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Frankenstein and the Debate Over Embryo Research

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This study uses evidence from the press and from the parliamentary record to examine the extent to which, and the ways in which, people involved in the public debate over laboratory experiments on human embryos in Britain during the 1980s drew on images from science fiction. It is shown that negative images from science fiction were used in the debate, but that these images could be transformed into resources for defending, as well as attacking, this form of scientific endeavor. It is also shown that other fictional structures were present in the debate and that both sides relied heavily on fictional components to justify their competing appraisals of embryo research.

In the course of the last decade or so, the idea at the heart of the Frankenstein myth has at last come close to realization through the new technology of assisted reproduction. The formation of human beings outside the womb by means of in vitro fertilization (IVF) is technically very different from the procedures vaguely hinted at in Mary Shelley's book or visually depicted in the typical Frankenstein horror movie. Nevertheless, Frankenstein's dream of systematic, science-based control over the creation of human beings can be seen as having become a reality in the modern fertility clinic where, by the end of the 1980s, "test-tube babies" were being regularly produced on a commercially viable scale (Birke, Himmelweit, and Vines 1990).

The rapid establishment of the new reproductive technology has generated widespread concern and considerable public debate. The purpose of this

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debate has been to decide whether further scientific experimentation and further development of the techniques of assisted reproduction should be encouraged or prohibited. Because this area of scientific activity is in its infancy, those involved in the debate have been obliged to look into the future (McNeil 1990). To decide how best to react to the emergence of research on human IVF embryos, people with no scientific expertise have had to try to imagine what would happen if embryo research and its technologies were allowed to develop without outside intervention. When outsiders are required to engage in imaginative work in their attempts to envisage the future course of scientific and technological development, the ominous figure of Frankenstein might be expected to play a role. There is an obvious parallel between Frankenstein's fictional creation of a living human being and Edwards and Steptoe's dramatic bestowal of life upon Louise Brown (Edwards and Steptoe 1980). What could be more natural than to fill in the missing parts of the test-tube baby story along Frankensteinian lines?

In making this suggestion, I am assuming that as people engage in debate about events in the real world, they may sometimes draw on works of science fiction, such as Mary Shelley's *Frankenstein*, or, more probably, on the derivative make-believe of the mass entertainment industry (Glut 1973; Smith 1992; Turney 1994). This possibility is worth considering because when speculating about the development of new, science-based technologies, participants cannot rely entirely on what they take to be the established facts. While they think and argue about the shape of things to come, they have no alternative but to create some kind of story that goes beyond these facts. Consequently, in the course of public appraisal of science and technology, the conventional boundary between fact and fiction may sometimes become blurred. In searching for the overall form of a real-life story that is at present incomplete, those involved must either invent a new, plausible story line or fit developments into a narrative structure that is already available. The historical record might, in principle, provide useful precedents. But people's knowledge of the history of science or technology is likely to be insufficient for this purpose (Durant, Evans, and Thomas 1989). There is good reason, therefore, to expect that some of those who participate in public debate on such matters will turn to certain fictional treatments of science that have become part of our common cultural repertoire.

The analytical literature on *Frankenstein* and on other "mad scientist" stories supports the supposition that these fictional products are relevant, in various ways, to happenings in the real world. Tudor, for example, in his cultural history of the horror movie, argues that these texts map our landscapes of fear concerning science and provide evidence of "changing popular images of what is threatening about science and scientists" (1989b, 589). He

describes in detail how both the stories employed in such films and the moral lessons they convey have changed in response to alterations in the social location of scientists and to changes in the institutional uses of scientific knowledge (Tudor 1989a). Films about mad scientists, he argues, beginning with the archetypal figure of Frankenstein, are expressions of a longstanding cultural ambivalence about science in which a general recognition of the power of science is accompanied by a persistent fear of the terrible consequences that follow when scientists' obsessive, amoral curiosity leads them to trespass in forbidden areas of inquiry.

A similar conclusion is reached in Toumey's (1992) examination of mad science fictions. Toumey argues that many, perhaps all, mad scientist stories are presented and interpreted, not just as enjoyable fantasies, but also as serious warnings about science and scientists. They operate, he suggests, as crude, yet memorable reminders of the ever-present possibility that scientists, by the very nature of their activities, may get things disastrously wrong and that ordinary people may suffer as a result.

Stories of mad scientists, whether textual or cinematic, constitute an extremely effective antirationalist critique of science. They thrill their audiences by brewing together suspense, horror, violence, and heroism and by uniting those features under the premise that most scientists are dangerous. Untrue, perhaps; preposterous, perhaps; low-brow, perhaps. But nevertheless effective. (Toumey 1992, 434)

This kind of analysis suggests that the narrative structures available in the mad scientist genre will be used regularly in the course of public debate concerning new, science-based technologies. Indeed, it would be precisely when the practical consequences of some widely discussed scientific innovation are as yet unclear that the stories derived from anti-science fiction would be most relevant. These fictions will work as effective warnings only if people use them for rhetorical purposes in cases of genuine uncertainty about the character of scientific research and the nature of its social impact.

We would not expect, of course, that the plots of specific books or films would normally be applied in detail to any particular area of scientific inquiry. The process of cultural transferal would usually operate more flexibly than this, and the correspondence between fictional text and real-world extrapolation would often be more metaphorical than literal. Nevertheless, despite the potential complexity of the process, there are strong grounds for investigating how people use the interpretative resources of anti-science fiction in the course of public debate over new departures in science and technology.

In the sections to follow, with this line of argument in mind, I will examine the public debate in Britain concerning research on human embryos, which was set in motion by the publication in 1984 of *The Warnock Report on*

Human Fertilization and Embryology (Warnock 1985) and which ended in 1990 with the passage of the *Human Embryology and Fertilization Act* and with parliamentary approval of a restricted form of embryo research (Morgan and Lee 1991; Mulkey 1991, 1993a, 1993b, 1994a, 1994b, 1994c, 1994d, 1995a, 1995b, 1995c). I will show that negative science fiction imagery was used by non-scientists in the press and in Parliament to criticize and to condemn research on human embryos. But I will also show that the same imagery was used by practitioners and supporters of embryo research to strengthen the case in favor of scientific experimentation on living human organisms.¹

Frankenstein in the Press

The image of Frankenstein, or other fictional representations of scientific conduct, may be present in people's real-world, practical discourse in two different ways. In the first place, Frankenstein or his equivalents may be mentioned openly in relation to a serious issue such as the experimental manipulation of human IVF embryos. Second, participants may note the presence of fictional components in the discourse of other parties even though the latter may have made no explicit reference to the world of science fiction. Both kinds of linkage between the realms of fiction and fact can be found in the course of the public debate in Britain in which the legitimacy of embryo research was examined. Let us begin with an instance where Frankenstein is clearly evident.

In November 1987, after more than three years of public debate, the British government published a provisional framework for legislation concerning embryo research and the new reproductive technology (Department of Health and Social Security 1987). This White Paper was to be the focus for further discussion, in Parliament and elsewhere, after which a bill would be introduced. The White Paper left one crucial issue unsettled, namely, whether or not embryo research was to be allowed to continue. This was identified as a deeply personal matter to be decided, not by government, but by the individual members of both Houses acting in accordance with the demands of their conscience. Nevertheless, the government report made it clear that, if Parliament did grant permission for further experimentation on human embryos, researchers would be closely regulated by statute and subject to criminal sanctions (Morgan and Lee 1991).

The reaction to the White Paper in two of the mass circulation newspapers involved explicit reference to the image of Frankenstein and his monstrous creation. In *The Sun* (27 November, 1987), there was a still from the film *Frankenstein* accompanied by a brief account of the main recommendations

contained in the government document *Human Fertilization and Embryology: A Framework for Legislation* (Department of Health and Social Security 1987). *Today* responded in a similar fashion with an item that began in the following way:

Clamp on Frankenstein Scientists

Scientists are to be banned by law from creating superbeings in the laboratory.

The technique known as cloning, which can produce identical humans from a single cell, will also be made a criminal offense.

The Government admits that the prospect of Frankenstein-style experiments is unlikely, but it wants to stop any genetic tinkering with embryos which would predetermine characteristics.

A White Paper published yesterday proposes the clampdown on test tube baby experiments. (Clamp on Frankenstein scientists 1987)

In both newspapers, the Frankenstein image dominated the text and was used to single out and to endorse the White Paper's proposal to establish strict control over the activities of scientists engaged in research on human embryos. By representing these scientists and their experiments in Frankensteinian terms, the newspapers seemed to imply that the former were potential malefactors; that if the legislative clamp were not applied, unfortunate consequences would follow—as in the fictional tale. There was a tension in the newspaper articles between the dramatic science fiction imagery and the official statements that Frankenstein-style experiments were “unlikely” or “extremely remote.” But these more modest assessments of the threat posed by embryo research were presented, unlike Frankenstein, without emphasis. Thus the unbalanced design of the articles drew particular attention to the supposed resemblance between embryo researchers and Mary Shelley's scientific villain. Frankenstein's prominence suggested strongly to readers that, despite official disclaimers, these scientists were dangerous and must be held on a tight rein (Nelkin 1987, 50).

We cannot know how these articles were received by the newspapers' regular customers. We do know, however, that they were seen from within the scientific community as a characteristically ill-informed attack upon embryo research and upon science more generally. Thus an editorial in the *New Scientist* condemned the tactics adopted by *The Sun* as sensationalist and misleading (Shattered test tubes 1987). Similarly, on 3 December 1987 *Nature*, in its news section, took the unusual step of reproducing the Frankenstein headline from *Today* by means of photomontage and added the brief, contemptuous comment: “The popular press in Britain promotes a less than flattering view of scientists. *Today's* response to last week's white paper” (p. 409). From the perspective of those sympathetic to embryo research, these

articles in the popular press provided clear illustrations of the open, explicit use of the Frankenstein image to convey a critical message about the researchers investigating human embryos. The message was taken to be "beware of science!" (Toumey 1992, 412).

One of the leading scientists involved in the debate over embryo research and related matters has argued that this kind of negative, science fiction imagery has permeated public discussion of these issues and that much of the opposition to research on human embryos has been a direct result of the malign influence of science fiction.

If there are disagreements about the donation or freezing of human embryos, far greater passions are aroused about the need to carry out research on them. Everyone knows in principle that medical advances are built on scientific research, but the necessity or otherwise for experiments on human embryos sparks the most intense argument, as fears arise about tailor-made babies, or clones, or cyborgs, or some other nightmarish fancy.

The trouble really started way back in the 1930s, by courtesy of the brilliant Aldous Huxley. In his novel *Brave New World*. . . . Admittedly some of Huxley's notions have come true. Fifty ova can now be collected from a human ovary. This is a modest figure compared with his thousands, yet his ideas still grip prophets of doom more than any other science fiction, as the numbers of human embryos growing in vitro rise year by year, and as his fellow writers whip up forebodings dire enough to alarm even the most phlegmatic science watcher. Whatever today's embryologists may do, Frankenstein or Faust or Jekyll will have foreshadowed, looming over every biological debate. (Edwards 1989, 69-70)

This passage was written by Robert Edwards (1989), the test-tube baby pioneer, in his *Reflections on the Embryo Debate*. Edwards offers a general account of the underlying processes of that debate, in which the opponents of embryo research are depicted as responding, not to the modest, unthreatening realities of actual research, but to the exaggerated, misleading inventions of the fictional realm. We are invited to see their rejection of embryo research as arising from a confusion between illusion and reality. According to this interpretation, science fiction has had a major impact on the public debate in which Edwards has been involved. Its contribution, however, has been largely negative. For it has distorted people's perception of where research on human embryos will lead and has generated fear and antagonism instead of fostering a proper appreciation of the benefits that further research will bring.²

Edwards's emphasis on the role played by science fiction in the debate operates as a defense of embryo research by removing its opponents' objections from the sphere of fact to the cognitively inferior domain of fiction. Because, in Edwards's view, these opponents are attacking the fantasies of

the science fiction writers rather than the actualities of embryo research, their criticisms need not be taken seriously. These criticisms, like the fictional texts from which they are said to derive, come to be seen as a form of imaginary discourse. In contrast, Edwards's own assertions are presented as straightforwardly factual in character.

In fact, of course, despite all the horror stories, most people connect embryo research with the early diagnosis or treatment of crippling diseases and therefore will concede, if pressed, that such research has been, and will continue to be, of great benefit to humanity. (Edwards 1989, 71)

In this passage, Edwards comes close to contradicting his own central thesis and to admitting that the horror stories of the science fiction writers have not, after all, *really* misled people; that, at some basic level, almost everybody recognizes that embryo research is a good thing. Nevertheless elsewhere, as we have seen, he emphasizes that the stories of Huxley, Shelley, and others have significantly affected public understanding of research on human embryos and that they continue to "loom over" embryologists' activities. In the first quotation above and in much of the subsequent discussion, he maintains unequivocally that the bulk of the opposition to embryo research has been built around images of *Brave New World* laboratories, Frankensteinian monsters, and other science fiction fantasies.

If Edwards's main line of argument is correct, it would be reasonable to infer that science fiction imagery would be particularly prevalent during those periods in which the debate over embryo research was most intense. One such period was the six months leading up to the final parliamentary decision concerning the future of research on human embryos in Britain. Thus, in order to investigate Edwards's claim systematically, I examined a collection of eighty-five press articles, editorials, and other special features, taken from newspapers and popular journals while the government bill dealing with embryo research was passing through Parliament, that is, from December 1989 to May 1990.³ Although more than thirty of these items expressed strong opposition to embryo research, only one made explicit use of the literature of science fiction. This feature consisted of four paragraphs taken from Huxley's *Brave New World* under the title "Brave New Embryos" (1990). The chosen passage, which had also been quoted by Edwards to illustrate the relevance of Huxley's novel to the current debate, deals with the mass production of human embryos. I take this item to be an ironic comment on the long-term implications of the official endorsement of embryo research. However, no attempt was made in the newspaper to use this fictional fragment as the basis for open criticism of embryo research or of the technology of assisted reproduction.

During the final phase of public debate, the mass circulation dailies such as *The Sun* and *Today* did not employ the kind of negative, science fiction imagery that had appeared in response to the White Paper. They concentrated instead on the positive outcomes of embryo research and repeatedly built their stories around favorable images of happy mothers holding contented, genetically screened, IVF babies (Mulkey 1993a). This emphasis throughout the concluding stage of debate on the benefits of embryo research shows that the earlier adoption of Frankensteinian imagery was not part of a campaign of sustained opposition to such research. The popular press was not imprisoned within the anti-science rhetoric of science fiction, but was prepared to employ whatever resources were available to create newsworthy stories (Nelkin 1987, 50-51). Consequently, as the pro-research lobby became increasingly well organized, the press coverage of embryo research came to be dominated by the images and story lines provided by that lobby (Mulkey 1993a, 1995b).

Science fiction imagery was almost entirely absent from the press during the final phase of public debate over embryo research. Even texts that contained strong opposition to such research made no use of this kind of imagery. Nevertheless, those sympathetic to embryo research continued to voice the suspicion that Frankenstein and company were everywhere at work and that their opponents were locked into an unreal world of monsters and mad scientists. For example, *New Scientist* opened its campaign in support of embryo research at the start of the final sequence of parliamentary debate with a mocking denial that “any embryo researcher has tried to produce a monster with bolts in its neck, horns on its head or a pointed tail” (Embryonic journey 1989). Later, as the decisive parliamentary vote approached, Dr. Bolton, an embryologist and “chairman of Progress, an organization supporting research,” was quoted in the *Mirror* on 19 April 1990 as saying that “[w]e want to allay public fears and prejudices that are perhaps compounded by those who oppose us. We are not mad scientists. We want to alleviate suffering.” In both these instances, of course, it was the advocates of embryo research who actually made explicit use of science fiction imagery.

There is little evidence in the material examined so far to support the claim advanced by Edwards and by other advocates of embryo research that their critics’ arguments were built around the “mad scientist” fantasies of the fictional realm. We must not forget, however, that the public appraisal of embryo research occurred over a period of years and that critical use of science fiction imagery could have been more significant during earlier stages of debate. It is necessary, therefore, to ascertain how science fiction imagery was used in the course of the initial phase of bitter confrontation over embryo research. To do this, I will examine the parliamentary debates

that followed the publication of the official report of the Warnock Committee in 1984.

Frankenstein in Parliament

Between 1984 and 1988, five major debates focused on embryo research. During this period, those opposed to such research were in the majority and research on human embryos was repeatedly denounced in Parliament in the most forceful terms. The opponents of embryo research dominated these debates until the tide began to turn in 1988 (Mulkay 1993b, 1994a, 1995c). If science fiction imagery was crucial to the interpretative processes of organized opposition to embryo research, we would expect it to have been evident in the course of these debates. There were, however, only four instances where people opposed to embryo research openly used elements taken from science fiction. In two of them, reference was made to Huxley's *Brave New World* and, in the other two, to some version of *Frankenstein*. The following speaker, for instance, begins the main part of her speech with these words:

I once watched a science fiction film about a man who was made in a laboratory. He escaped and did all kinds of terrible things. It makes me think: is this the start of something which could lead to a Hitler theory of only the perfect human beings being brought into our society? (Baroness Masham, *Parliamentary Debates* [Lords], 5th ser., vol. 456 [1984], col. 576)

She goes on to comment on the decline of Christianity, on the problems arising from abortion and childlessness, on the need to protect embryos from the moment of fertilization, and on the usefulness of IVF in certain circumstances. In the middle section of her speech, she considers what she regards as the very real dangers of embryo research in a way that broadly parallels the earlier reference to the mythical laboratory of science fiction. "The temptations for experimentation on the human embryo could go far," she says. Scientists "might try to reach their goal without regard to the embryo." How, she asks, could we non-experts control them? Her overall conclusion is that embryo research should not continue and that "the further we get away from nature, the more problems we shall have" (col. 577).

It appears that this speaker is drawing on some vague memory of a Frankenstein horror movie to give form to her condemnation of this new type of research involving the laboratory production of human beings. She uses a crude, minimal formulation of the Frankenstein story to convey the idea that the unanticipated consequences of this act of scientific trespass, difficult

though they are to specify at this stage, may be most unwelcome. Her speech resembles the *Today* article in introducing fictional material explicitly into its appraisal of embryo research and in using the negative tone of the Frankenstein image to hint at the dangers that would follow if research in this area were allowed to continue.

Frankenstein is present in this first example from parliamentary debate, but his image is by no means dominant. The same is true of the passage below, taken from a later debate in the Commons in which a Private Member's Bill outlawing embryo research is being discussed. The speaker asks the question: Why is research on human embryos necessary? Scientists' answer, he claims, is that it is necessary because it will enable them eventually to control the processes of human reproduction and to eliminate genetic defects. This supposed reply generates a second rhetorical question.

Where are we going? If we take the rectification of genetic defects to its logical conclusion, one day we shall live in a society in which medical developments applied to in vitro fertilization will be so advanced that facial appearance, physical strength, skin coloring, IQ and intelligence will all have become the subject of laboratory experiment, so much so that one will be able to book an embryological configuration—tall, dark, handsome, short, intelligent, athletic, shrewd or perhaps even a Frankenstein monster if that is what one wants. (Campbell-Savours, *Parliamentary Debates* [Commons], 6th ser., vol. 73 [1985], col. 659)

Frankenstein seems to be less central to this speech than to the articles in the popular press or to the speech by Baroness Masham. The reference to Frankenstein is not used here to establish the interpretative context, but appears to be added almost as an afterthought to the list of possible configurations. Yet Frankenstein's presence does contribute to our understanding of what is being said. For it is the mention of Frankenstein that indicates most clearly in this part of the speech that the speaker is not simply offering a neutral description of what he thinks is likely to happen, but is also expressing his disapproval and repugnance. In other words, Frankenstein's introduction implies a moral resemblance between the fictional scientist's monstrous achievement and the excesses to be expected of real scientists in the foreseeable future.⁴

Although this speaker refers to Frankenstein to signal opposition to the prospect of continued research on human embryos, the reference to science fiction is not essential to the speech. The speaker's account of the science-based technology of the future derives textually, not from the Frankenstein myth, but from his imaginative reconstruction of the discourse of actual scientists at work today. Frankenstein plays only a peripheral role in these speculations. As with Baroness Masham, reference to the fictional character

seems to be little more than a convenient device with which to convey negative feelings and a sense of apprehension about the direction in which certain sectors of modern science appear to be heading. The same is true of participants' occasional use of *Brave New World* for critical purposes.

The public will want some specific questions answered exactly. For example, how can we get sufficient numbers of sufficiently qualified scientific inspectors to differentiate between a 14-day and a 15-day old embryo . . . ? The public will want proper answers to those . . . questions. There are widespread, and I believe well-informed, fears lest trans-species fertilization lead beyond embryonic growth to a mixed breed, converting the uniqueness of man into a bastardized freak. The public, I believe, will revolt against debasement of human generation to stud farming methods. I believe that the public is already showing signs of an instinctive resistance to the Brave New World's intrusion into this most private and sacred area of human experience. (Lauderdale, *Parliamentary Debates* [Lords], 5th ser., vol. 456 [1984], col. 566)

These examples show that parliamentary critics of embryo research did sometimes refer to science fiction in their attempts to speculate about the future and to demonstrate the need, either to ban such research or to exercise greater control over scientists' activities. But we could hardly conclude, from occasional, passing references of this kind, that science fiction had exerted a major influence on the opposition party. Indeed, negative science fiction imagery was actually used more frequently in these debates by the supporters of embryo research than by its critics.⁵ We find, however, as in the material discussed in the previous section, that advocates of embryo research claimed to be able to detect Frankenstein's influence upon their opponents whether or not these opponents happened to mention him.

We are provided with opportunities for alleviating the miseries and problems that infertility inflicts on individuals and society and, at the same time, letting loose upon society the forces that could do more harm than good. I cannot help feeling that Mary Shelley's spectre of Dr. Frankenstein's monster impinges heavily on our subconscious when we address ourselves to the problem of embryology, causing a fear of and revulsion against the possible products of the ruthless pursuit of knowledge for its own sake or the application of medical techniques to create monsters or superhumans. (Dobson, *Parliamentary Debates* [Commons], 6th ser., vol. 68 [1984], col. 585)

The speaker continues by acknowledging that the idea of Frankenstein's monster may have some value if it encourages ordinary people to "be on their guard" and to ensure that the new science-based techniques are not improperly used. Nevertheless, he insists, we must not let our powerful feelings of fear and revulsion prevent us from recognizing and accepting the benefits that controlled embryo research will bring. We must not, he implies, make the mistake of taking Mary Shelley's story too literally. We must instead do

our best to control the Frankenstein-inspired promptings of our subconscious mind and to avoid adopting unreflectively the negative preconceptions evident in so many contributions to the public debate. In this speaker's view, although we are all influenced by the Frankenstein myth, some people have been able to restrain that influence and to deal with the issues under review in a more detached and logical manner. Such an approach, he contends, leads to cautious support for the use of IVF and for the continuation of embryo research.

A similar assessment of Frankenstein's significance in the public debate over embryo research is proposed in the following pro-research contribution to the same parliamentary session.

It is a subject fraught with fantasies of futuristic horror. Lurid associations with "Brave New World" embryology, Nazi medicine or Frankenstein experimentation, make debate between irreconcilable moral positions very difficult. (Meacher, *Parliamentary Debates* [Commons], 6th ser., vol. 68 [1984], col. 534)

In the speech from which this quotation is taken, the fantasies of science fiction are treated as potent influences on the views of those people with whom the speaker disagrees. Belief in these horror stories is said to make debate difficult because it is usually associated with a stance of such moral certitude that rational discussion becomes impossible. As he puts it in a later session, one of the major obstacles preventing dispassionate debate "is the dread that scientists are somehow running amok and that unless they are reined in by immediate legislation, science fiction nightmares such as human-hamster hybrids, carbon copy cloning by nuclear transplantation or wanton torture of living fetuses in the laboratory might see the light of day" (*Parliamentary Debates* [Commons], 6th ser., vol. 73 [1985], col. 686). Once again, Frankenstein and company are represented as having prevented other people from properly grasping the realities of embryo research. In contrast, for those supposed realists who, like the speaker, are able to step outside the realm of fantasy and to avoid the moral absolutism justified by its imaginary horrors, "the benefits of controlled research, closely monitored and regulated by a licensing body of the sort recommended by the Warnock committee, seem to be compelling" (*Parliamentary Debates* [Commons], 6th ser., vol. 68 [1984], col. 536).

In the course of the embryo debate, in Parliament and in the media, negative science fiction imagery was used explicitly by supporters of embryo research as well as by its critics. For the latter, science fiction was available as a convenient cultural resource with which to convey disapproval and apprehension. For the former, it was a resource with which to weaken the credibility

of their opponents' speculations about the future and to explain away their refusal to accept the reassurances offered by the representatives of scientific research. When Frankenstein appeared within the context of anti-research discourse, he reminded recipients forcefully of the dangers of scientific development. When Frankenstein appeared within the context of pro-research discourse, he was made to speak, not of the dangers of science, but of the credulity, ignorance, and dogmatism of those who were unwilling to endorse the advance of scientific knowledge.⁶

Competing Visions of the Future

The material presented above has one puzzling feature: How was it possible for scientists and other supporters of embryo research to insist repeatedly that science fiction was a major influence on their opponents, when those opponents made little explicit use of science fiction imagery? Part of the answer is that explicit reference to science fiction was not essential for its influence to be detected. At least some of those in favor of embryo research were able to infer the influence of Frankenstein and of science fiction more generally from other, less obvious, features of their opponents' arguments in relation to embryo research. One of these features was undoubtedly their disapproval of such research. But it seems unlikely that this alone was sufficient basis for the kind of fictional attribution exemplified above.

I suggest that the discourse of opponents to embryo research in Parliament, and probably in many other settings, regularly displayed additional elements that could be taken to reveal its essentially "fictional" nature. Let me examine one parliamentary speech in which these recurrent characteristics can be observed. To illustrate the range of features involved, I will quote at length from this speech.

I want to consider where this whole matter will lead us. . . . Ectogenesis involves maintaining the embryo in vitro for progressively longer periods. Why have a limit of 14 days? Why should it not be extended to 20, 30 or 40 days? The ultimate goal may be to produce a child entirely in vitro or to produce genetically identical individuals by cloning. In other words, the goal may be to mimic the natural process leading to selective breeding or the creation of human beings with predetermined characteristics. . . . One can see that coming, not in a lifetime but in two lifetimes. All those matters are hypothetical, but they may come about. As we are aware, we slide from one piece of primary legislation and so on. . . . I now want to consider trans-species investigations. We are all aware that in agriculture they have combined a sheep and a goat and a rather remarkable beast was formed. It would not take a great leap of imagination to imagine what might happen. Each cell has its DNA. It is possible

through genetic engineering and manipulation of cells to remove or to splice in a link and that might have catastrophic consequences. . . . The White Paper . . . says that we must have a system of mandatory licensing. The system would, of course, create a criminal offense. But . . . [m]ost of the activities in breach of the law could be compiled clandestinely. Therefore, while one might get the respect of those who have respect for the law, those who thirst for knowledge, regardless of restraint, will work unceasingly for what they term their aspirations. . . . The dignity of man must remain inviolate. His status is degraded as soon as the legislature permits us to interfere, to man's detriment, with any part of his being, whether in time of growth or synthesis. . . . There have been great achievements throughout British medicine and I pay tribute to the work that has been done. Having said all that, surely we in the House can see, down the labyrinth of years, the dangers to which we are exposed, and the dangers to which we are exposing the nation. (Skeet, *Parliamentary Debates* [Commons], 6th ser., vol. 126 [1988], cols. 1225-27)

This speaker, like so many opposed to embryo research, formulates his response on the basis of what he takes to be its long-term consequences. Where will it lead us, he asks, not in one lifetime, but across the span of generations to come? He recognizes that, in attempting to look so far ahead, he must rely on his imagination. But he treats disciplined extrapolation from what is known about present-day science as a necessary and legitimate part of the process of appraisal.

In his imaginative vision of a future in which research on human embryos has been allowed to continue, the speaker attributes great power to science. He assumes, in particular, that scientists will sooner or later succeed in their attempts to mimic, and thereby to control, the natural mechanisms of human reproduction. However, this acknowledgment of scientists' potency is combined with a profound distrust. A significant proportion of scientists, he suggests, will pursue their technical objectives without respect for the law or for the fundamental values on which human dignity depends. He seems to imply that the very amorality of scientific culture makes it so technically successful, yet at the same time so resistant to external control (Lewenstein 1989). He concludes, therefore, that technical accomplishments such as sexual selection, cloning, genetic manipulation, trans-species fertilization, and so on, which are at the moment either hypothetical or in their infancy, furnish faint but prophetic clues to the achievements of the future and to the disruptive social changes that will in due course follow if scientists are permitted to continue their inquiries in the realm of human creation.

This type of abstract narrative appeared repeatedly throughout the parliamentary campaign against embryo research.⁷ Its characteristic elements are the extended temporal perspective, the open dependence on imaginative work, the suspicious recognition of the power of science, the stress given to scientists' obsessive pursuit of technical goals, the emphasis on the difficulty

of controlling science from outside, the significance attributed to certain unusual technical developments in contemporary science, and the expression of repugnance at scientists' incursion into a sacred region of human existence.

Although the original Frankenstein story and its fictional derivatives employ much more concrete and particularized story lines than does the speaker above, there are numerous parallels between the two kinds of narrative structure. In the first instance, both types of narrative take place outside the time span of ordinary experience; that is, they occur either in a fictional recreation of the past or in an as yet unrealized future. Second, the typical anti-science fiction and the critical speculation concerning the development of embryo research are both built around a "generalized fear that the engine of change is out of control" (Tudor 1989b, 591). Scientists' motives tend to be depicted in both these kinds of text as untrustworthy and as leading them to trespass into forbidden areas, with disastrous results (Toumey 1992; Mulkey 1995b). Thus, third, scientists are seen as ignoring the limitations implied by commonly accepted values and, consequently, as threatening irreparable damage to the social fabric (Tudor 1989a). The science fiction horror movie and the denunciatory prophecy about embryo research can be seen to be similar in kind because they are both creative projections of negative assumptions about science and about scientists. The expression of these underlying assumptions in an undeniably imaginative form by the critics of embryo research enabled those defending science to treat this type of supposedly real-world discourse as deriving from, and as implicitly belonging to, the genre of anti-science fiction.

Accordingly, explicit reference to the fictional realm was not required for opposition discourse to be read as a form of anti-science fiction by supporters of embryo research. The negative construal of scientists' motives, the condemnation of scientific amorality, and the temporal extension of the narrative line could in themselves be taken to reveal such discourse as unreal in character, irrespective of its detailed content. I suggest that the repeated appearance of these features in opposition rhetoric led supporters of embryo research to conclude that Frankenstein and company were constantly at work behind the scenes.

Adoption of an extended temporal perspective was essential to opponents of embryo research because it created interpretative space in which to exercise their critical imagination. It was only by looking well into the future that they were able to postulate dramatic technical changes and to envisage radically new forms of science-based activity that were clearly incompatible with present-day morality. Advocates of research regularly attacked their opponents' use of this temporal strategy and constantly urged that the discussion be kept "undistorted by wild speculations" about the far distant

future. In so doing, they reaffirmed the apparently more cautious approach employed in the *Warnock Report* of keeping the temporal perspective short, and reliance on imagination to a minimum.

The pace of scientific discovery is unpredictable. Indeed, a number of major developments has taken place during the lifetime of the Inquiry. The changes which take place in society itself are also difficult to predict. The impact of scientific discoveries on the society of the future is therefore doubly hard to predict. We took the pragmatic view that we could react only to what we knew, and what we could realistically foresee. (Warnock 1985, 5)

Despite their rejection of their opponents' speculative efforts as "exaggerated and emotive propaganda" and despite their commitment, in principle, to a policy of short-term realism, the supporters of embryo research, in practice, also made much use of imaginative claims about the future. This has been documented in detail elsewhere (Mulkey 1993b). Let me, therefore, offer just one brief illustration taken from a speaker whom we have seen above condemning other people's futuristic fantasies.

Research that holds the prospect of reducing this blight on so many lives must be welcomed. Moreover, such work can reduce the incidence of miscarriage. . . . But the potential for research goes much wider. Information could emerge on how a range of birth defects arises or on how cancer cells become malignant. It may also help to remedy genetic disease, which affects one in 50 children. . . . For the future—it may be a distant future, but it is foreseeable—it could be possible to use cells, which divide to form specific organs in the embryo, to correct blood disorders or repair damaged tissue in the pancreas or even the heart, the brain or the liver of an adult. (Meacher, *Parliamentary Debates* [Commons], 6th ser., vol. 68 [1984], col. 536)

Those in favor of embryo research, like this speaker, regularly slipped into the prophetic mode, although, of course, their speculations concentrated on the expected benefits of such research rather than the problems to which it might give rise (Nelkin 1987, 51). Such claims were often challenged. They were, however, never depicted as blatant fantasies deriving from the fictional realm. This was, presumably, because there was no well-known fictional genre to which such optimistic extrapolations could be linked. Nevertheless, both sides in the debate made repeated use of fictional narratives; that is, they both creatively projected their divergent conceptions of science into the future as a way of justifying their present course of action. Both sides also employed a set of typical factual assertions about the present and the recent past. In both cases, these supposed facts were given meaning, and operated to provide justification, by being combined with a form of imaginative discourse that enabled speakers to claim to reveal how the collective decision

either to permit or to prohibit embryo research would lead, down the labyrinth of years, to quite different futures.

The advocates of embryo research had the advantage of being able to maintain that their positive vision of the future was supported by the authority of science. Those engaged in opposition to embryo research labored under the disadvantage that their bleak narratives bore a distinct resemblance to certain familiar stories from science fiction. We cannot know for certain how these differing alignments in relation to the domains of science and science fiction affected the eventual outcome of the public debate. However, it seems likely from what we have seen above that the existence of a fictional genre expressing widespread fears about science and technology tended, somewhat paradoxically, to weaken the campaign against embryo research and to strengthen the arguments of those who supported its continuation.

Notes

1. This study is based on systematic examination of two sets of data. The first is a collection of eighty-five press articles, editorials, and other special features on the topic of embryo research. This material was collected by Lincoln Hannah Ltd Mediascan. The collection was obtained by means of scans of all the national British newspapers plus a number of leading provincial papers and popular journals during the period December 1989-May 1990. It has been made available to me by Dr. Alan Handyside of the Hammersmith Hospital, to whom I offer my warm thanks (for further details, see Mulkay 1993a). The second collection of data is made up of the major parliamentary debates in which research on human IVF embryos was the dominant topic. The details of these debates are as follows: United Kingdom, *Parliamentary Debates* (Lords), 5th ser., vol. 456 (1984), cols. 524-93, Human Fertilization: Warnock Report; vol. 491 (1988), 1450-1508, Human Fertilization and Embryology; vol. 504 (1989), 1538-80, Unborn Children (Protection) Bill; vol. 513 (1989), cols. 1002-14, Human Fertilization and Embryology Bill; vol. 515 (1990), cols. 950-90, Human Fertilization and Embryology Bill. United Kingdom, *Parliamentary Debates* (Commons), 6th ser., vol. 68 (1984), cols. 547-90, Human Fertilization and Embryology (Warnock Report); vol. 73 (1985), cols. 637-702, Unborn Children (Protection) Bill; vol. 126 (1988), cols. 1202-61, Human Fertilization and Embryology; vol. 170 (1990), cols. 914-90, Human Fertilization and Embryology Bill; vol. 171 (1990), cols. 31-133, Human Fertilization and Embryology Bill.

2. This view of the disturbing influence of the Frankenstein myth seems to be widespread among scientists. See, for example, the suggestion by Lewis Wolpert that one of the useful things sociologists could do would be to explain why the "Frankenstein image is so unrealistically persuasive in relation to genetic engineering" (1994, 745). Wolpert's proposal stands as another instance of a scientist using science fiction to deny credibility to those who refuse to accept that scientific advance is necessarily beneficial (for further discussion of these issues in relation to embryo research, see Mulkay 1995b).

3. For details of this material, see note 1.

4. Although it has not been my aim in this study, it would be possible to carry out a formal discourse analysis, or a formal rhetorical analysis, of this material (for examples of discourse

analysis, see Gilbert and Mulkay 1984 or Curt 1994; for examples of rhetorical analysis, see Sullivan 1994).

5. The following speakers used science fiction imagery to criticize embryo research in the early debates: The Earl of Lauderdale (United Kingdom, *Parliamentary Debates* [Lords], 5th ser., vol. 456 [1984], col. 566); Baroness Masham (col. 576); Mr. St. John-Stevas (United Kingdom, *Parliamentary Debates* [Commons], 6th ser., vol. 73 [1985], col. 648), and Mr. Campbell-Savours (col. 659). The following speakers used science fiction imagery to defend embryo research in the early debates: Mr. Meacher (United Kingdom, *Parliamentary Debates* [Commons], 6th ser., vol. 68 [1984], col. 534); Mr. Dobson (col. 585); Ms. Richardson (vol. 73 [1985], col. 643); Mr. Crouch (col. 655); Mr. Meacher (col. 686); and Lord Rea (United Kingdom, *Parliamentary Debates* [Lords], 5th ser., vol. 491 [1988], col. 1468). In the later debates, there were two passing references to science fiction by critics of embryo research: Mr. Duffy (United Kingdom, *Parliamentary Debates* [Commons], 6th ser., vol. 170 [1990], col. 943); and Mr. Benyon (col. 964). There were also two references to science fiction by supporters of embryo research in the debate on 23 April 1990: Mr. Thurnham (United Kingdom, *Parliamentary Debates* [Commons], 6th ser., vol. 170 [1990], col. 64); and Mrs. Currie (col. 77). In addition, in the debate in the Commons on 2 April 1990, Mr. Dalyell, the political correspondent for the *New Scientist*, asked the minister to confirm that Mr. Duffy's reference to the eugenics of a brave new world was inappropriate in view of the fact that the legislation under consideration forbade any research that could lead in that direction (United Kingdom, *Parliamentary Debates* [Commons], 6th ser., vol. 170 [1990], col. 977). The minister for health subsequently answered "in the affirmative" (col. 982).

6. Pro-research rhetoric employed a twofold contrast between fact and fiction. On the one hand, it involved a comparison between two distinct genres or textual forms. On the other hand, it involved a comparison between true and false assertions. These two contrasts often overlap, but they are not identical (for further discussion, see Mulkay 1985, 10-12).

7. See, for example, Sir G. Vaughan (United Kingdom, *Parliamentary Debates* [Commons], 6th ser., vol. 68 [1984], cols. 551-52); Mrs. Knight (cols. 565-66); Mr. Cash (cols. 573-74); Sir B. Braine (vol. 126 [1988], cols. 1215-16); Mr. Hind (vol. 170 [1990], col. 99); Mr. Burt (cols. 112-13); Lord Hanworth (United Kingdom, *Parliamentary Debates* [Lords], 5th ser., vol. 456 [1984], cols. 545-46); Lord Rawlinson (cols. 555-56); The Earl of Perth (vol. 513 [1989], col. 1085); and Lord Stallard (vol. 515 [1990], col. 970).

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