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Jensen, Eric

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Eric Jensen

The issue of human cloning has featured in the national science policy agendas in both the United States and the United Kingdom since the announcement in 1997 of Dolly the cloned sheep's birth in Scotland. Such news stories suggesting the imminent cloning of humans have inspired fictional entertainment media over the years, including numerous popular films. Study 1 examines elite British press coverage of human cloning from 1997 to 2004 (n = 857). Study 2 focuses on five human cloning films released between 1978 and 2003. Two sharply divergent discourses emerged from these data. Unqualified hope and habitually hyped claims of future cures permeated the press discourse. In contrast, the films constructed human cloning as an inherently dangerous technology often wielded by hubristic scientists in the tradition of Frankenstein. Both the predominately positive hype in the broadsheet press and the largely negative hype in the films indicate an impoverished and "thin" public debate on the issue of human cloning.

1. Introduction

Humans have long been plagued by a wide range of devastating and incurable diseases. Over the past century, modern medicine effectively eradicated many diseases from large swaths of the globe. Today, modern science offers new hope that many more cures are within reach for some of the most serious diseases. For millions of people afflicted by Parkinson's disease, cancer, spinal cord injuries, and infertility, new biomedical technologies such as those promised by human cloning can be viewed as harbingers of unprecedented utopian possibilities. At the same time, high consequence dangers inherent in such scientific development have engendered deep societal concerns. Discourses of risk and uncertainty increasingly define these late modern times, calling science into question. According to social theorist Ulrich Beck (1992) and others, these trends define modern society as an age of globalized technological risks. This "risk society" is shaped by increasing public fears over the intrinsic uncertainties inherent in techno-scientific development.

Within the context of risk society, science-based controversies over genetically modified foods, cloning and stem cell research have become major flashpoints in global politics, with important implications for the future of modern society. Most recently, biomedical science

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has offered humanity the promise of cures for many debilitating diseases and injuries through the development of therapeutic cloning. However, therapeutic cloning and its more controversial concomitant reproductive cloning have also sparked a prolonged debate over the ethical, legal, and social implications of human cloning.

In the 2004 US presidential campaign the issue of stem cell research, including therapeutic cloning, received a remarkable level of attention. The keynote address at the Democratic National Convention and numerous speeches by the narrowly defeated presidential candidate John Kerry served to raise the profile of stem cell cloning as a political issue. Furthermore, recent scientific developments around the world are making human cloning an increasingly concrete reality. In today's globalized world, geographically distant scientific developments can increase the pressure on Western politicians and regulatory bodies to effectively confront this issue.

The United Kingdom has been at the forefront of the human cloning debate since Dolly the sheep was cloned in Scotland in 1996. Since then, the UK has been the leading Western nation supporting the cloning of human embryos for stem cell therapies. In 2001 reproductive cloning was explicitly banned in the UK after a short period of Parliamentary debate. However, at the same time cloning for stem cell therapies was legalized through an extension of the 1990 Human Fertilisation and Embryology Act. Despite this legislative resolution, the controversy over human cloning maintains its prominent position on the public and press agenda. The high profile of human cloning means that the ways in which nations confront this particular biotechnology will be disproportionately important as a harbinger of future societal negotiations between public sensibilities, scientific imperatives, and political considerations. In order to gain insight into the public discourses that cut across the entire spectrum of stakeholder interests, this article explores the discursive construction of human cloning in the mainstream British national press and US-produced popular films. These are important forms of popular mass media for developing the cultural and symbolic context within which public, scientific, religious, and political interests struggle for rhetorical dominance.

As with most controversies, the terms and scope of the human cloning debate have largely been set by the mainstream news media. News media frame bioethical debates by defining the important concepts (e.g., the "embryo"; Williams et al., 2003), and by creating publicly accepted truths through the construction of social and cultural reality (e.g., Luhmann, 2000). However, human cloning is distinctive in this respect, for it has long been the subject of entertainment media. Together the news and entertainment media comprise the primary venue for the human cloning debate. These media construct much of the tacit knowledge central to science policy debates and the mobilization of public concerns (Luhmann, 2000). Although numerous studies have indicated the central importance of mass media in the human cloning debate (Einsiedel et al., 2002; Hellsten, 2000; Nerlich et al., 2000; Nerlich and Clarke, 2003; Priest, 2001; Weasel and Jensen, 2005), none have employed a rigorous, well-grounded qualitative analysis of the discourses that structure the human cloning debate across different mass media types. Through an in-depth analysis of the elite British press and popular films on human cloning, this article addresses the research question: What is the nature and function of the predominant discourses in press and filmic accounts of human cloning? This question is addressed through analyses of 857 British press articles and five Hollywood feature films.

In the press, a central theme of utopian hope emerged from this analysis, with the idealized therapeutic possibilities of cloning for stem cells dominating the discourse. In the films, however, doom scenarios predominated. Primarily following in the tradition of Mary Shelley's *Frankenstein*, these scenarios portrayed the (mis)use of reproductive human cloning for ultimately destructive purposes. It will be argued that each of these themes is constituted out of the same underlying tendency towards uncritical media hype regarding both the

potential for success and the risks of technological failure or abuse. These findings are considered in terms of their implications for ideals of effective democratic decision-making and regulatory control over new scientific technologies. First, however, the basic terminology underlying this debate requires explication.

Terminology: defining therapeutic and reproductive cloning

The present studies point to a struggle to define the popular understanding of human cloning within the public sphere. There is a relatively complex contestation of terms in the press. For example, in order to avoid negative connotations, advocates of therapeutic cloning frequently parsed their phrasing deliberately, saying that cloning human embryos for stem cells is not "human cloning." Instead, they argued that this scientific process should be called variously "therapeutic cloning," "stem cell cloning," or simply "nuclear transfer." While each of these terms can be considered accurate, the rhetorical purpose here is to obscure the fact that both "cloning for live birth" (reproductive human cloning) and "therapeutic cloning" rely on the same somatic cell nuclear transfer (SCNT) technology. Working in the reverse direction were the opponents of all permutations of human cloning (particularly anti-abortion activists) who engaged in a deliberate attempt to conflate "therapeutic" and "reproductive" cloning (see also, Weasel and Jensen, 2005). This intentional conflation was aimed at achieving a comprehensive ban on all forms and uses of human cloning technology, as opposed to a partial ban that did not extend to therapeutic cloning. This pattern of not distinguishing between therapeutic and reproductive cloning was also evident in the popular films analyzed in this study.

Given this treacherous semantic territory, it was with careful thought that the following terms were selected for use in this article. Henceforth, *therapeutic cloning* is used without quotation marks to refer to the use of SCNT to clone a human embryo from which stem cells can be derived for therapies or cures. *Reproductive cloning* is understood as the use of SCNT to clone a human embryo, which is subsequently implanted and brought to term culminating in a live birth. These definitions reflect the most common usage within press coverage of human cloning.

Britain and modern bioscience

Scientists in the UK are at the cutting edge of biotechnology and biomedical research. The considerable economic and political interests at stake for Britain make regulating techno-scientific development a vital issue for the nation's future. The debate over human cloning is instructive and heuristic in terms of understanding the ways in which the media, the public, and the government apprehend controversial new developments in biomedicine. News coverage is the subject of Study 1 because of the vital role it plays as the primary disseminator of science news to the public. While entertainment media are less frequently examined for this kind of study, they are uniquely important in this debate due to the numerous fictional representations of human cloning appearing continuously at least since the 1970s across the full range of entertainment media. All these media messages have become part of the discursive context for this issue, with unavoidable consequences for the perspectives of members of the public and their representatives in government.

Presently, techno-scientific development in the UK is overseen by a government that takes an explicitly "pro-science" approach to regulation and financial support of biotechnology. The government envisions an increasingly technology-based, "knowledge-driven"

economy capable of sustaining a high standard of living for its citizens well into the 21st century. The Department of Trade and Industry has published a White Paper in conjunction with the Office of Science and Technology detailing the government's view of the role of science in the future of British society. This White Paper contends that "For Britain to prosper in the 21st century," it must be "pursuing scientific advance … We must have the ability to generate, harness and exploit the creative power of modern science" (DTI/OST, 2000). This pro-science ethos is espoused even up to the level of the Prime Minister:

> Tony Blair has promised to break down the "anti-science fashion" in Britain … "It is time to speak up for science," he said. (*The Times*, 20 May 2002)

The reason for the defensiveness inherent in Blair's position is the public skepticism and pressure building over the handling of issues such as genetically modified (GM) foods and the mad cow disease outbreak in Britain. Although the UK has traditionally been very quick to regulate controversial scientific developments in the new genetics (Torgerson et al., 2002), the control appears to remain firmly in the hands of scientific experts.[1] Moreover, the question for such experts is almost always one of how and at what pace techno-scientific development will be allowed, not *whether* the technology should be allowed to develop at all (Evans, 2002). This situation is what John Evans describes as a "thin" public debate. This thin form of argumentation is based on the narrow goal of maximizing the means of achieving predetermined ends. Evans contrasts this negative state of closed public discourse with a more desirable "thick" debate in which the full range of ends and means are open to discussion and democratically accountable decision-making.

Criticizing science

Generally speaking, scientists are given the widest latitude in criticizing the work of other scientists. In fact, the peer review process which forms the bedrock of the scientific symbolic economy is based on an idealized notion of built-in scientific self-criticism. However, outsiders and non-experts are rarely given a voice in scientific debates or regulatory decision-making. For most aspects of techno-scientific development, the lay public must simply accept the technocratic rule of professional experts without comment, or frequently, without any knowledge of the regulatory decision at all.

However, the exception to this general rule of "hands off" technological development is the rare instance when science becomes embroiled in a public debate over the morality of its actions. Such high-profile interruptions in the insulated harmony of autonomous scientific decision-making have recently centered on issues dealing with human life and reproduction (Mendelsohn, 1993), including *in vitro* fertilization (IVF) and recombinant DNA in the 1970s, the embryo research debate in the 1980s, and the human cloning debate of the late 1990s and early 21st century. During the controversies surrounding these technologies, the lack of effective science critics with standing equal to scientific experts constituted a significant problem for fair-minded news media facilitators of such public debates. Moreover, the public was left with the bioethics profession as the only category of secular, non-scientist, policy-oriented technology analysts capable of challenging the scientific experts. The relatively new field of bioethics has rapidly expanded in recent years to address these and other pressing developments in the life sciences. However, there is considerable concern about whether this category of science critics is adequate to the task of representing the public's interest in matters of science policy (Evans, 2002; Fukuyama, 2002).[2]

Human cloning and the press

News media define the social reality of modern risks and at times sound the alarm about their severity and persistent uncontrollability. An independent press can call into question the safety guarantees of the state and raise public awareness of a given threat (Beck, 1995: 100).[3] Raising the level of public awareness regarding the global and interdependent nature of such problems is an important precursor to the reorientation of policies and institutions towards addressing such global risks (Castells, 1997: 111). The press has long represented an important center of symbolic power in modern society, "generally outside the direct control of the Church and the state" (Thompson, 1995: 53). Indeed, it is difficult to overestimate the significance of the press in the development of the modern political public sphere. Today, "there is one forum that overshadows all others, making them sideshows … *general-audience mass media provide a master forum*" (italics added), comprising "*the* major site of political contest because all of the players in the policy process assume its pervasive influence (whether justified or not)" (Ferree et al., 2002: 10). This notion of the press as a "master forum" is aptly applied to the framing of the human cloning controversy in news and entertainment media. A recent study showed that the most educated and interested consumers of biotechnology news tend to choose newspapers over other forms of mass media such as television (Bauer and Bonfadelli, 2002: 160). Accordingly, the present analyses of the human cloning controversy will derive their empirical basis from a comprehensive sample of mainstream British press coverage in addition to the sample of popular films.

2. Method

Sample

In order to understand the discourses embedded in the contemporary debate over human cloning, a comprehensive sample of press coverage in elite British newspapers and science advocacy periodicals was collected for Study 1. The sample frame for the study began in 1997, the year Dolly the sheep was revealed to be the first mammal cloned from an adult cell. Sampling then extended to March 2004, the year therapeutic cloning was shown to be scientifically feasible through the first successful extraction of usable stem cells from a cloned human embryo. The two main categories of press articles examined in Study 1 are: "broadsheet" and

Table 1. Distribution of sample articles and total n

Publication	1997	1998	1999	2000	2001	2002	2003	2004	Total
Broadsheet									
The Guardian	10	12	10	40	31	27	17	10	157
The Times	38	36	26	31	42	33	20	10	236
Daily Telegraph	11	10	7	47	50	25	5	10	165
Financial Times	2	10	7	21	18	20	16	3	97
Economist	5	3	—	—	11	5	6	2	32
Science Advocacy									
New Scientist	8	11	6	11	29	14	21	6	106
Nature	9	11	10	4	12	8	5	5	64
Total	**83**	**93**	**66**	**154**	**193**	**132**	**90**	**46**	**857**

Note: The guardian category also includes articles from *The Observer*, the version of the *The Guardian* that is published on Sunday. Likwise, *The Times* category also includes articles form *The Sunday Times* and the Daily Telegraph category includes articles form the Sunday Telegraph

"science advocacy." The typicality of these media categories in scientifically advanced nations around the world offers additional generalizability to the study's findings (Schofield, 1993). Even though tabloids have significantly higher circulation numbers than broadsheets have (i.e., mainstream, non-tabloid elite newspapers) in Britain, they are much less generalizable to other national contexts.

Articles for the broadsheet sample were selected from the major mainstream newspapers and periodicals in Britain: *The Guardian/Observer*,[4] *Times* and *Sunday Times*, *Daily Telegraph* and *Sunday Telegraph*, *Financial Times*, and *Economist* (Table 1). The "science advocacy press" category is represented by *New Scientist* and *Nature* in this study, two publications that have a tradition of actively supporting techno-scientific developments such as

Table 2. Plot summaries for Study 2 sample films

Film and promotion tagline	Summary of human cloning aspect of storyline
The Boys from Brazil (1978) If they survive, will we?	Set in "present day" (1978) Brazil, Dr. Josef Mengele executes an evil plot to return the Nazis to global hegemony by cloning the already dead Adolf Hitler, As part of his scheme to recreate truly evil and dictatorial Hitlers around the world (e.g., as opposed to artistic Hitlers), Mengele tries to replicate the real Hitler's childhood with parents of the same ages and personalities, as well as a father that was murdered when Hitler was 14 years old.
Multiplicity (1996) Better living through cloning	*Multiplicity* is the only comedy in the sample. The plot centers on Doug kinney, who is very busily juggling the demands of work and family, and is offered the solution of getting cloned. A genetic scientist approaches kinney one particularly stressful day at his job, persuading him that a cione could solve all his time problems. Unsurprisingly, complications arise as kinney struggles with the unforeseen consequences of the geneticistis hubristic actions.
The Sixth Day (2000) Are you who you think you are?	In this futuristic film, Arnold Schwarzenegger plays a trditional family man who is cloned without his knowledge by a malevolent corporation that maintains a positive public image by appearing to use cloning only for therapentics and pet replacemetns. He finds himself replaced at work and at home by his clone. Eventually Schwarzenegger's character joins forces with his clone to defeat the villain's scheme to breed clones genetically dependent on him in perpetuity.
Imposter (2002) In the future, not everyone is who they seen	This film is based in a dystopian future world, with cloning introduced to the plot by an investigator for an elite police force who explains that aliens are killing and replacing humans with undetectable ìreplicantsî designed to act as bombs. He says that these replicants are exact copies of the donors which have been created using nanotechnology. The lead character and others come to suspect that he is a replicant. However, his beloved wife was the true replicant, exploding in the end and killing him along with many others.
Star Wars: Attack o the Clones (2002) The clones are coming	It is revealed that the nameless, faceless strom troopers in the original *Star Wars* trilogy are in fact human clones grown from test tubes. Such clone soldiers are mass produced for various customers by a race of extraterrestrials. A tour of the alien cloning facility shows the clone soldiers at various levels of physical development, starting as fetuses in a tube and growing into the final product: masked soldiers in uniform.

embryo research (e.g., Mulkay, 1997). The sample articles were accessed from the full-text electronic databases *Lexis-Nexis Academic Universe* and *EBSCOhost*. The publications' official websites were used to fill in where coverage gaps existed in these databases. The sample was then extensively screened to ensure data quality.

In Study 2, five high-profile, full-length films were analyzed. Table 2 summarizes the basic story and relevant content of each film in the sample in order to set the stage for analysis of these "texts."

Grounded discourse analysis

Both studies employed a two-stage, analytic approach. "Phase 1" yielded preliminary findings relying on the guiding principles of grounded theory methodology (Glaser and Strauss, 2001; Strauss and Corbin, 1998), including standard coding procedures as well as iterative reapplication and revision of initial inductively generated codes, categories, and themes. It was designed to seek out themes, continuities and discontinuities within and between the newspaper articles and films with which to make inductive inferences regarding the nature of human cloning portrayals in print and film. Finally, incubation periods ranging from one week to over three months were used in order to test the durability of the results. Such incubation periods entail returning to the data after a period of time with a fresh perspective, interrogating the data in order to ensure that an adequate account has been achieved.

Subsequently, the analysis went beyond the bounds of grounded methodology, seeking to understand the preliminary inductive results from a more expansive discourse analytic perspective. "Phase 2" represented an elaboration upon the findings of the grounded analysis, as well as fresh examination of the text whenever necessary. Broadly speaking, "the discourse analyst is after the answers to social or sociological questions rather than to linguistic ones" (Potter and Wetherell, 1994: 48). In discourse analysis, the analyst is seeking to understand the reality constructed in the text. In this article the various constructions related to human cloning within the data are explored, as well as the ways in which these internal constructions link up to the external realities of modern society. Phase 2 focuses on the constructive nature of discourse (Gill, 2000: 173; Parker, 1994: 94; Potter and Wetherell, 1994: 48), and the broader implications of such discursive constructions.

3. Results

Study 1: British press results

Both utopian and dystopian visions of the future play an important role in the debate over human cloning. However, the elite British press evidenced a strong bias towards positive, utopian coverage of therapeutic cloning. Accordingly, the sample data for Study 1 are primarily focused upon therapeutic rather than reproductive cloning. The vastly uneven volume of in-depth coverage of therapeutic cloning helped to make utopianism a dominant factor in the print news medium. Specifically, Study 1 results show that a hyped notion of utopian hope is the most prominently featured theme in the press sample (n = 857), acting as the main source of discursive legitimation and rhetorical power. Study 1 indicates both the significance of the utopian vision of therapeutic cloning, and the consequences of this vision for enduring notions of Progress and the normative problem of creeping technocracy.

Patient groups, scientists, and politicians sought to assert their will upon the legislative and public agenda with regard to therapeutic cloning by deploying a highly effective utopian narrative through the medium of the elite press. This narrative identified stem cell researchers and their work as the necessary ingredients for a utopian transformation of the present into an idealized future in which many of the worst illnesses and genetic disorders of modern society have been eradicated. One form of the hope discourse was the tragic personal story tied to the larger political issue of therapeutic cloning. The following data extract exemplifies the integration of the personal, political, and scientific into a narrative of hope through therapeutic cloning (*The Sunday Times*, 24 December 2000):

> Samantha, a mother of five young children, has already had four strokes. A controversial new technology which uses cells from human embryos could help her and millions of others – but is it ethical?
>
> Six days after the birth of her twins … Samantha Panting suffered a massive stroke. Aged just 30, she was left partially paralysed and unable to talk – with five children under seven to care for.
>
> Although she made an almost complete recovery, since then she has had three more strokes … Today Panting … is forgetful because of the damage the strokes have done to her short-term memory; her right hand is also weak. Another stroke would cause more deterioration … she knows she could be struck down again at any time and fears not being able to play a full role in her children's lives.

After establishing this personal narrative of a woman desperately in need of hope and help the political angle is grafted on, providing the concrete possibility of hope through therapeutic cloning.

> Last week MPs [Members of Parliament] gave the go-ahead to controversial research which offers hope to Panting, to thousands of other stroke victims and potentially to millions of others suffering from acute conditions and degenerative diseases.

Finally, the article broadens the hope discourse from the personal example of Panting, to an entire utopian vision of a "new medical era."

> This research, which uses cells from human embryos, could offer the prospect of a cure for cancer and a way of repairing vital organs such as the liver and heart. It could herald a whole new medical era … New brain cells could cure Parkinson's and Alzheimer's disease and even help to prevent strokes in people such as Panting. From stem cells, new nerves could be grown to treat paralysis; new lung linings could be grown for cystic fibrosis sufferers; diabetes, blindness and innumerable other conditions could become curable. The first treatments could be available within five to 10 years.

This example shows how easily the hope narrative can span the personal, political, and scientific spheres. The Parliamentary decision to allow therapeutic cloning is tied directly to patients' hopes for a cure. Similarly, in many other articles legislative restrictions on therapeutic cloning are constructed as impediments to hope.

> For the first time there is a realistic hope of designing treatments for paralysis, head injuries and stroke, and progressive neurological diseases such as multiple sclerosis and brain cancer. But *just as scientists pick up speed in their quest for new therapies, politicians are applying the brakes*. The British Parliament recently voted down proposals to allow researchers to study stem cells harvested from embryos – cells that may

> ultimately help paralysed people walk again and treat devastating neurological diseases. And if the Republicans prevail in the contested US presidential elections, they will likely reverse an earlier decision allowing such research to be publicly funded … these moves … *could delay long-awaited advances by years*. (italics added; *New Scientist*, 18 November 2000)

As implied in the data extract above, even the *possibility* of state intervention is framed as an immoral barrier to the hope of relieving patient suffering. For example, one American scientist commented on the effect of pending legislation in the US:

> Nobody wants to invest in the work here because it might be outlawed at any time. It is a real tragedy. I have calculated that two people die of heart disease, Parkinson's or diabetes – all curable with stem cells – every minute that we delay research on this. (*The Sunday Times*, 14 July 2002)

Thus, the object of outrage in this debate was effectively directed away from the destruction of early embryos during the therapeutic cloning process and towards the ostensibly overbearing government regulation of the technology. In the data extracts below, the object of outrage was the UK government's decision to have a second expert panel consider the therapeutic cloning issue:

> 1) *Scientists are outraged by the government's procrastination*. Lord Winston, of the Royal Postgraduate Medical School in London, has said: "If you could use tissue from human embryos to save hundreds of lives, *there must be a moral imperative to do it*". (italics added; *The Sunday Times*, 12 March 2000)

> 2) The decision has come under fire from scientists and many media commentators, with some arguing that the government is running scared of public opinion. (*New Scientist*, 3 July 1999)

The government quickly capitulated to the kind of criticism exemplified in the data extracts above. In this way, the utopian narrative of therapeutic cloning translated into success in shaping the political agenda in favor of unfettered techno-scientific development.

While such utopianism looks forward towards a new and better future, it draws much of its inspiration from the grand narratives of the past. Central to modern utopianism is the mythical notion of scientific progress. Rooted in the Enlightenment, the discourse of Progress is based on the view that scientific reason and technological innovation have placed society on a progressive upward trajectory. As social theorist Zygmunt Bauman (1989) puts it: "With the Enlightenment came the enthronement of the new deity, that of Nature, together with the legitimation of science as its only orthodox cult, and of scientists as its prophets and priests" (p. 68). Emblematic of a highly uncritical perspective towards science, the framing of scientific discoveries in terms of the grand narrative of Progress was a powerful and pervasive feature of the discourse of hope in the therapeutic cloning debate. Bauman (2000) asserts that the concept of progress comprises two interrelated beliefs: 1) "that 'time is on our side'" and 2) that "we are the ones who 'make things happen'" (p. 132; see corresponding examples from the data below):

> 1) Time is On Our Side
>
> … this year the 20,000-plus neuroscientists … let slip their optimism that repairing damage to the brain and spine is finally within reach. [Now deceased quadriplegic actor who once played Superman] Christopher Reeve summed up the mood. "*There is no reason*

> *why this problem and other disorders of the brain and central nervous system can't be overcome*," he told the meeting. Researchers agree. "*We can do it soon. We must do it soon*," said Dennis Choi, outgoing president of the society. It remains to be seen just how much progress politicians will allow scientists to make. "Scientists know a lot, but the obstacle of politics will affect implementation," says Reeve. (italics added; *New Scientist*, 18 November 2000)

2) We Make Things Happen

> … Such folk, in resisting medical advances, would leave man's sufferings to the tender mercies of the inventor of cancer and earthquakes. But the truth is that *the fate and well-being of mankind is our own responsibility*, and happily … *the world contains enough human intelligence and kindness to offer fragments of hope for the future*. In promising to cure some of the most dreadful afflictions we or those we love might suffer, stem cell research stands high among those hopes. (italics added; *The Guardian*, 1 December 2001)

Bauman (2000) argues further that the "self-confidence of the present" (p. 132) and trust in Progress rest on the two beliefs in human potential exemplified in the examples above. However, he contends that such self-confidence and trust in the future are severely undermined by the lack of a clear contemporary force or agency capable of moving the world forward. Thus, he asserts that "the foundation of trust in progress is nowadays prominent most for its cracks, fissures and chronic fissiparousness" (p. 133). Nevertheless, Bauman (2000) predicts that the "modern romance with progress" (p. 134) will continue in the form of a permanent quest for a state of perfection, giving meaning to the individual's task of living and re-establishing trust in a new era that he calls "liquid modernity."

In the debate over therapeutic cloning, this "romance with progress" was reinforced by the official pro-science disposition of the British government. The government's public sponsorship of Progress constitutes an important component of the larger utopianism of therapeutic cloning. Indeed, at several points in the debate Prime Minister Tony Blair attempted to frame grassroots protest movements as "anti-Progress" in order to de-legitimate their political positions opposing certain areas of scientific research.

> Tony Blair has promised to break down the "anti-science fashion" in Britain, declaring that *the Government will never give way to misguided protesters who stand in the way of medical and economic advance* … Mr Blair gave warning that research work would be lost … *if animal welfare activists and other protesters were allowed to get away with stopping projects that could save lives* … "*It is time to defend science, to make clear that the Government is not going to allow misguided protests against science* to get in the way of confronting the challenges of making the most of our opportunities." (italics added; *The Times*, 20 May 2002)

For Blair, the Progress discourse served a legitimating function. His adaptation of the grand narrative of Progress represented an attempt to give the largely economically motivated pro-science position of the British government a politically appealing veneer of utopianism.

> He called for an end to the air of suspicion and mistrust that sometimes surrounded the work of scientists and the misplaced fears and ignorance it often generated. Mr Blair said *there were huge opportunities in science, for medical progress* and for dealing with some of the great environmental and economic challenges … He will say that scientists should be applauded and admired and should not have their work denigrated. (italics added; *The Times*, 20 May 2002)

As evidenced above, Blair firmly placed his government within a scientistic paradigm through his choice of legitimation strategies. He did not justify his views on this issue with reference to democratic consent. Rather, Blair relied upon discourses of morality and scientistic respect for expertise in order to legitimate his utopian vision for a Britain in which techno-scientific development features prominently and many of society's ills are cured through education and scientific progress.

This discursive pattern exemplifies Ulrich Beck's concern about the use of Progress as a source of legitimation for technocratic governance. Beck argues that the normative concept of Progress is a significant factor in displacing previously extant democratic legitimation criteria in favor of technocracy. Specifically, the evidence from this study supports Beck's view that, in many areas of science policy, "progress replaces voting" and insulates techno-scientific development from attempts to bring it under the control of democratic institutions (Beck, 1992: 184).

Such technocratic tendencies defined the British legislative and regulatory responses to therapeutic cloning, despite a thin facade of public consultation and democratic debate. Within the press discourse, experts were systematically constructed as the only important authorities on the future of therapeutic cloning. Although hope for patients was frequently cited by these experts, the locus of control was always placed within expert institutions. For example, a laudatory article about the British approach to legislating this issue concluded that: "A sensible consensus seems to be emerging among legislators, regulators and scientists in the UK" (*Financial Times*, 6 March 1997). However, the key constituency missing from this "consensus" is the *public*! The decision-making model implicitly advocated by this and other articles would leave politicians, bureaucrats and experts alone to decide on the best course of action without public accountability or serious citizen involvement.

Similarly, the scientist that cloned Dolly, Professor Ian Wilmut,[5] does not seem to see a need for the lay public to be involved in the decision-making over therapeutic cloning. Instead he supports giving scientists and professional ethicists the jurisdiction over ethical issues raised by therapeutic cloning:

> Wilmut conceded that fusing a cell from a human adult with an egg and growing an embryo to be used to treat humans would "raise issues that would have to be considered *by biologists and ethics people*." (italics added; *The Guardian*, 26 February 1997)

For Wilmut and others, a Ph.D. or M.D. seemed to be the minimum entrance requirements in order to be eligible for "decision-maker" status in therapeutic cloning policy deliberations. Even opponents of therapeutic cloning had to flaunt their technocratic credentials in order to legitimate their viewpoints:

> *Many of us are doctors, scientists and former ministers*. We all believe that we need new treatments for patients suffering from such conditions as Parkinson's or Alzheimer's, but we think the Government is wrong. (italics added; *The Daily Telegraph*, 16 December 2000)

The defensive posture taken in the data extract above is indicative of the largely uncontested dominance of expert authority in the debate over therapeutic cloning. Indeed, before therapeutic cloning actually reached Parliament in 2000, the science advocacy press seemed nervous about whether expert control would be maintained over this issue. This *New Scientist* editorial in 1999 explicitly argues in favor of following the advice of experts and against listening to the public:

> Unfortunately for Tony Blair's administration … simply *trying to make policy by gauging likely public reaction … will lead nowhere in the long term. It would do much better to listen to the clear advice of its own expert committees*. (italics added; *New Scientist*, 3 July 1999)

Ultimately, however, there was little cause for cloning advocates to worry, as the government chose a decisively technocratic approach to human cloning. This governmental decision reflected the influence of economic and scientific interests from outside the government, but it also came about as a result of especially strong and widespread internal pressures promoting expert authority in this matter from within Parliament:

> Most British scientists believe that there is no other way for now, so *the Lords committee would be opposing expert opinion if it took a contrary view*. *Respect for expertise survives in the Lords*, with many members having attained their seats by virtue of it, so the betting is that the report will back continued embryo stem cell research. (italics added; *The Times*, 25 February 2002)

The institutional pressures towards technocracy were supplemented in this case by a powerful groundswell of support from patient groups, combined with the vision of a disease-free utopian society achieved through therapeutic cloning. All of this helped to set the pro-research news agenda in the elite British press, while negative references to dystopian science fiction were relatively limited. However, these findings do not necessarily generalize to other media. For example, previous research has shown that the tabloids in Britain were much more disposed towards dystopian imagery in their coverage of human cloning (Nerlich and Clarke, 2003; Nerlich et al., 2000), as was the American press (e.g., see Nelkin and Lindee, 2001; Priest, 2001). Indeed, these other newspapers are known to draw inspiration from fictional accounts of human cloning, including those presented in the films analyzed below (e.g. Nerlich et al., 2001; also see Peterson et al., 2005).

Study 2: popular film results

Although elements of the utopian formula from the elite British press found their way into some entertainment media as well, the main thrust of film narratives was dystopian and highly critical of cloning technology. The notion of using human cloning technology in the pursuit of stem cell therapies was completely absent from the films analyzed in Study 2. Instead, "doom scenarios" predicated on unrealistic visions of reproductive cloning were predominant, giving the films a distinctly negative undercurrent overall.

In 1978, *The Boys from Brazil* was released to a society in which tadpole cloning, recombinant DNA, and *in vitro* fertilization were still newly developed and highly controversial scientific technologies. At that time, human cloning was still a distant and far-fetched fiction for most moviegoers. Although the reality of reproductive cloning appears to be a much more immediate possibility today, fiction is still an important component of the contemporary debate. Rogin (1987) argues that in many cases the boundaries demarcating film from real life have dissolved, rendering extant issues such as human cloning malleable for definition and framing based on their fictional representation in film.

A common framing device used to cast scientific technologies in a negative light is the Frankenstein myth. For example, genetically modified foods have often been problematized through the use of the label "Frankenfoods" (Nerlich et al., 2000). When applied to human cloning films, the Frankenstein myth typically followed a standard pattern: the mad scientist creates a Frankenstein-like monster that can no longer be restrained, thus unleashing an uncontrollable menace upon society. This Frankenstein theme was dominant in the film sample.

Beginning with *The Boys from Brazil*, Nazi hunter Ezra Lieberman's investigation of Dr. Mengele's scheme to clone Hitler leads him to several physically identical children from different families and nations around the world. Seeking expert help to understand this observation, Lieberman goes to a scientist for advice. This scientist clearly represents a stereotypical, archetypal scientist with all the requisite accoutrements of that role, including a white lab coat and an air of naive scientism which makes him believe that scientific progress is unquestionably positive and beneficial. The nine-minute scene between Lieberman and the scientist is the unique centerpiece of this film's engagement with the concept of human cloning (italics added for emphasis):

Scientist: Our [cloning] experiments began with the simplest of animals.Shrimps, frogs … But we moved on to mammals. We tried several laboratory animals.

[Lieberman looks stunned at this scientific reality]

Lieberman: [declares] *it's monstrous doctor*!

Scientist: Why? *Wouldn't you want to live in a world full of Mozarts and Picassos*? …

Lieberman: The one who is cloned, the donor, he has to be alive doesn't he?

Scientist: Not necessarily … with a sample of *Mozart*'s blood, and the women, someone with the skill and the equipment could breed a few hundred *baby Mozarts* … My God, if it's really been done, what I'd give to see one of those boys.

This scene ends by undermining the scientist's naive enthusiasm and his uncritically optimistic view of cloning technology, while simultaneously reinforcing the Frankenstein myth. Lieberman dramatically reveals that the person who was cloned was "not Mozart. Not Picasso. Not a genius who would enrich the world. But … Adolf Hitler."

In addition to *The Boys from Brazil*, *Multiplicity* and *The Sixth Day* fit comfortably within the confines of the Frankenstein myth. However, *Imposter* and *Star Wars: Attack of the Clones* do not fit into the Frankenstein narrative because aliens, not scientists, are placed in the role of clone creators. In *Imposter*, the alien creators are never represented visually or aurally, but there can be little doubt as to their malicious intentions. The *Imposter* aliens created clones for the sole purpose of delivering explosives against the replicated individual's friends, family, and/or colleagues. In *Star Wars: Attack of the Clones*, on the other hand, the alien cloners are much more benign. The *Star Wars* aliens are merely neutral entrepreneurs providing a service (viz. a clone army) for a fee, without expressing any ethical qualms about what is done with their product after it is purchased. This motif of alien creators of human clones may be worthy of further exploration in future research. It is possible that it may constitute a new pattern of displacing responsibility for harmful technologies outward onto an alien "Other," thus offering a way of telling stories about dangerous scientific technologies that does not rely on the Frankenstein framework. Nevertheless, the remainder of this analysis will focus on the other three films, which feature human cloners.

There are noteworthy variations within the Frankenstein theme that is presented in *The Boys from Brazil*, *Multiplicity* and *The Sixth Day*. In *The Boys from Brazil*, the distinguishing variation was that Nazi Doctor Josef Mengele was knowingly attempting to unleash an evil dictator upon the world, rather than naively creating the monster without understanding the consequences as Dr. Frankenstein did. Next, *The Sixth Day* differs from the classic Frankenstein myth by having the unscrupulous CEO of a massive and powerful technology company be the unrepentant, selfish, and transparently evil villain of the film. The scientist that created the company's cloning technology is only an employee, and his intentions fit the

classic myth better than the CEO's. Indeed this scientist is given the sympathetic motivation of trying to resurrect his dead wife. He sees the error of his actions late in the film and is murdered by the CEO for refusing to participate in future cloning activities.

Compared to *The Sixth Day*, *Multiplicity* offers a more traditional portrayal of the scientist. As with the prototypical scientist consulted by Lieberman in *The Boys from Brazil*, the cloning scientist in *Multiplicity* evokes an overly optimistic scientific hubris contributing to the development of a cautionary tale about the dangers of "playing God." Here, the cloning scientist offers the lead character the opportunity to solve his problems by purchasing a clone to share some of the workload:

> You don't have to live this way. I can help you … change your life … I make miracles. I create time: I make clones … The procedure takes about two hours … and in the end you have everything you need.

The fact that this scientist naively fails to acknowledge any concerns about his casual use of cloning technology evokes the Frankenstein theme. Moreover, the scientist's claim that he is creating the miracle of life strongly evokes the trope "playing God." This trope is probably the most important framing device supporting the Frankenstein myth in the present.

"Human beings have always been afraid of their creative power, and the idea of man-made life was scary long before science was in any position to think of procedures that might make it reality" (Nussbaum and Sunstein, 1998: 11). Now that such life-making procedures are indeed a reality, fears about scientists using cloning technology to "play God" have gained increasing currency (Shermer, 1999). Such fears about human hubris are not new to the human cloning debate, dating back at least to ancient Greece. More recently, films from *Jurassic Park* to *Gattaca* have performed the role of a kind of "morality play about forbidden fruit and the dangers of scientists playing God" (Boyd, 2001: 98; Nelkin and Lindee, 1995: 54). In addition, "playing God" is easily the most common religious objection to human cloning technology (Lindsay, 2001; van Dijk, 1998: 45). For example, Professor Leon Kass, arguably the most powerful philosopher writing on human cloning (he chairs the Presidential Bioethics Advisory Commission), has described human cloning as "man playing at being God" (Kass, 2000: 69). Within this discursive context, the present films re-constitute these concerns through explicit and implicit activation of the narrative of scientists "playing God." In turn, the "playing God" trope serves to reinforce the hubristic image of science inherent in the Frankenstein myth.

In *The Sixth Day*, the "playing God" trope is explicit, with the very title of the film and the anti-cloning law within the film alluding directly to the passage in the Bible which states that "God created man on the 6th day." This powerful framing device immediately places the film within a religious context, and is likely intended to prompt audience reflection on whether humans are attempting to achieve their own "6th day" by creating human beings without God. The following scene from *The Sixth Day* portrays a brief debate between Schwarzenegger's heroic character and the villainous CEO Michael Drucker about the ethics of human cloning. It also offers an obvious example of filmmakers blending reality and fiction by placing real life (if exaggerated and distorted) pro-cloning arguments in a highly unflattering light. Specifically, this scene finds Drucker presenting a specious argument in favor of human cloning:

> Drucker (evil CEO cloner): … We won't have to lose our best people. We won't have to lose our Mozarts. We won't have to lose our Martin Luther Kings. We will finally be able to conquer death. We will finally be able to conquer death. [*sic*]
>
> Gibson (Schwarzenegger): [Angrily] And who gets to decide who lives and who dies? You?

Drucker: You have a better idea?

Gibson: Yeah, what about God? [points upward]

Drucker: [Derisively] Oh, you're one of those. I suppose you think science is inherently evil.

Gibson: No, I don't think science is inherently evil. But I think you are.

Drucker: If you believe God created man in his own image, then you also believe that God gave man the power to understand evolution, to exploit science, to manipulate the genetic code, to do exactly what I'm doing. I am just taking over where God left off.

Drucker's arguments are severely undermined for the audience by his role as the villain and his manifest disinterest in any of the noble ends for which he is advocating. In addition, this filmic representation of such an insincere use of utopian rhetoric in favor of human cloning would seem to cast a shadow over pro-cloning utopianism in the larger public debate.

In part because of cynical doom scenarios that fictional media such as *The Sixth Day* portray, scientific accountability has been a growing public concern since the advent of genetic science and biotechnology (Torgerson et al., 2002: 29). The science fiction films examined in this study have been consistently used to develop and reinforce hyped scenarios of human reproductive cloning going horribly wrong. Taken together, these films constitute a morality play about the dangers of hubristic science. However, because they are framed by pervasive dystopian hype there is little possibility of audiences mobilizing any meaningful and sustained action to challenge techno-scientific development on the basis of these media messages. Instead, the important real world issues such as the cloning of embryos for stem cell research are given a pass by both news and entertainment media. Thus, the general criticism leveled at fictional science in these films does little to advance substantive debate on the advisability of allowing risky scientific technologies such as human cloning. Most real issues remain largely hidden from public scrutiny, while unaccountable technocratic decisions are regularly made about these issues with major implications for individual lives and the larger society.

4. Discussion

In the embryo research debate of the 1980s, there is historical precedent for the kind of utopianism displayed in the press discourse on the therapeutic potential of human cloning. Then, as now, the press ensured that "a message of hope was regularly conveyed and reinforced by means of highly personal narratives" (Mulkay, 1997: 70). Moreover, the promises of cures became reified in scientists' discourse and the press's construction of the debate, making "the future accomplishments of embryo research become strangely tangible" (p. 71). This certainty with regard to the utopian prospect of future cures was undoubtedly a major factor in the ultimate liberalization of therapeutic cloning regulations in the UK at the outset of the 21st century.

Likewise, the doom scenarios portrayed in popular films helped to frame the public policy debate around the a priori conclusion that reproductive cloning must be banned. There was no significant resistance to this pre-fabricated conclusion from any of the key political figures in the human cloning debate. It was not politically viable to resist the longstanding doom scenario that science fiction has constructed for human cloning at least since *Brave New World*. Therefore, rather than attempting to confront some of the fiction-based misconceptions about reproductive cloning,[6] such hyped and unrealistic fears were legitimated and reproduced

through a severely "thinned" political discourse (Evans, 2002). In the UK, this thin discourse asked people to attach all their fears to reproductive cloning, while at the same time uncritically assenting to the legalization of therapeutic cloning.

"Widely disseminated images and narratives have real effects, regardless of their relationship to the technical details of the scientific work. They shape the way people think about new technologies, assess their impacts, and develop ways to control them" (Nelkin and Lindee, 2001: 91). Thus, despite (or perhaps because of) the largely hyped and dystopian portrayals of human cloning technology in the present sample of science fiction films, their impact on the human cloning debate should not be underestimated. The Wellcome Trust (1998) conducted focus groups to gather public perspectives on cloning and found that respondents frequently referenced films such as those in the Study 2 sample. These films were used both as the explicit basis of their views and as a means of communicating their concerns about cloning to others. Extended discussion was often unnecessary: Merely mentioning such films sufficed to immediately communicate an entire narrative about human cloning (Wellcome Trust, 1998). These films give concrete form to dystopian conceptions of human cloning, which are often difficult to articulate without reference to such shared cultural memories as those constructed through these popular films. Unfortunately, when such shared cultural memories are based in myth and unrealistic fiction they do little to promote substantive discussion of human cloning. Instead, human cloning dystopias in film can give the issue a familiar mythical shape, potentially minimizing citizens' felt need to seek further information before settling on a firm opinion.

Thus, in their own way both the press and popular films undermined the ideal of an informed, reasoned and "thick" public debate on this topic (Evans, 2002). In the press, excessive optimism and hype about the imminence and scope of the therapeutic possibilities of human cloning have been so prevalent and unqualified that disappointment and failure are the inevitable outcomes. Likewise, popular films have hyped the risks of human cloning to the point that the dystopias they envision are often deeply misleading and far removed from any scientifically plausible and realistic scenario. As a consequence, the excessive recourse to hype in mass media has led to a thinned and hollowed public discourse on human cloning. Moreover, such hyped and confusing media messages reinforce public uncertainty and undercut the possibility of different segments of society (e.g. religious, scientific, and patient advocacy groups) engaging in a constructive dialogue on important issues such as those related to human cloning research.

Technocracy

In this environment of thin public discourse, the normative tendency towards technocratic rule over science policy flourishes. The failure in the UK for example to incorporate the public to any significant degree in the final political decision-making about human cloning indicates the persistent strength of expert governance over techno-scientific development in the UK. The danger of losing democratic control to technocracy in modern nation-states is a social reality that portends major implications for the future of democracy and modern society. It is obvious that some degree of technocratic control is desirable, and indeed necessary within the current political system, to the smooth functioning of most regulatory institutions at the national or trans-national level. However, there is a point at which expert advice becomes dominant to such an extent that democracy is merely a facade behind which the truly important decisions are taken by elites and expert systems. Locating the ideal balance between the functional need for efficiency through expertise and the democratic necessity that science and technology be subjected to the legitimate authority of public control is a highly complex and difficult task.

There is a strong argument to be made that the British governmental and regulatory systems' approach to the issue of human cloning is symptomatic of a broader slide towards excessive technocratic control over key decisions about the future of science and technology in Britain. It is true that the government has acknowledged the need to address emerging techno-scientific developments democratically. For example, the government White Paper on *Science Policy for the 21st Century* states that:

> We need a more systematic and independent approach to satisfy public concerns about the risks created by scientific innovation … Science must be our servant and not our master. Public acceptance of science cannot be taken for granted. (DTI/OST, 2000)

However, this statement is undermined by the failure to offer ways of integrating public concerns into the regulatory schemes of the British government. Instead, the recommended solution is government-supported engagement by scientists: "Government must complement this by providing a strong and open framework of regulation, supported by scientific evidence and independent scientific advice" (DTI/OST, 2000). This solution completely cuts the public out of the process and reinforces the "cultural dupe" model of the lay public that sociologists such as Brian Wynne (1996) have argued so effectively against. According to the government view expressed through the White Paper, the public should accept expert judgments with regard to technological risks and benefits: "When science delivers innovations that improve people's lives with minimal risk that they understand, they support it wholeheartedly" (DTI/OST, 2000).

However, the policy debate on therapeutic cloning in the British press has been dominated by technocratic institutions and a pervasively scientistic, utopian belief in the ability of science to deliver miraculous technologies with minimal side effects. Meanwhile, reproductive cloning was quietly shunted aside and made illegal without serious or prolonged debate. Furthermore, the government's support for industry over other considerations is clear as the White Paper repeatedly refers to creating "the right climate" for techno-economic development to flourish. It is apparent that this is meant to include an adequately liberal regulatory climate in addition to direct government subsidies. In this way, the ideal of democratic legitimation was willfully sold out and subordinated in order to subjugate the democratic will to the formally rational decision-making of expert panels that considered not *whether* to allow the technology but *how*.

In the UK and elsewhere, the implementation of new biomedical technologies is regulated by scientists, technologists, and other influential members of the wealthy class that can hope to fully enjoy the benefits of these technologies. Any overtly democratic influence on the outcomes of this process is so indirect as to be almost negligible. Although ideas such as lay citizen panels and public participation are increasingly discussed, there is no evidence that they have taken hold in policymaking on the issue of human cloning. Rather, there are strong indications that expert decision-making continues to predominate in the governance of techno-economic development in modern British society. In today's world, bequeathing control over the future of human biology and society to scientists is quickly leading to a technocracy that governs the truly important aspects of the global future, while democratically elected politicians occupy their time with partisan politics and the immediate problems of civil society. The combination of economic interests and patient-based legitimation appears to have been sufficient cover for most British politicians to follow the lead of the expert advisory panels. Robin Grove-White (1998) argues that the "only way forward to contain future crises of this sort is through a franker shared sense of the new forms of uncertainty in which we are all now increasingly embedded … and wider genuine

participation in the far-reaching social judgements" (p. 53). Grove-White (1998) contends that this "calls for radical new thinking about institutional reform" of traditional politics (p. 53). However, the other institution that would have to reform in order to roll back excessive technocracy is the press.

The present study indicates a high degree of press complicity in the slide towards technocracy. The press did not play the vital countervailing role that it could have by challenging the technocratic regulatory structure governing techno-scientific development. The presence of an independent press does require experts to explain themselves to an entity outside of science. However, in this debate this explanatory requirement was kept at the formally rational level of discussing *means*, not the additional, "thicker" level of substantively rational deliberation over *ends*. The press is also expected to limit the ability of democratic political institutions such as the British Parliament to cede control of issues such as human cloning to non-political and unaccountable institutions. Persistent press questioning could have compelled Parliament to address human cloning in a more democratic manner. For example, this could have compelled the use of direct input from the public rather than the hollow exercise in "public consultation" that was heavily filtered through expert systems. Instead, Parliamentary decision-making primarily took place within the context of expert panels, with barely a whisper of concern from the British press. Nevertheless, there is still potential for the news media to play a positive role in fostering a healthy, "thick" debate within the context of therapeutic cloning in the future. Even if the content of the press coverage is questionable at times, the very fact that the press (occasionally) challenges scientific progress to justify itself to the public can help to construct Progress as less of an unquestioned and self-legitimating ideal. Such press questioning of otherwise technocratic rationalities could create a discursive space for a substantively rational debate that extends beyond the predetermined end of a longer and more disease-free life. Such a "thick" debate would address the full range of questions about what society's desired ends should be with regard to biomedical technological advances (Evans, 2002). This potentially positive role for the press is not easily achieved and the powerful forces of technocracy are already reasserting themselves into this discursive space. The agents of technocracy are trying to systematically co-opt citizen concerns and place them within the borders of the technocratic structure in order to maintain their expert control. Whether the public will resist technocracy and demand democratic control remains to be seen. However, the need for democratic legitimation has become all the more urgent as issues such as human cloning expose the deficit of effective and independent science critics.

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Notes

1 It is worth noting that some view the UK government's Agricultural Biotechnology Council and certain other exercises in public engagement as meaningful attempts to incorporate democratic deliberation into the science policy process, offering hope for further improvements in the future.

2 The relatively new field of bioethics has quickly become institutionalized as bioethicists joined the well-entrenched non-democratic scientific decision-making mechanism of expert panels and commissions advising and constructing science policy on the basis of formally rational deliberations (e.g., see Corrigan, 2003). Beyond concerns about the "thinness" of debate based on this formal rationality (Evans, 2002), Francis Fukuyama believes

that bioethicists have been "captured" by the technocratic system and that many have simply become "nothing more than sophisticated (and sophistic) justifiers of whatever the scientific community wants to do" (Fukuyama, 2002: 204).

3 However, this raising of the alarm primarily occurs for market-based reasons (e.g., increasing circulation), rather than altruistic motives (Beck, 1995: 100).

4 *The Observer*'s Robin McKie took the lead in breaking the early news story that Dolly the sheep had been cloned, beginning with the first story on the subject on 23 February 1997.

5 Dr. Wilmut is the scientist who cloned Dolly in 1996 and he has since begun working on therapeutic cloning. These factors made him a major figure in the debates over human cloning.

6 Several misconceptions about reproductive cloning are endemic in the mass media. For example, two points that are consistently misrepresented are 1) clones cannot be instantly created as exact copies of the genetic donor; clones must grow up from a baby into an adult just as any other child, 2) being genetically identical does not mean that a clone will be phenotypically identical; clones would have distinct personalities and perhaps even small physical differences as a result of growing up in a different physical and temporal environment (e.g. Silver, 1998, 2001).

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Author

Eric Jensen is a Ph.D. Candidate in the Centre for Family Research and the Faculty of Social and Political Sciences, University of Cambridge, UK. He holds an M.A. in communication studies from Portland State University, and an M.Phil. in sociology from the University of Cambridge. He supervises on qualitative methodology, social theory, and media studies at Cambridge, and has taught courses on the human cloning debate, group communication, and evangelical politics. His Ph.D. research examines the production and content of Anglo-American press coverage of therapeutic cloning. Correspondence: Centre for Family Research, Free School Lane, Cambridge CB2 3RF, UK; e-mail: jensen@gatesscholar.org