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Modest witnessing and managing the boundaries between science and the media: A case study of breakthrough and scandal

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This article works with the figure of the "modest witness" and the concept of "virtual witnessing" to explore the case of the South Korean scientist, Hwang, whose stem cell breakthroughs are now regarded as hoaxes. We analyze the rhetorical techniques used by the scientific establishment and news media to first endorse, and then disavow, Hwang's work. In particular, we focus on how the rhetoric of disavowal operates to maintain a dominant understanding of the normal relationship between science and the media. We highlight how journalists and scientists framed the original breakthroughs in ways which obscured the mediation of these events, but, once the scandals emerged, began to foreground the media as a problem. This retrospective acknowledgement of mediation also subtly (re)assigned the problem to the world of celebrity scientists and fictional genres and narratives. This lets news reporting, and routine science–journalist relations off the hook.

Keywords: cloning, discourses of science, media and science, media representation, representation of science, science and popular culture, stem cells

1. Introduction

Science and a generically defined "media" are often framed in opposing camps, not least by scientists who blame the media for sensationalism, inaccuracy and distortion. However, many scholars now argue that journalists have, in fact, become crucial players in attesting to scientific knowledge claims (Gieryn, 1999; Lewenstein, 1995; Simon, 2002). Rather than accepting the notion of separate spheres (science versus media) it is thus more meaningful to explore the coverage of contemporary scientific advances (and setbacks) as forms of "mediated science" and unpack the role of the media—in our case, primarily the news media—in the "making" of science (see also Redfield, 2005; Kirby, 2003 for alternative sites of witnessing).

These arguments are explored through focusing on a high-profile case where scientific breakthroughs originally embraced as both factual and reputable by the scientific establishment (and feted as such through news reporting) were later exposed as fraudulent. Hwang Woo Suk and his team were celebrated for achievements in human cloning and stem cell research in 2004/5, leading to headlines not only in South Korea but globally, including in the UK,

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North America, Australia, India and China. However, the breakthrough claims were gradually discredited in late 2005/early 2006. This article examines reporting around this case in parallel to, and in interaction with, statements by scientists and the scientific establishment (including press releases, specialist journals such as *Nature* and quotations in the mass media).

We locate this work within a network of STS studies which have helped develop a complex and nuanced understanding of the work that literary and visual mediation does in the making of science in public. We draw on Shapin and Schaffer and on Haraway to explore the social and literary technologies used in the making of science, and in particular the figure of the modest witness. We then go on to focus on critiques of the role of the mass media by drawing on the work of Gieryn, Hilgartner, Lewenstein and Simon.

2. Conceptual framework

Shapin and Schaffer's landmark book, *Leviathan and the Air Pump* (1985) recast conventional understandings of the founding of modern science. They demonstrate that the making of modern science involved a very particular configuration of social and political structures in seventeenth-century Britain. They emphasize that "natural facts" are always fabrications of material, social and literary technologies, and highlight how the generation of scientific knowledge has involved a carefully regulated system of "witnessing," made possible by such technologies. These have not persisted unchanged from the seventeenth to the twenty-first century, but Shapin and Schaffer's account of Boyle's founding of experimental culture still resonates. Members of the experimental community functioned as "modest witnesses" through collective witnessing of experiments in a social space and through the production of detailed reports of experiments which could make their replication possible. Shapin and Schaffer note that these reports included visual images—"detailed naturalistic representation(s)" (p. 61)—as well as language crafted "to give the impression of verisimilitude" (p. 63).

This idea has been further developed by Haraway (1997), who draws attention to the ways in which race, gender and class relations were crucial to, and reconstituted in, the forging of the scientific witness. Haraway scrutinizes and questions the realist epistemological orientation of modern science and the claims to legitimacy of its apparently dis-embodied and disinterested observers (1997: 26–32). She mobilizes the figure of the modest witness (as the ideal model of the modern scientist) to draw attention to problematic gender relations in which the "masculine practice of modesty by appropriately civil (gentle)men" (p. 29) rendered them qualified to attest to matters of fact, while: "modesty enforced on (or embraced by) women of the same social class simply removed them from the scene of action" (p. 29). She also draws attention to the racialized nationalist imaginary that elides whiteness with virtue.

In this article, we mobilize the modest witness figure as a heuristic lens through which to view the representation of Hwang as the principal actor in this drama, using it to trace implicit assumptions in contemporary representations of "good" scientists and their practices. However, in order to map the complex terrain in which this figure circulates it is also necessary to examine the mass media's role in this process. We draw on the work of four scholars who have explored the distinctive features of the relationships between the institutions of Science and the Media.

In the first instance, it is useful here to turn to Gieryn's engagement with the work of Shapin and Schaffer. He extends their work on social and literary technologies to incorporate reflection on the mass media in the late twentieth century. He points to the way the processes they describe became a more distanced form of peer review with the development of scientific journals. Gieryn notes that: "with time the scientific paper became increasingly elliptical as

more and more parts of the experiment became routine, not requiring elaboration." He suggests that: "involvement of the mass media in scientific discovery extends that trend toward enlarged ellipses in reporting experimental details" (1999: 200). Gieryn developed this account in relation to the case of Cold Fusion and the media's role as privileged witnesses in this "discovery." He argues that this privilege was not due to their expertise or trustworthiness but: "because they were needed as conduits for a 'second-order virtuality'" as "their broadcasts and stories carried images and words about what would be presented eventually in a scientific paper" (200–1). He elaborates on this process in relation to the first announcement of the alleged discovery at the University of Utah. He argues that: "the press conference became part of science, as journalists were enlisted as vital allies" (p. 200). He suggests that, because the Utah work being reported on was not yet recognized as being normal science, the press conference was in effect an invitation to the media to join the scientists in *making* the scientific breakthrough.

> The media were asked to add their own instruments (video cameras, tape recorders, images, the printed word) to the technical equipment (calorimeters, scintillation counters, palladium rods) that had carried Pons and Fleischmann up to this exciting moment but could carry them no further. (Gieryn, 1999: 200)

He concludes: "The media here became the late-twentieth-century equivalent of … the 'gentlemen witnesses' so vital for attesting knowledge claims three centuries earlier" (Gieryn, 1999: 200).

In his case study focusing on cancer epidemiology, Hilgartner (1990: 525) examines normal science and the process through which "facts emerge only as they stabilize." He teases out the rhetorical work required to shore up: "an idealized view of genuine, objective, scientifically-certified knowledge … the epistemic 'gold standard', as the exclusive preserve of scientists" (1990: 520–5). Although his focus is on scientific advice rather than scientific breakthroughs, his work interests us because he shifts attention from the "expertise" of the scientist towards particular media of communication and the specific audiences for whom communications are intended. He also foregrounds the rhetorical claims made about such communication processes. Hilgartner gives due attention to the range of communication contexts in which knowledge is presented, including mass media accounts, but also scientific papers in journals, grant proposals, and policy documents. He points out that: "when one looks carefully for the *precise location* of the boundary between genuine scientific knowledge and popularized representations, one runs into trouble, stemming from the fact that scientific knowledge is presented in many contexts" (Hilgartner, 1990: 524, emphasis in original). He illustrates this with a diagram showing a spectrum ranging from laboratory "shop talk" at one end, right the way through to mass media accounts at the other (1990: 524–8).

The work of Lewenstein (1995) and Simon (2001) is also particularly pertinent for our purposes. They, like Gieryn were inspired by the Cold Fusion saga. Lewenstein notes: "When the public saga of cold fusion began in March 1989, the role of the mass media in a scientific controversy quickly became a central issue" (1995: 404). His analysis provides an account "that integrates media reports into the overall communication patterns that shaped the cold fusion saga … [showing that] the media's role in cold fusion can only be understood by reconceptualising our idea of what science communication is" (Lewenstein, 1995: 408). Lewenstein suggests that rather than the *spectrum* of science communication suggested by Hilgartner, "it might be better to describe a circle or a sphere, with all forms of communication leading to each other." He labels the figure used to illustrate this suggestion "The Web of Science Communication Contexts" (1995: 425–6).

Simon adds another dimension to the Cold Fusion case study. He points out that in this case the mass media acted as a mode of inter-specialist communication in addition to its taken-for-granted role of mediating science to the lay public. Simon also notes the work done by journalists acting as intermediaries between scientists. Above all, Simon draws attention to "the importance of science in public as a kind of *public science*" (2001: 387, emphasis in original). "Scientists," he writes, "work to construct or deconstruct knowledge in the public domain rather than just within specialist networks, and their work is mediated through mass media forums like newspapers, magazines and television rather than just through the apparatus of scholarly publication and presentation" (Simon, 2001: 387).

Applying the insights of all these authors to the Hwang case allows us to build on this literature not least because of several crucial differences between Cold Fusion and the Hwang example. Firstly, in contrast to the case of Cold Fusion, which was controversial and highly contested from the outset, Hwang's breakthroughs were initially validated science which met the gold standard of being published in a prestigious peer-reviewed journal. Only later were these discredited. Secondly, unlike Cold Fusion, embryonic stem cell research is mainstream science. Although it can be controversial (because of the history of fraud and the status of the embryo) it is despite, and sometimes *because of*, this also subject to massive investments of time, money, and public relations. The breakthroughs attributed to Hwang were eagerly anticipated by the embryo stem cell research community and seized upon to further enroll public/policy/funding support for such research. These dimensions of the Hwang case offer an ideal opportunity to trace shifts in rhetorical strategy over time as the story mutated from being a much needed opportunity to celebrate an authentic breakthrough to being a scandal about fraud.

In a sense, our investigation tests out Simon's conclusion that "Public representations of science can produce knowledge as well as culture" (2001: 387). In this article we provide an account of how scientific knowledge is produced in the Hwang drama. We are attentive to the politics of rhetoric and the investments that particular groups of actors have in deploying their own simplified accounts of the relationship between "Science" and "the Media," and we find Hilgartner's work useful for tracing these investments. But we think that Lewenstein's *web* metaphor for the terrain of communication—we would say *mediation*—is more convincing than Hilgartner's spectrum. This is because, it seems to us, for example, that laboratory "shop talk" is not confined to the laboratory. It is mobilized and deployed to rhetorical effect in other mediated spheres, and we trace this in the case study that follows. More particularly, we work with Gieryn's concept of "second-order virtuality," to explore whether it provides useful analytic purchase on the social and literary technologies in play in this twenty-first century science scandal.

3. Method

Data collection

The authors of this paper began following the Hwang story in 2004 while assembling an archive of UK press and television news coverage about genetic science. The flurry of reporting around the South Korean breakthrough in February 2004 was one of the peak news events that year. It was covered by every major UK newspaper and appeared on national news—and we therefore decided to track this story over a longer time period, and through other methods. This decision was vindicated with the announcement in May 2005 of the further breakthrough and given a further twist with the high-profile disintegration of claims in late 2005 and into 2006. Our data collection continued throughout this period.

Our media archive includes:

- UK, Korean and US press coverage for each week around the peak events (when the two breakthroughs were announced and when each of the scandals first erupted). This archive consists of twelve UK national newspapers, six Korean newspapers and two US newspapers (*New York Times* and *Washington Post*).
- UK television news and radio coverage around the same peak events (the main terrestrial television news bulletins and Radio 4's flagship news program *The Today Programme*).

This archive is contextualized, where appropriate by searches on all English language output recorded on LexisNexis—an archive which reflects the international significance of the Hwang story by recording over 2,700 items which open with a discussion of Hwang, stem cell research and cloning published between 2004 and 2006. This mass media archive is complemented by our examination of:

- coverage of events in the leading journals *Science* and *Nature* (2004–2006);
- press releases from relevant UK and US government or science bodies, and interviews with several leading stem cell scientists. This includes an interview, conducted in 2005, with Professor Hwang (when he was in the UK publicizing his breakthroughs in May of that year). Further interviews were conducted that summer in South Korea by our colleague Choon Key Chekar. Nine interviews were obtained with major players in the debate there (journalists and their key sources) and e-mail correspondence exchanged with some of the journalists involved in reporting the case both in Europe and in the US.

These data are analyzed to pursue four main questions:

1. How did both the scientific establishment and the news media endorse the South Korean breakthroughs as authentic (through 2004 and most of 2005)?
2. How did they subsequently retell the story (in late 2005 and into 2006) to re-present them as *inauthentic*?
3. What do these accounts tell us about the relationship between "Science" and "the Media"?
4. How do these accounts serve to restabilize the boundaries between science and the media?

Analysis

Collecting the wide range of data listed above gave us a multidimensional and cross-cultural perspective on debates around the South Korean achievements/scandals. Our original sample was read closely to examine the use of discourse, metaphors and narratives. For example, we examined how Hwang was characterized at different points in time (e.g. as proud or modest, secretive or open to scrutiny) and how he was positioned in relation to the rest of the scientific community (e.g. isolated or internationally integrated). We also analyzed the way in which journalists themselves appeared (or disappeared) as mediators between the audience and "the facts," and how journalists, and the scientists they quoted, characterized the relationship between science and the media. As particular hypotheses emerged from reading our original corpus we complemented this analysis by pursuing specific questions through the electronic database, LexisNexis. We used this to track the emergence of specific terms associated with Hwang and his work. For example, via this method we were able to identify when he was first described as a "celebrity" or "rock star" scientist and the context in which such labels were used.

The following section explores our findings in relation to how the initial breakthroughs were celebrated as authentic (February 2004–November 2005) and then unraveled (in late 2005 and early 2006). Our primary focus is on the UK coverage, but we draw on material from other countries as appropriate. We examine the rhetorical techniques that were originally employed to underline Hwang's status as a bona fide "modest witness" and how this status was retrospectively denied once his work was exposed as fabricated. Alongside this, we explore how the scandals were represented in ways which allowed both the scientific establishment and the news media to maintain their own position as brokers of authenticity (in spite of their previous endorsement of the false claims) and to (re)draw boundaries between science and the media.

4. Findings

Authenticating the breakthrough: introducing Hwang as modest witness and the role of virtual witnessing and second-order virtuality

In February 2004, Hwang and his colleagues announced that they had cloned 30 human embryos and harvested stem cells from one of them. This was followed, in May 2005, by a further announcement that they had established 11 stem cell lines derived from the skin cells of individual patients. Each breakthrough was greeted by both the scientific establishment and the news media as genuine. Headlines emphasized the welcome Hwang's achievements received within the scientific community and their potential impact on future medicine.

The fact that the announcements were accepted as true by both scientists and journalists is not surprising given that Hwang meticulously abided by mainstream scientific protocol. He first published papers in a prestigious peer-reviewed journal (*Science*). Only then, as befits a reputable scientist, did he follow this up with press conferences at high status scientific conferences. However, as noted earlier, science is not simply "made true" in the moment of publication but is established through a process of mediation over time. In Hwang's case the stabilization of his claims in the public domain involved:

- the performance of a certain type of persona,
- the formation of particular alliances,
- the mobilization of his findings in the broader stem cell research landscape.

Hwang became well known at international conferences, seemed to perform the "modest witness" persona very well, and was identified by other central figures in the research community as genuine and "not a self-publicist" (Wilmut and Highfield, 2006: 177). The very rare challenges to this image came from critics of the stem cell enterprise, as in this example from the *Straits Times*, where the journalist commented: "Some critics dismiss his humility as a facade. Korean Bioethics Association secretary Koo Young Mo said: 'Hwang is a genius in building a public image. I don't think he is a humble man. He is just pretending to be humble'" (7 August 2005). On the infrequent occasions when such comments did make it into the media, however, they were usually undercut. The article including the criticism above, for example, preceded it by introducing Hwang as a "self-effacing man" adding Hwang's own comment that: "I am only a simple scientist focused on improving the standard of biotechnology and the lives of patients."

In addition to enjoying a widespread reputation for being a modest and genuine man, Hwang appeared very open. For example, he routinely invited key scientists from around the

world into his laboratory (seeming to offer opportunities to join in the inner circle of modest witnessing). This invitation was frequently issued to journalists too, and even social science researchers. Indeed, he extended this welcome to us when we interviewed him.

Hwang's alliances with international scientists were also crucial to his initial successes. His apparently close collaboration with the (white, American) scientist, Gerald Schatten was particularly valuable, perhaps not least because of the way in which the figure of the modest witness is raced. The extent to which this collaboration was less about the "substance" of the science, and more about its image was revealed by the official Inquiry into Schatten's part in the scandal. The Inquiry concluded that Schatten, in spite of being named as co-author on the 2005 "breakthrough" paper, did not participate directly in the faked research. Rather than being a genuine co-researcher, Schatten served instead as an adviser, translator and, crucially, "a public relations mediator" (*Washington Post*, 11 February 2006).[1]

Over and above the performance of a certain type of persona and the formation of particular alliances, Hwang's case was helped by the socio-political context of his breakthroughs. This context ensured that many parts of the stem cell community had an interest in promoting his work. (We define "the stem cell community" here in its broadest sense including embryo stem cell scientists, science journalists and policy makers.) His claims fell on fertile ground because they had been so eagerly anticipated. The journal *Science*, for example, greeted the February 2004 achievement as "both remarkable and *inevitable*" (*Science*, 13 February 2004, our emphasis) and Hwang's work also served as valuable proof of the potential of the field. It was mobilized to help justify the, often visionary, public statements and excited media coverage associated with stem cell research in the past, and reinforce the rationale for bold financial and legislative investment for the future (see Haran et al., 2008).

Given all the above it is not surprising that Hwang's breakthroughs were actively embraced by many key individuals from the stem cell research community. However, rhetorical work was still necessary to present his findings as authentic to a wider audience. This was partly because of the long history of fictional or false claims in this field. Cloning is, according to Franklin, inherently marked with the taint of fakery. The word itself carries associations of cloned/faked consumer goods and breach of copyright (Franklin, 2007). It has long featured as a plot device in fiction (see Haran et al., 2008; Kirby, 2003), and has also been associated with specific scientific frauds. In fact, just a few months before Hwang announced his first breakthrough, Panos Zavos received international attention after claiming to have implanted a cloned human embryo into an infertile woman (Haran, 2007).

The extensive rhetorical work evident in efforts to convince the wider public of Hwang's breakthroughs involved:

- explicit assertions of Hwang's status as a *bona fide* scientist,
- a range of declarations about the virtual witnessing of his work,
- an emphasis on his international renown and collaborations and
- a body language of representation designed to invoke confidence.

The public were repeatedly reassured that Hwang and his team were not "bogus" or "rogue" doctors (*The Times*, 13 February 2004). One headline announced: "After the mavericks and cults, this cloning could mark a turning point" (*Telegraph*, 13 February 2004) and Radio 4's *Today Programme* declared that this was "quite a different case from Zavos" (*Today*, 12 February 2004). An array of official sources underlined this message. Explicitly addressing stereotypes about Asia (drawn from the world of cinema) Schatten asserted that the Korean team could not be dismissed as "just karate kids" (quoted in *Nature*, 1 May 2005). The head

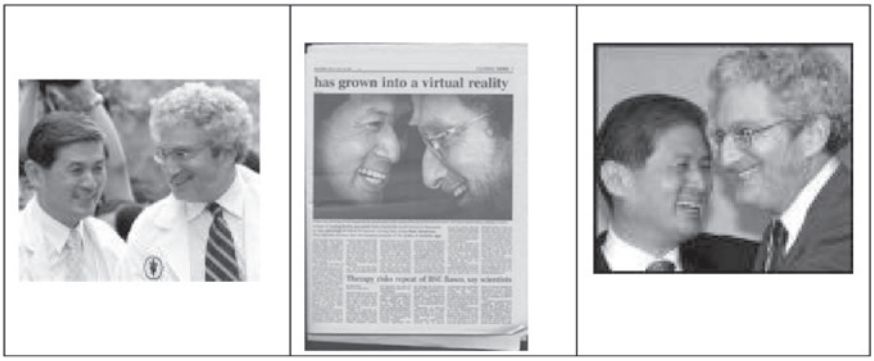

Figure 1. Illustrations of the close relationship between the South Korean and US scientists.

of the UK's Human Fertilisation and Embryology Authority declared: "these aren't cowboy cloners" (*Today*, 12 February 2004).

Crucial to the distinction between Hwang and "karate kids" or "cowboy cloners" was that Hwang's work was geared toward the correct end (healing not reproduction) and that his science had been properly processed. Television and newspaper reports routinely informed audiences that the research had been "reported in the respected journal *Science* and at the American Association for the Advancement of Science annual meeting in Seattle" (*Daily Mail*, 13 February 2004). The public were reminded that Hwang's work had been "verified, peer-reviewed and published in a major journal" (*The Times*, 13 February 2004). It therefore met what *The Times* identified as "the gold-standard for cutting edge research" (13 February 2004).

Over and above this the contrast with charlatans, such as Zavos, was highlighted by spelling out the fact that Hwang was not a lone operator, but a well-connected and widely respected scientist. The South Korean work had been conducted by a *team* of scientists in collaboration with international experts, not hidden behind closed doors or national boundaries (e.g. *Telegraph*, *Sun*, 13 February 2004). UK and US colleagues spoke up endorsing Hwang's achievements. Intimate photographs were displayed of Hwang and his US partner, Gerald Schatten, embracing or gazing into each other's eyes as they celebrated their work (see Figure 1).

Crucially, for this paper, the validation of Hwang's breakthroughs also involved a particular visualization and body language of mediation. The news coverage itself appeared transparent and unmediated: truth was played straight to camera. Hwang spoke directly to viewers with a confident smile. Film footage showed him posed in front of an elaborately carved fireplace at the prestigious press conference venue or displayed him at work in his laboratory, providing visual evidence of experiments in progress. Pictures of the cloned embryos also illustrated the advances. The audience were invited to "see for themselves."

The scandals: disowning the fraud by recasting Hwang as no longer a "modest witness"

Media coverage changed dramatically in late 2005 and into 2006. The scandals around Hwang emerged in two parts: in late November 2005 concerns were raised about how he had sourced the eggs used in his research. By early December such ethical concerns had been superseded by allegations of fraud. Questions around Hwang's egg sourcing practices first attracted suspicion in May 2004 after an investigation by the journal, *Nature*. However, it did

not become a public scandal until mid November 2005 when a South Korean investigative program, *PD Notebook*, was broadcast on television. The program alleged that Hwang's team had obtained many more eggs than he had admitted, that donors had been paid and not adequately informed of the risks, and, most damning of all, that two of the donors were junior members of Hwang's own team. Just before this program was aired, Hwang's US collaborator, Gerald Schatten, severed associations with him, citing concerns about the conduct of the research and, on 24 November Hwang publicly apologized for ethical lapses and resigned from all his official positions.

The full-blown scandal about scientific fraud quickly followed. Suspicions were raised through a combination of whistle blowing from within Hwang's own team, an ongoing investigation by South Korean investigative journalists and young Korean scientists comparing notes on the Internet. Ironically some suspicion was prompted through duplicated photographs appearing in the scientific papers authored by Hwang—visuals designed to illustrate the work were hence implicated in its undoing. (See *Science*, 24 March 2006 for one account of how Hwang was exposed.)

The fatal blows came on 15 December 2005 when the second *PD Notebook* investigative program was aired revealing that the DNA of several stem cell lines received from Hwang's team did not match that of the individual patients from whom they supposedly derived. On the same day one of Hwang's co-authors, Roh Sung-il, said Hwang had told him there were no individual-specific stem cells as claimed in their 2005 *Science* paper. Roh announced that they had decided to retract the paper. The final nail in the coffin came in January 2006, when an official investigation by the Seoul National University concluded that some of Hwang's research had been "intentionally fabricated."

The repositioning of Hwang's claims as false involved, on one level, a very simple, albeit protracted, process. Rumors, media investigations and then action by Hwang's colleagues (as first Schatten and then Roh distanced themselves from him) saw his reputation progressively disintegrate. The inquiry by Seoul National University then confirmed Hwang's disgrace. The "facts" and the "fabrication" spoke for themselves.

However, to see it this simply is to gloss over the rhetorical work involved in disowning the breakthroughs. Repositioning Hwang as charlatan involved, we argue, not just reporting the bare facts. It involved a shift in the body language of representation, retrospectively constructing new explanations for events in South Korea and isolating Hwang's work so that it did not contaminate the rest of science, or, indeed, bring news reporting into disrepute.

The shifting body language of reporting during the scandals was very dramatic. Instead of formal press conferences in historic surroundings, Hwang was now filmed hurrying to his car, avoiding questions. His clearly distressed supporters jostled journalists away and blocked cameras with outstretched hands. The formality of news reporting was replaced by the visual conventions of investigative reportage. The opening shots of *BBC News* on 23 December 2005, for example, included deliberately disorderly film footage—with lots of movement in the hand-held camera, chaotic filming at odd angles, and blanking out when the camera's lens was blocked (see Figure 2). Whereas reporting of his breakthroughs had respectfully focused on Hwang's face or his immediate team, images around his downfall were also wider-angle, to reveal the media circus which surrounded him. Photographs and film footage in news reports showed the scramble of international media as they captured his official apology and resignations (see Figure 3). When news reports during the scandal period re-presented previous footage from the "breakthrough period," these images were now modified to distance them from the truth as it was understood in the present. The old images were shown with deliberately blurred edges, in slow motion or with stripy lines run across the visuals (a conventional, even filmic, distancing technique used to illustrate both past and falsehood).

Figure 2. Chaotic camera work and the blocking of the camera's lens.

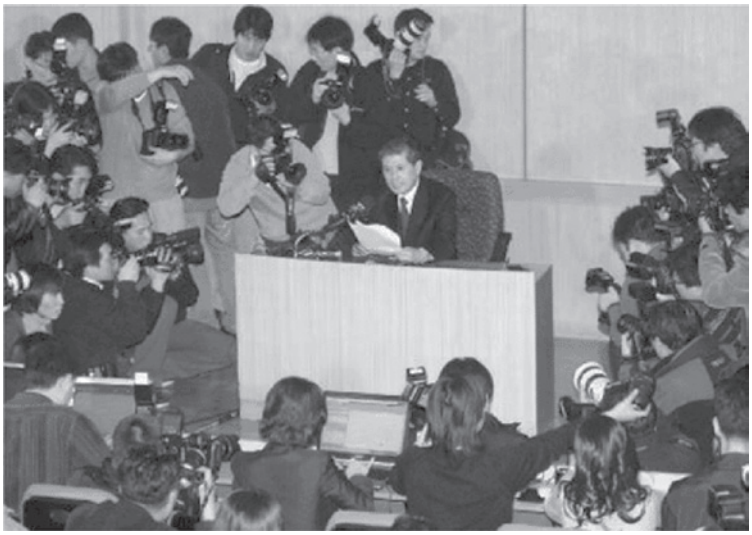

Figure 3. Bringing the media into the frame.
Credit: IM JAE-HWAN/AFP/GETTY IMAGES.
Source: http://www.sciencemag.org/cgi/content/full/310/5753/1402/F1. "A very public apology," in C. Holden, © (2005) "Stem Cell Research: Korean Cloner Admits Lying About Oocyte Donations," *Science 2* December 2005, Vol. 310, no. 5753, pp. 1402–1403.

Alongside such visual devices five rhetorical techniques helped to recast Hwang. These involved:

- reframing his claims as immodest and grandiose,
- expelling Hwang from the community of modest witnesses,
- orientalizing him and South Korea,
- focusing in on his celebrity/"rock star" reputation,
- metaphorically repositioning his trajectory into the fictional genre.

Hwang himself ceased to be described as modest and unassuming once the scandals emerged. Instead he was frequently retrospectively assigned a degree of arrogance or even delusions of grandeur. His claims for the potential of stem cell work (once indistinguishable from other

Figure 4. Illustration of the break-up between the South Korean and US scientists.

routine claims for the technology) (see Kitzinger and Williams, 2005) were now represented in deliberately hyperbolic style as claiming to make the lame walk and the blind see.

Hwang was also explicitly and very publicly expelled from the community of modest witnesses. Instead of joint press conferences with international scientists and displays of bonhomie, Hwang was now shown as an isolated pariah. This was illustrated both by the formal breaking of ties and by a focus on conflict between former allies. This breach was represented symbolically in one Japanese newspaper which printed a photograph of the former collaborators Hwang and Schatten, torn into two jagged parts, like an image from a vitriolic divorce (Figure 4).

Alongside such progressive isolation, Hwang was increasingly orientalized during this time. Explaining Hwang's fraud involved some interesting revisiting of past explanations—much of which, in the US and UK media, focused on his "Asian-ness." For example, where evidence of his South Korean work ethic and dedication had previously been presented to make his claims plausible, it was now used to explain that his obsession had trumped any concern about ethics or veracity. Where fulsome South Korean government support had once been presented as evidence of what science can achieve when the state is "on side," it was now reframed as a dangerous channeling of nationalistic ambition (see Chekar and Kitzinger, 2007).

The most dominant framing of all, however, became the metaphor of fame and celebrity. After exposure Hwang was regularly referred to in terms such as "one-time celebrity," "former superstar" or "fallen rock star" and reporting about the scandal highlighted his high media profile. The conventional approach, in which the media act transparently and invisibly to witness Hwang's announcements was abandoned during the scandal period as media actors were literally brought into the frame and included in film footage of unfolding events (see our point above about the shift in picture framing during the scandal period). There was also an explicit emphasis on Hwang's star status with headlines such as:

> "Superstar" cloning expert lied about eggs (*Telegraph*, 28 November 2005)
>
> Cloning star who fooled the world (*Telegraph*, 24 December 2005)
>
> The fall of a scientific "rock star" (BBC News On-line, 10 January 2006)
>
> Just how did the first celebrity researcher fall so disastrously? (*Observer*, 1 January 2006)

Some of these "celebrity" style attributions involved a revisiting of the facts that had been known much earlier (such as his naming as a "Star of Asia" by *Business Week* (11 July 2005),

his identification as a "supreme scientist" in his own country (*Korea Times*, 3 March 2005) and being named as one of the 100 most influential people in the world by the *New York Times* (11 April 2005)). Journalists we interviewed who had visited Hwang in South Korea had also themselves witnessed how he was treated "like a rock star" during 2004/5. However, it was only in his *downfall* that his fame became widely recast as a discredited form of celebrity, and that the celebrity/rock star/superstar epithet became commonly used. Often it was scientists who furnished journalists with quotes highlighting this discrediting celebrity label. For example, concern about "superstar" scientists is highlighted by a professor of regenerative medicine in a press release produced by the UK's Science Media Centre in response to the scandal ("Scientists react to Hwang revelations," 23 December 2005). Similarly, one early use of the epithet "rock star" appeared in a quote from a competing scientist/entrepreneur who accused Hwang of playing games and jetting round the world "like a rock star" (Lanza quoted in *Washington Post*, 30 December 2005).

During the scandal period journalists and scientists identified Hwang as a "poster boy" for Korean science (*Today*, 10 January 2006) and emphasized that he had "achieved the sort of celebrity one associates with footballers, not with people in lab coats" (*Times Higher Education*, 24 February 2006). Rather than being modest and humble he was now described as one of those "showmen" who seek out the limelight, and perform "on stage" in a "flamboyant" and "theatrical" fashion (words never previously ascribed to him) (*New York Times*, 24 December 2005) and attention was drawn to Hwang's courtship of the media. Accounts of the original breakthrough press conferences were rewritten to highlight Hwang's celebrity-like behavior. One article opened by declaring: "Two years ago, Hwang Woo-suk stood like a rock star before a throng of science reporters" adding that it was only "After 10 minutes of posing for photographers" that he finally sat down (*The Columbus Dispatch*, 24 December 2005). Simultaneously to this recasting of the man, there was a recasting of reactions to him. Whereas his popularity had previously been presented as evidence of his engagement with a social good, fervent support was now recast as evidence of his "cult" status (e.g. *Economist*, 3 December 2005) and Hwang's followers were relegated to the position of irrational "fans." Respect for this once renowned scientist was now seen as irrational deification or obsequious obeisance to a mighty ruler. The *Guardian*, for example, commented "In his own country he achieved god-like status" (24 December 2006) and *Nature* compared him to a ruler "surrounded by fawning courtiers" (12 January 2006). His "celebrity status" and having become "one of the most famous scientists on the planet" was foregrounded as part of the problem (*Observer*, 1 January 2006; *Guardian*, 24 December 2005).

This recasting represents a radical *shift* from earlier accounts—a fact underlined by a simple quantitative analysis. A search of all English language news about Hwang on LexisNexis shows that there were just 14 references to Hwang as a "celebrity" during the 21 months when his star was in the ascendant (February 2004 to November 2005) but this epithet was used 35 times in the three and a half months during which the scandals surfaced. Even more striking is the fact that there were just seven references to Hwang's "rockstar" or "superstar" status while his successes were attracting international acclaim (February 2004 to mid November 2005) but 58 uses of such labels in coverage of his dramatic fall from grace (mid November 2005 to February 2006).

The *meaning* of the publicity given to his science via the mass media was thus radically reshaped during the scandal. Originally media publicity for his breakthroughs had been used as demonstrative of his "world renown" and the significance of his achievements—with references to his research "generating headlines around the world" (*JoongAng Daily*, 20 May 2005) underlining its importance. After the scandal, however, such media attention became implicated in its fabrication.[2] Instead of his work being "spectacular" it was now merely a

"spectacle." Commentators began to draw attention to Hwang's science being displayed "in full view of the television cameras …" (*Nature*, 12 January 2006) and celebrated in front of a "breathless media" (*Guardian*, 1 January 2006). The breakthroughs were retrospectively positioned using the language of popular journalism, public relations and film. They were "splashy" (*International Herald Tribune*, 11 January 2006) and "blockbuster claim[s]" (*Star-Ledger*, 30 December 2005) performed for a "goggling press and general public" (*Korea Times*, 19 December 2005).

Hwang's loss of credibility was further underlined through specific reference to a range of *entertainment* and *fictional* genres. This did not just involve reframing Hwang as a "showman" but also mobilizing narratives from fictional/popular genres to reframe his entire trajectory. *Nature* referred to: "The sheer Shakespearian drama of the Korean cell biologist's eclipse" (12 January 2006). The headline of the *Guardian* referred to the "rags-to-riches fairytale" of this "clone king" (24 December 2005). *The Times* wrote of a "shabby sub-plot" (30 December 2005). The *Telegraph* knocked Hwang's story even further down the generic pecking order characterizing events as "saga" or "soap opera" (24 December 2005).

The Korean press mirrored such fictional metaphors evident in the scientific journals and US and UK mass media, often framing Hwang as a self-important "movie star" or film producer. The *Korea Times* drew a graphic (and extensively referenced) picture of how Hwang's media relations were implicated in his downfall. "Hwang's menagerie of cloned creations," the paper declared, were presented "with all the media wizardry and showmanship of filmmaker Carl Denham (Jack Black) in 'King Kong' (2005) or theme park entrepreneur John Hammond (Richard Attenborough) in 'Jurassic Park' (1993)." His spectacular claims, just like the escapades of these film characters, were designed to "capture our collective imagination and dazzle us with jaw dropping, eye-popping scientific stunts worthy of the silver screen" (*Korea Times*, 19 December 2005).

In reports about the scandals Hwang's relationship to the media thus became a narrative through which to express his loss of status as modest witness. The double layers of referencing of fictional media (film scenes which portray filmmakers or theme park designers) deepen the charge against the discredited scientist. Implicit in all this discussion is an account, not only of Hwang, but more broadly, of the "normal" relationship between Science and the Media, between fact and fiction—and it is this issue that we address in the following subsection.

Science and the Media: redrawing boundaries after the scandal

On one level the Hwang scandal, and the debate that followed, could be read as leading to a thorough revisiting of the relationship between science and the media. There are certainly some examples of bold headlines highlighting a problem and calls for reflection (even the odd admission of *mea culpa*). Radical critiques of the situation are, however, rare. Much of the debate was shallow, and, we would argue, sidestepped rather than addressed fundamental issues about the science–media intra-relationship. Both scientists and journalists were engaged in an implicit (journalists) or explicit (scientists) attempt to recuperate their own position as truth tellers, and to obscure their interdependent relationship with the other.

In efforts to maintain the status quo, Hwang's relationship with the media became framed as dangerous simply because it was so extreme and, by implication, exceptional. Rather than reflecting on normal science–media relations (in the sort of critical way outlined in our review of the STS literature) journalists and scientists responded by simply redrawing the "correct" boundaries between science and the media in ways which reinforced the value of both science journalism and the status of science, without reflecting on their mutually reinforcing connections.

In retrospectively identifying Hwang as a "superstar" and reframing him as a "celebrity," journalists (and scientists whose comments resourced their copy) *appear* to problematize (Hwang's relations with) the media. However, such statements only implicate a *certain type* of approach. The problem is implicitly reassigned to lowbrow, fan-based media—rather than reflecting on how science journalism and news reporting routinely depends on official sources and how science correspondents often have an investment in narratives of scientific progress. Similarly, in retelling Hwang's story as a scandal framed by the metaphors of non-news genres, commentators establish a distance between science/factual/news reporting and celebrity gossip columns or fictional output such as soap opera. (The irony is that gossip columns may, in fact, be rather better at digging out embarrassing facts about their objects of reportage.)

It is also noteworthy that reporting of the scandal avoided any explicit contrast between the routines of news reporting, and the efforts involved in investigative reporting. Instead, the post-scandal reporting simply subtly appropriated representational tropes drawn from the investigative genre (the chaotic "real" scene and the hand-held camera). Rather than confronting the problem that the news media had displayed as genuine, things that were false, producers also simply used visual techniques (such as blurring and slow motion) to disown previous representations. Thus images were problematized retrospectively, in an unreflective and unself-critical way—in the service of recuperating the truth status of news representations for now and in the future.

In so far as science journalists were implicated in reporting fraud as breakthrough, they were often presented as merely innocent dupes following correct and normal procedures. Hwang was made the guilty agent, the "attention-seeker" and "headline-grabber" (e.g. see *Express*, 9 November 2006; *Korea Times*, 15 December 2005; *Yonhap* (South Korea), 11 January 2006, 21 January 2006). Thus, for example, when footage of one of Hwang's press conferences about his breakthroughs was re-shown during the scandal it was accompanied by a voiceover noting: "This was the image he presented to the world"—with all the implications of image management and spin that phrase implies (*ITV News*, 23 December 2005). Note here how public relations images are "presented" by Hwang not by the media. This obscures the investment science journalists have in a story that will get their byline on the front page, let alone the media's role as raison d'être and reproducer of such press conferences and photocalls.

There was, however, some acknowledgement of the press, and the masses as an audience "inviting" such performances in some reports. What is notable here is how the focus on *false* science being performed for a "goggling press" and the popular masses depends on an implicit contrast with the sober, measured and "modest" gaze of the gentleman witness. This thus again disavows the intra-relationship between normal science and normal science reporting, and erases the ways in which scientists and policy makers originally delighted in greeting and promoting Hwang's spectacular achievements.

In this context it is particularly striking how the role investigative journalism and the *PD Notebook* documentary played in exposing Hwang went relatively unremarked. This is in spite of the courage of journalists in pursuing such work in the face of everything from death threats to companies pulling their advertising from the channel. Perhaps this relative lack of recognition is because to have celebrated the role of *investigative* reporting might have highlighted the limitations of the *routine* news/science reporting genre and raised questions about the close relations between science journalists and scientists.[3,4]

We would add the observation that subjecting the Hwang scandal to a form of genre-reassignment (relocating his rise to stardom and fall from grace to the narrative of *fiction*) serves to reinforce the supposed "purity" of science news and denies what many critical observers have highlighted—that stories of scientific progress as told in the news routinely

evoke epic heroes. In addition, although it is common sense to think of "fact" and "fiction," and "media" and "science" as separate and opposing sites, this paper is situated in the body of work which questions these assumptions and examines how such oppositions serve specific interests (see Hilgartner, 1990; Lewenstein, 1995; Kirby, 2003; Petersen et al., 2005; Haran, 2007). We would argue that the genre-reassignment process in the Hwang case reinforces a false binary that preserves myths about "straight" reporting. Fiction is presented as an elaborate web of emotion, fantasy, appeals to identification, dramatic tension and cunning plot devices. Those who present this as the "opposite" of fact-based reporting ignore the way in which both fact and fictional representations may be used as a forum through which to lobby for a particular scientific agenda (Kirby, 2003). The mythical binary also ignores the many transpositions, borrowings, exchanges and flows between factual and fictional sites which have contributed to the cultural imaginings of science in general, and cloning in particular (Haran et al., 2008). It also obscures how news reporting about genetic science often involves highly emotive story-telling, involving powerful metaphors, appeals to identification and routine attempts to engage audiences through the promise of future relief from suffering (see Haran et al., 2008; Anderson, 2002; Holliman, 2004; Nerlich et al., 2002, 2004; Petersen, 1997; Van Dijck, 1998; see also special issue of *Science as Culture*, 2008).

Attempts to redraw the boundaries between science and the media are particularly evident in reports which attempted to reclaim the Hwang debacle as evidence of the triumph of science. Even though the scandals suggested that peer review gave no guarantee of veracity, the Hwang case was used by some commentators as evidence of the *success* of current protocol—generating headlines such as: "The cloning fraud case is a scientific success story" (*Guardian*, 13 January 2006), "Stem cell scandal validates science" (*Roanoke Times*, 16 January 2006) and "Fraud's the only fool" (*The Times*, 28 January 2006). Core to these interventions was the assertion that the internal systems of scientific witnessing, and replication, would eventually guarantee veracity—and attempts to place the media firmly *outside* this system.

The editor of the *Lancet*, Richard Horton, wrote the first of these articles (a leader for the *Guardian*) claiming the Hwang debacle as a "Scientific success story" (13 January 2006).[5] Horton optimistically observed that the real lesson of the cloning fraud was "that science has succeeded not failed. Scientists have quickly rooted out a fabrication of staggering proportions, a self-correction which is to science's credit, not shame." In this rhetorical move science was thus credited with the "rooting out" and idealized as an area of society that promotes "persistent self-criticism." Horton contended that: "The public should feel confident that science is able to admit its mistakes and clean up its act." Horton also staunchly defended the autonomy of scientists and science and appealed for a wider appreciation of "the way science is done."

There was an intriguing tension at the heart of Horton's assertions; he expressed his wish that scientists and science journalists would make greater efforts to ensure that the public understand how science really works and yet he also advocated that science is best done "slowly, quietly and progressively." It is then rather unclear what would be left for the mass media to report. Horton's emphasis on provisionality, corroboration and replication also seems at odds with current versions of "science news." It would seem to require journals like *Nature* and *Science* to cease issuing press releases about scientific papers they publish, or else to frame these far more cautiously than is currently the case. The issuing of such press releases has become an integral part of global scientific practice and academic publishing (and was central, for example, to strategies around the Human Genome Project) (see Nerlich et al., 2002; C. Williams et al., 2003; Henderson and Kitzinger, 2007; A. Williams et al., 2009); it seems unlikely that this practice will be altered.

In another article, Mark Henderson, science editor of *The Times*, took a similar line to Horton's. It was hard, he admitted, for scientific reviewers to spot clever manipulation, however, "what happens next," he wrote, "raises an almost insurmountable bulwark against fraud." This, he argued "demonstrates the peculiar rigor of science."

> A published paper … will be pored over by experts across the world, many of whom will try to replicate it. Any errors, whether accidental or fraudulent, will come to light under such intensive scrutiny. When the results of an experiment prove impossible to repeat, alarm bells ring. (*The Times*, 13 January 2006)

The media is evacuated from this account of the process, a view also promoted by other science writers. An editorial in *Stem Cells and Development* for example concluded that: "Had science proceeded as it should, with humility and caution, further attempts to replicate those findings in multiple laboratories would have soon enough discovered the breakthrough was not what it seemed" (1 June 2008). Such descriptions suggest that scrutiny, and attempted replication, of the original peer-reviewed paper is what will uncover accidental or fraudulent errors.[6] This obscures the rest of the web of science communication, including, crucially, mass media coverage that might draw the attention of diverse experts. It also assumes that the papers in question will, in their own right, necessarily elicit sufficient interest to open them up to scrutiny. In Hwang's case, the international dissemination of his key findings through the mass media afforded this possibility. A less widely publicized paper might well have remained unscrutinized for much longer. This certainly seems to have been the case with other frauds. Simon, for example, surmises that "without the early involvement of the media cold fusion may have remained a legitimate scientific problem for much longer than it did" (2001: 388). We would surmise similarly that without the global (as well as national and local) publicity surrounding Hwang's research it might have taken a great deal longer to debunk. The media played a very specific role in ensuring concerns about Hwang's work were raised and pursued. In a very direct way, the investigative reporting in South Korea by *PD Notebook* helped ensure the accusations were taken seriously. More generally, and indirectly, the mass media added a layer of witnessing which probably played a key role in constructing an international community of observers who could scrutinize Hwang's claims and ethical practices.

5. Conclusion

This article has mobilized the "modest witness" figure to explicate the representation of Hwang and to trace some of the implicit assumptions in contemporary representations of "good" scientists and their practices. We have shown how Hwang's breakthroughs were initially validated through peer review but were *stabilized* through his convincing performance of the modest witness (his persona, networking, collaborations and apparent openness to scrutiny). We have highlighted the ways in which these performances were witnessed, reinforced, created and mediated by journalists and fellow scientists. His subsequent downfall was underlined through his expulsion from the community of modest witnesses—including his isolation and orientalization. Crucially he was also reconfigured as an immodest celebrity or "rock star" scientist—and was subject to genre-reassignment, his story relocated into the genre of blockbuster film, fictional spectacular or soap opera. This article thus shows how media profile is intimately implicated, albeit in a very slippery way, in the twenty-first century construction of the modest witness.

This article also worked with Gieryn's discussion of "second-order virtuality." His discussion of this concept in the Cold Fusion case might give the impression that experimenters call upon journalists to witness their practices only when their peers are dubious about their findings. So the second-order virtuality he describes is a kind of substandard witnessing that *bypasses* normal procedure. In the Hwang case, however, the work had already been witnessed and attained the "gold standard" of being published in a prestigious peer review journal—*before* journalists were invited to join the fray. Nevertheless we would argue that the media were, in some sense, still being invited to "add their own instruments (video cameras, tape recorders, images, the printed word)" to the technical equipment that had carried stem cell research up to this exciting moment. Such media coverage was sought to help enroll the broader community of funders, policy makers and citizens to witness the realization of a strong experimental foundation for embryonic stem cell research.

Thus in extending the insights into media–science relations beyond the Cold Fusion examples explored by many previous authors we have shown how the media are intimately implicated in the fabrication of both scientific truth and falsehood. We hope our detailed attention to images, narrative and representational "body language" both convincingly demonstrates how this operates, and offers a tool kit for further exploration of how this occurs. The twist in the Hwang tale allows us to demonstrate how scientists and science journalists routinely disavow the media's intimate involvement in the making of "true science," but retrospectively scapegoat the media in the fabrication of "false science." Although public relations is integral to the development of modern science, it is only highlighted when that science comes to be seen as problematic. We accept that scientists/science journalists sometimes acknowledge the impact of the media on issues such as science funding or policy and even concede that this encourages particular rhetorical strategies. However, that acknowledgement is fleeting and often undercut by the *implicit* assumptions that run through their discourse. Further, by restricting recognition of media impact to funding or policy the core of real science is rhetorically protected from such implication. Thus much of what counted as "reflection" about the media–science interface in reporting of the Hwang scandal actually served to redraw the boundaries between science and the media and sidestep more fundamental challenges.

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Notes

1 The summary Inquiry report notes that having Schatten's name on the 2005 article "conferred considerable credibility to the paper within the international scientific community." The Inquiry team also reflects on Schatten's co-authorship of the publication in *Nature* about the cloning of Snuppy, the dog. They note, somewhat dryly, "We have no reason to doubt Schatten's statement to us that his major contribution to the paper was a suggestion that a professional photographer be engaged so that Snuppy would appear with greater visual appeal. It is less clear that this contribution fully justifies co-authorship" (www.mac10.umc.pitt.edu).

2 The reactions of international journalists were given great significance in South Korean reporting. One early article about the breakthroughs opens with a quote from Hwang declaring: "I witnessed the enthusiasm of the world's press about the scientific achievements of Korea" and proceeds with an account of the press conference during which "many foreign reporters raised their hands to ask a question. They … highly praised our efforts and

the value of the research" (*Hankyoreh*, 14 February 2005). Attention from UK and US media outlets such as the BBC and the *Washington Post* also featured at the center of some South Korean news reports (e.g. *JoongAng Ilbo*, 13 February 2004).

3 Interestingly although *Science*'s review of the Hwang scandal meticulously documents the key role of investigative journalism, its headline focuses on the role of young scientists: "How young Korean researchers helped unearth a scandal" (24 March 2006).

4 The line between science and the media was also drawn during the early days of the emerging scandal. For example, a South Korean paper criticized *PD Notebook* on the grounds that "If there was a problem with Dr. Hwang's research paper, then it would likely have been a fellow geneticist who first pointed it out. As for now, the controversy is being amplified by leaks of information, media exposure or press conferences, *all totally irrelevant to science*" (*Yonhap*, 5 December 2005, our emphasis).

5 It is not always relevant to distinguish between scientists and science journalists because journalists often drew heavily on their briefings from scientists. As one UK science editor admitted science journalists were "willing collaborators" in promoting stem cell research (see Kitzinger, 2008). We would also note longer term collaborations such as the joint authorship of the book *After Dolly* by the scientist, Wilmut, and journalist, Highfield. Rather than attempting to *disentangle* scientists from science journalists in this paper we are giving due attention to their intermeshing.

6 By 2008, some reports suggested that it was a failure to replicate that had led to Hwang's downfall (e.g. *Straits Times*, 23 July 2008). In commenting on the scandal the "obvious" need for replication was frequently highlighted. The editor of *Science* apparently complained most news outlets fail to caution that studies must be replicated to be truly authenticated (cited in *New York Times*, 13 February 2006). Yet few of the original press releases around the Hwang breakthrough mentioned this need for replication at the time.

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