

Being a “good” scientist: importance of research outputs?

Scientists we interviewed felt their efforts to engage the public on behalf of stem cell science should be rewarded in some way. Extending certified knowledge – peer-reviewed publications – has traditionally been a marker for distinguishing accumulated capital (skills, prestige and outputs) among scientists (Sonnert 1995). A key commodity here is time. Winning grant funding and employing post-doctoral/PhD researchers gives scientists more time to produce and publish original research so that they can stay at the front of the field. Yet those we spoke to argued that time spent speaking to the media or taking part in public events during this extended debate meant less time was available for the scientific work judged essential by their peers:

I think we all have an obligation to communicate science accessibly, sensitively, and proactively but communicating your science is no substitute for producing good science, and there was a slight imbalance that underlines this saga. (Scientist 9)

This well-established trope of “publish or perish” was also acknowledged by a leading science journalist as being particularly problematic in the interspecies controversy, largely because of the amount of time key figures devoted to communicating or engaging the public:

It took a lot of time. It is a distraction from their research. When you’re like [Scientist X] and you’re really senior, and you’ve got to raise millions for a whole new research program . . . The disadvantages are time, and it’s still the case that a lot of research institutes and funding agencies don’t reward you for public engagement. They say they do, but then they say, “Why haven’t you published?” (Science Journalist 8)

Scientist 10 echoed this dilemma, highlighting the potential for mixed messages over the recognition/rewards for communicating science and how peers value it:

Last year, for example, I submitted our grant review – basically it’s a kind of progress report for [Funder A] highlighting the center’s research outputs, etc. . . . Despite a whole section of the form asking about public engagement, which I happily filled in, not a single reviewer commented on it. It’s frustrating because clearly they’re only interested in the publications. I can understand that. But if it’s irrelevant to the review, why ask for it in the first place? (Scientist 10)

Such frustrations reveal another concern as well. Unable to secure funding to carry out this research and with the emergence of a new less ethically problematic

technology – induced pluripotent stem (iPS) cells – meant the labs involved did not benefit from the (high impact) peer-reviewed publications once expected. The only rewards on offer now were recognition for tackling a controversial topic, which as Scientist 10 suggests, were valued differently.

Other scholars have found different trends, however. Jensen *et al.* (2008) research on the public engagement activities of 3500 scientists at the French National Center for Scientific Research (CNRS), for example, found that the most active popularizers of science were often also the most active academically in terms of publication record, teaching load, and collaborations. While such findings question any hard and fast rules over the frequency/intensity of engagement versus research productivity, the scientists we spoke to remained concerned about being them aligned too closely with the former:

So you had to be very careful. I think it did harm the career of [Scientist Y], because I think [s/he] got very distracted by – from [her/his] scientific career – and distracted by the media storm and the campaigning in Parliament and [s/he] rather neglected the science, I think. (Scientist 2)

Cultivating a public profile, as Scientist 2 suggests, can have serious consequences for scientists' credibility. Developing this point, Scientist 2 went on to explain how close s/he had come to a loss of scientific capital:

I'm very relieved that I don't spend much time in the news now, and I can get on with my work. I was aware that people in my own cohort here, of scientists and clinicians, felt that this was getting too much exposure and this would be harmful to my career, and it may have been, but I don't think so. I managed to duck a lot of the more extreme criticism and fortunately I got back in and focused on the work in the lab to do something productive, which helped. (Scientist 2)

To effectively engage the public, though, good interpersonal skills such as charisma, enthusiasm and the ability to speak plainly have become increasingly important to the modern makeup of science. While those empiricist qualities (rigor, rationality, and objectivity), which have traditionally been associated with being a "good" scientist, persist (Gilbert and Mulkay 1984, Burchell 2007), the ability to communicate with diverse audiences is also highly prized. Having these interpersonal skills can potentially be as much a liability as an asset to individual scientists, however. Given that public engagement tends to be self-selecting – more articulate and confident scientists are more likely to volunteer – the actors involved are likely to build up close working relationships. The science journalists we interviewed often cited a small group of scientists when writing their articles, because of the accessibility and ability of these scientists to translate research for non-technical audiences. Yet being overly reliant on a small number of scientists can (disproportionately) elevate the profile of these researchers:

In earnest, I think [the scientific community] don't like controversy and they don't particularly like people being conspicuous . . . There was antagonism built up from

the scientific community, with some saying: Oh why are people like [Scientist W] getting so much attention? (Scientist 2)

Such visibility, or exposure, can lead to criticisms from peers who see a “good” communicator and a “good” scientist as mutually exclusive traits:

If you can manage to be an outstanding scientist and an outstanding spokesman you are truly a rare bird indeed. I think people were prepared to cut the likes of [one of the scientists] a little slack given [they] do so much good in that one area. But the trouble is, how much slack do you give them? (Scientist 9)

Although this suggests a “good” scientist should be able to juggle the production and dissemination of original knowledge alongside public engagement (cf. Jensen *et al.* 2008), the experiences of the scientists we interviewed were that the (institutional/professional) rewards remained in favor of producing tangible material outputs – peer-reviewed publications and successful grant applications. A perception also persisted that time spent doing public engagement was time taken away from other key aspects of science. Whether such black-and-white characterizations truly hold in the modern world – where demands on science/scientists to talk openly about their work have grown – is open to debate.

Conclusion

In early 2007, the House of Commons investigation into interspecies research concluded that “in general, the creation of all types of human-animal chimera or hybrid embryos should be allowed for research purposes” under license from the regulator (House of Commons Science and Technology Select Committee 2007). The UK government accepted the ruling and amended its legislation. Yet interspecies research failed to take off. By late 2007, two independent research teams – one led by Shinya Yamanaka and another by James Thomson – announced the successful reprogramming of adult somatic cells to create induced pluripotent stem (iPS) cells. Without having to create or destroy a human embryo, the iPS bandwagon gathered momentum around the ethical and technical credentials of this new technology, displacing the need for interspecies research. To date, research on interspecies embryos in the UK has slowly disappeared.

The (initial) rise and sudden fall of interspecies research further problematizes the generally positive view of public engagement found by Burchell *et al.* (2009) among the scientific community. Much of the literature on the public understanding of science to date focuses on how to develop, optimize, and encourage methods of engagement or critique the political/instrumental nature of such activities (cf. Wynne 2006). Public engagement, it is argued, is more than a pragmatic fix or professional philanthropy, but can materially benefit scientists as well as society. Yet popularizing science, as this case study has shown, can be challenging, time-consuming, and potentially risky for the career prospects of those involved. A major finding of this paper has been the differing and sometimes irreconcilable

tensions faced by scientists. These tensions operate across a cluster of interrelated scales. Specifically there are a series of overlapping practical, technical, and ethical trade-offs to be made. At the smallest scale there are judgments to be made about how much professional/personal capital should be invested and where exactly that investment should be made – publishing for professional audiences versus communicating science for the public. At the other end of the spectrum there are risks that translating contentious research for popular consumption can result in what might be seen by some as exaggeration, particularly from the perspective of their scientific peers.

Depending on the intensity and frequency of engagement scientists can be caught in a kind of “goldilocks” scenario. That is, too little effort may lead to insufficient support for the research, or alternatively allow other voices to enter and shape the debate. Peers, by contrast, can see too much activity as blurring the boundaries between the promotion of the “science” and promotion of the “scientist.” It may be that the scientific and public contexts surrounding some contentious areas mean that scientists are in a “no win” situation, with no practicable means of finding an overall “right balance.” What is clear is that there is considerable potential for public engagement to have counterproductive consequences (see Johnson *et al.* 2010). Our findings indicate that in this case study at least, little has changed since the 1970s. Added to this, a strongly felt perception that communicating science is not institutionally rewarded or perhaps valued in the same way as more traditional research outputs (e.g. publications and grants) has meant engaging the public carries the risk of not being seen as a “serious” scientist by peers. Such imperatives can reduce the attractiveness of public engagement, as time spent doing it inevitably is time taken away from the “real business” of doing good science. If, as in this case, the trajectory of the research then fails to take off as anticipated, those involved can be left with little material benefit, and in turn, can be left open to attacks over their professionalism from their peers.

Such concerns reveal the difficulty of raising expectations without creating hype. The latter not only damages the reputation of the scientists involved but also negatively impacts on the wider field. As the newspaper examples discussed earlier show (cf. Connor 2009, Martin and Chadwell 2011), losing control over the narrative means the scientists involved and their peers are continually reminded of the long-term effects of this controversy as the topic has, as predicted by one of the scientists quoted earlier, come back “to bite” the field. Overstating the case for contentious research also raises uncomfortable questions about the scientific rigor and professional judgment of proponents. Peers can even use it as an opportunity to police the boundaries of “good” and “ethical” scientific behavior, by distancing the community from what can be labeled as “unorthodox” behavior. This paper has highlighted the tensions, risks, and potential negative consequences that can ensue when scientists engage the public. Although scientists’ participation in public debates is often highly valued, it seems, its value within science itself is more complex. Yet as problems over the legitimacy of science persist, and the

social necessity of engaging the public remains, important questions are left unanswered about how the communication of science will be managed in the future.

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