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Is It Really Possible to Do the Kessel Run in Less than Twelve Parsecs and Should It Matter? Science and Film and its Policy Implications

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ABSTRACT

The entertainment media influences our lives in a myriad of different ways—from the way we dress, to the language we use, to the products we buy. What might be less obvious are its influences on national policies. This Article, an introductory foray into the effects of media on policy, focuses on the effect that movies have on science policies in the United States and around the world. Through an analysis of both classic and recent blockbuster films and concurrent events involving science policies, this Article argues that Hollywood exerts an inordinate amount of influence on national science policies, and even extends beyond that to affect biotechnology markets. Acknowledging this important influence, the Article then examines why this may be the case. While a thorough analysis of related First

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Amendment jurisprudence suggests that some of the most radical solutions to tamp down Hollywood's influences, including limited censorship, may not always run afoul of constitutional free speech rights, this Article nevertheless proposes that the scientific community should take proactive measures to either prevent or hamper Hollywood from promoting bad science policies.

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Mundus vult decipi: the world wishes to be deceived.[1] Hollywood fulfills our desires for fictional reality through the creation of movies that promote the suspension of disbelief. This Article discusses instances where this deception is not limited to the confines of the theater but leaks beyond those walls and into our collective *weltanschauung*,[2] often with unfavorable consequences for science and public policy.

Science and film have traditionally had an uncomfortable relationship. Whereas science is about finding objective truths, movies are, if not wholly fictional, thoroughly laced with elements of fiction. When these fictional elements combine with a portrayal of science, often based on visceral fears, our understanding of that science becomes indelibly and negatively colored. This Article concerns those instances where films tend to add to the information pollution that already clouds society's understanding, promoting policy decisions that might not be in the best interests of science.[3]

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1. Mundus Vult Decipi Translation, http://www.special-dictionary.com /latin/m/mundus_vult_decipi.htm (last visited Jan. 6, 2009) (defining "mundus vult decipi" as "the world wants to be deceived").

2. Weltanschauung – Definition from the Meriam-Webster Dictionary Online Dictionary, http://www.merriam-webster.com/dictionary/weltanschauung (last visited Jan. 6, 2009) (defining "weltanschauung" as German for "a comprehensive conception or apprehension of the world especially from a specific standpoint").

3. Gilbert S. Omenn, *Grand Challenges and Great Opportunities in Science, Technology, and Public Policy*, 314 SCIENCE 1696 (2006), *available at* http://www.sciencemag.org/cgi/content/full/314/5806/1696. The obvious question to ask is why a government should care about what is best for science. After all, in the words of James Carville, lead strategist of the 1992 Bill Clinton presidential campaign, "It's the economy, stupid!" It's the Economy, Stupid – Wikipedia, http://en.wikipedia.org /wiki/It's_the_economy,_stupid (last visited Jan. 7, 2009). Omenn points out that "[e]conomists have attributed more than half of the gains in gross national product and up to 85% of the gains in per capita income over the past few decades to advances in science and technology." Omenn, *supra* note 3.

This Article will distinguish between the media's use of good and bad science. Simplistically, this distinction differentiates science based on peer-reviewed experimental results or hypotheses that are generally accepted by the mainstream scientific community from those that are not. This assumption does not support any particular theory, but rather relies on science's time-tested methodology designed to determine a verifiable answer over an untested or unreliable one.

This Article is an early attempt at examining areas where inaccurate public perceptions of science exists. It looks to media—and film in particular—to assess its potential involvement in such perceptions. The Article will first examine the general nature of the media's influence on society and on public policy, looking at some anecdotal evidence. It will then point to extensive quantitative analyses regarding the media's influence on our actions, focusing on suicide rates and violence among children. This section will also examine other less-studied areas including medical testing, teen drug use, and forensic investigations that suggest that the media has a strong influence on our personal actions.

This Article looks beyond simple personal actions and takes a more global perspective on public-policy choices influenced by film. It first describes the nature of this particular analysis, including important caveats and limitations. Assuming the potential for a causal relationship between films and our actions, the Article then cursorily examines why we believe what we see in certain films and notes preliminary suggestions of an effect on the viewers' regard for science and scientists—a view that is fortified by Hollywood's tendency to portray science in a less-than-positive light.

The Article then looks to particular examples of movies (some based on novels) that may have led to actual misguided scientific policies, including *Godzilla, The China Syndrome, Jurassic Park, Gattaca, Outbreak*, and *The Day After Tomorrow*. This section will provide a short synopsis of each movie, along with a description of the relevant historical events. Through examination of concurrent and preceding historical and market events, this Article will suggest a direct connection between the portrayal of science in film and subsequent national events and policies. After an initial analysis suggesting that there is at least a qualitative effect resulting from the surveyed movies, the Article will examine particular suggestions to limit these negative effects, including governmental and non-governmental interventions. Noting that governmental interventions may run afoul of the First Amendment guarantee of free speech, this Article gives a brief overview of the relevant First Amendment case law and theories to suggest that this need not be the case. The Article

concludes that either the government or the scientific community should be involved in somehow controlling the depiction of science in film—particularly if the depiction creates strong negative perceptions that promote suboptimal science-dependent policies, such as those relating to greenhouse gases or genetic testing.

I. MEDIA INFLUENCE

We live in a world inundated with information. "Must see TV,"[4] blockbuster movies, 24/7 cable-news channels, podcasting,[5] the blogosphere, and the Web all keep us plugged into this unstoppable media juggernaut.[6] Given our relentless exposure to the media, most researchers would agree that the media has some effect on our personal actions, although difficult to quantify. It influences the way we dress and the way we talk, and it is not a stretch to conclude that it influences the way we think, although many would deny it.[7] Notwithstanding the media's influence on our personal lives, concerns arise when it influences the way that government policy is dictated. "[I]t is not possible to understand congressional science policy without understanding the American people, and the reason for that is very simple: like it or not, Congress is representative of the general populace"[8]—and the general populace believes much of what it reads and sees in the media.

The media is a powerful tool for the legitimization of technical issues because of its role as gatekeeper to these issues.[9] The images that we watch in film may become deep-seeded memories and

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4. "Must see TV" is a 1990s advertising slogan that was developed to entice viewers to watch NBC programming. *See* Must See TV - Wikipedia, http://en.wikipedia.org/wiki/Must_See_TV (last visited Jan. 6, 2009); Bill Carter, *'Must-See TV' Marketer Leaves NBC*, N.Y. TIMES, Oct. 17, 2008, at B3, *available at http://www.nytimes.com/2008/10/17/business/media/17adcoside.html?partner=rssnyt&emc=rss.*

5. Podcast - Wikipedia, http://en.wikipedia.org/wiki/Podcasting (last visited Jan. 6, 2008) ("A podcast is a series of audio or video digital-media files which is distributed over the Internet by syndicated download, through Web feeds, to portable media players and personal computers . . . . The term is a portmanteau of the words 'iPod' and 'broadcast.'").

6. "Media," in this context, is a broad and vague term that encompasses all forms of information distribution, has no particular agenda or affiliation, and exists to satisfy our need for information and entertainment.

7. J.N. Clarke et al., *The Paradoxical Reliance On Allopathic Medicine And Positivist Science Among Skeptical Audiences*, 64 SOC. SCI. MED. 164 (2007).

8. Statement of Vernon J. Ehlers, vice-chairman of the House Committee on Science and Technology, *quoted in* Kirby, *The New Eugenics*, *infra* note 282.

9. *See generally* Toby Ten Eyck & Melissa Williment, *The National Media and Things Genetic*, 25 SCI. COMM. 129 (2003).

metaphors that we often return to when we are exposed to related scientific facts and issues.[10] And it is not only the lay public that uses these metaphors. The Reagan administration used the popular *Star Wars* trilogy of the late seventies and early eighties to reference the Strategic Missile Initiative.[11] *The New Yorker* recently reported on instances of West Point cadets citing the television show *24* as an argument to support the use of torture.[12] In Congressional testimony, scientists used metaphors from the film *Deep Impact*[13] to bolster support for Near-Earth Object detection systems,[14] and Rep. Xavier Becerra (D-CA) recently used terminology from an essay in Michael Crichton's latest novel in his bill to ban gene patenting.[15]

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10. Professor Joel Black coined this effect as the "*War Games* Effect" after the popular 1983 movie. *See* Kirby, *Science Consultants*, *infra* note 356, at 245.

11. *See* Strategic Defense Initiative - Wikipedia, http://en.wikipedia.org/wiki/Strategic_Defense_Initiative (last visited Jan. 6, 2009) (noting that although initially used in a derogatory fashion by Strategic Defense Initiative critic Dr. Carol Rosin, supporters "adopted the usage as well on the grounds that yesterday's science fiction is often tomorrow's engineering").

12. Tom Regan, *Does '24' Encourage US Interrogators to 'Torture' Detainees?*, CHRISTIAN SCI. MONITOR, Feb. 12, 2007, *available at* http://www.csmonitor.com/2007/0212/p99s01-duts.html (citing Jane Mayer, *Whatever it Takes: The Politics of the Man Behind "24,"* THE NEW YORKER, Feb. 19, 2007).

> [T]he motto of many of his students was identical to Jack Bauer's: "Whatever it takes." His students were particularly impressed by a scene in which Bauer barges into a room where a stubborn suspect is being held, shoots him in one leg, and threatens to shoot the other if he doesn't talk. In less than ten seconds, the suspect reveals that his associates plan to assassinate the Secretary of Defense. [Gary] Solis [a retired law professor who designed and taught the Law of War for Commanders curriculum at West Point] told me, "I tried to impress on them that this technique would open the wrong doors, but it was like trying to stomp out an anthill."

Regan, *supra* note 12 (quoting retired West Point professor Gary Solis); *see also* Posting of Jon Wiener to The Nation, http://www.thenation.com/blogs/notion?pid=157437 (Jan. 15, 2007, 12:35 EST).

13. Review of DEEP IMPACT (1998), http://www.imdb.com/title/tt0120647 (last visited Jan. 6, 2009) (unless a comet can be destroyed before colliding with Earth, only those allowed into shelters will survive. Which people will survive?") (describing the plot).

14. *See* Kirby, *Science Consultants*, *infra* note 369, at 244 (citing congressional testimony on Near-Earth Objects held on May 21, 1998); Pat Dasch, NSS Testimony by Submitted to Written Record for House Science Committee May 21, 1998 Hearing on "Asteroids: Perils and Opportunities." 21 May 1998, *available at* http://www.nss.org/news/mailings/mailing14.html ("Within the past few weeks, science fact and now Hollywood fiction have conspired to elevate the issue of impactors beyond the level of "here today, gone tomorrow." As I prepare this testimony, the movie "Deep Impact" has just opened in theatres across the nation. Hundreds of thousands of Americans have flocked to the film...").

15. *See* Press Release, Office of Congressman Xavier Becerra, Reps. Becerra & Weldon Introduce Bill To Ban The Practice Of Gene Patenting (Feb. 9, 2007), *available at*

Scholarship has probed into the nature of the need to attach ourselves to these metaphors. Professors Brossard and Nisbet, for example, point out that people are "cognitive misers"; in other words, people look for shortcuts in processing technical information. The scenes and images in movies and television offer us these shortcuts to reach judgments about a particular issue through the simplistic framing of that issue. Media frames are a particularly convenient shortcut:[16] straightforward and visual framing allows the media to overwhelm all other sources of information on a particular subject, thus informing the public, the policy makers, and even potentially other scientists.[17]

Other scholars note that the media's importance in framing the debate is due to its ability to first anchor and then objectify the issue. As described by Professor Lievrouw, for an issue to be successfully represented in society, the idea first has to be anchored; in other words, an unfamiliar idea must be classified into readily understood categories and then objectified or converted into an image that can be easily assimilated into current culture.[18] The media successfully accomplishes both.

A. Anecdotal Evidence of the Media's Effect on Individual Lifestyle Decisions

There are many examples of the effect of media on our lifestyle and personal decisions. A recent publication lists some cultural happenstances that seem to be at least casually related to movies and television, including a dip in merlot wine sales and a corresponding rise in pinot noir sales[19] after a wine snob put down merlot and praised pinot noir in the movie *Sideways*;[20] a jump in law school

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http://becerra.house.gov/HoR/CA31/News/Press+Releases/2007/02-09-07+REPS+BECERRA+WELDON+INTRODUCE+BILL+TO+BAN+THE+PRACTICE+OF+GENE+PATENTING.htm.

16. *See* Dominique Brossard & Matthew Nisbet, *Deference to Scientific Authority Among A Low Information Public: Understanding U.S. Opinion On Agricultural Biotechnology*, 19 INT'L J. PUB. OPINION RES. 25, 25-31 (Mar. 2006).

17. *Id.*

18. Leah A. Lievrouw, *Communication and the Social Representation of Scientific Knowledge*, 7 CRITICAL STUD. IN MASS COMM. 1, 8 (1990).

19. Michael Y. Park, *Hell No, Merlot: 'Sideways' Alters Wine Market*, FOX NEWS.COM, Mar. 2, 2005, http://www.foxnews.com/story/0,2933,149122,00.html.

20. Review of SIDEWAYS (2004), http://www.imdb.com/title/tt0375063 (last visited Jan. 6, 2009) ("Two men reaching middle age with not much to show but disappointment, embark on a week long road trip through California's wine country, just as one is about to take a trip down the aisle") (describing the plot).

applications in 1991, around the same time that the television show *LA Law* peaked in its ratings;[21] a similar jump in applications to forensic science programs following the success of the *CSI* television franchise;[22] an increase in sales of BMW Minis[23] after they were highlighted in the remake of the movie *The Italian Job*;[24] a 500 percent increase in library-card applications[25] immediately following an episode of *Happy Days*[26] where the Fonz gets a card; an inexplicable rise in emergency room visits following the end of each *ER* episode;[27] and testimonials by many engineers and physicists who cite *Star Trek* as a major influence on their career paths.[28]

Some may argue that these anecdotes merely apply to the most susceptible among us, those easily swayed by the media:[29] teens and young adults who are keenly interested in their self-image and look to

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21. Betsy Streisand, *Linking Life and, Um, Art*, U.S. NEWS & WORLD REP., Apr. 25, 2005, at 54, *available at* http://www.usnews.com/usnews/culture/articles/050425/25csi.b.htm (discussing the effect of the television show *CSI: Crime Scene Investigation* on the way jurors view cases and evidence, as well as the effect of *LA Law* on law school applications).

22. Richard Catalani, CSI: Crime Scene Investigation, Address at the American Film Institute Catalyst Workshop: Communicating Science and Engineering, Hollywood CA, (July 18, 2004), *available at* http://pro.imdb.com/rg/maindetails-title/nconst-pro-header-link/name/nm2140990/.

23. C.D. Simms & P. Trott, *The Perceptions of the BMW Mini Brand: the Importance of Historical Associations and the Development of a Model*, 15 J. PRODUCT & BRAND. MGMT. 228 (2006), *available at* http://www.emeraldinsight.com/Insight/viewPDF.jsp?Filename=html/Output/Published/EmeraldFullTextArticle/Pdf/0960150401.pdf.

24. Review of THE ITALIAN JOB (Paramount Pictures 2003); *see generally* Review of THE ITALIAN JOB, http://www.imdb.com/title/tt0317740 (last visited Jan. 6, 2009) ("Based on a 1969 Michael Caine film of the same name, thieves plan to pull off the heist of their lives by creating Los Angeles' largest traffic jam ever") (describing the plot).

25. Carlos E. Cortés, *How the Media Teach*, 104 Y.B. NAT'L SOC'Y FOR STUD. OF EDUCATION 55 (2005), *available at* http://www3.interscience.wiley.com/journal/118691397/abstract.

26. *Happy Days* (ABC television broadcast Sept. 27, 1977) (showing the Fonz, after getting his card, saying, "Reading is cool!"); *see also* Matthew Hutson, *Media: Happily Ever After*, PSYCH. TODAY, Aug. 19, 2008, *available at* http://www.psychologytoday.com/articles/pto-20080717-000008.html.

27. Streisand, *supra* note 21.

28. *See, e.g.*, Dwayne Day, *Star Trek as a Cultural Phenomenon*, CENTENNIAL OF FLIGHT, http://www.centennialofflight.gov/essay/Social/star_trek/SH7.htm.

29. *See, e.g.*, Andrew T. A. Cheng et al., *The Influence Of Media Reporting Of A Celebrity Suicide On Suicidal Behavior In Patients With A History Of Depressive Disorder*, 103 J. OF AFFECTIVE DISORDER 69 (2007) (discussing the influence of media on vulnerable people who are suicidal); Kelly Ladin L'Engle et al., *The Mass Media are an Important Context for Adolescents' Sexual Behavior* 38 J. ADOLESCENT HEALTH 186 (2006); Lawrie Z. Sullivan et al., *Media Influence on the Body Image of Children and Adolescents*, 14 EATING DISORDERS 355 (2006).

the media to reinforce that image.[30] Nevertheless, this Article will show that there have been well-documented policy shifts that are relevant to everyone, not just impressionable youths.

Others may argue with this analysis by claiming that the purported casual relationship is actually reversed: that the media is influenced by current public opinion, which is then reflected in film and television, and not the other way around. Thus, the argument goes, movies often reflect the way that society is thinking. For example, the spate of alien-invasion movies during the early years of the Cold War probably reflected the American infatuation with protecting itself from all things un-American.[31] Humanity being victimized by mysterious and hostile aliens was a thin veil for the prevalent fear of communism.[32] More recently, it has been suggested that an uptick in alien-invasion movies will usually correspond to increased global anxiety.[33] Monster movies reflect similar national anxieties: in the fifties, there was a spurt in the number of mutant-creature movies—for example, *The Beast From 20,000 Fathoms*[34] (considered the inspiration for *Godzilla*)—that reflected the fear of the newly formed atomic-energy industry. The underlying theme of many monster movies is that things can go very badly when man interferes with nature. Movies in this time period included *Them!*,[35] *Tarantula*[36], *Kronos*,[37] *Beginning of the End*,[38] *The Deadly Mantis*,[39] *The Fly*,[40] *The Beast of Yucca Flats*,[41] and *The Most Dangerous Man Alive*.[42] These examples, however, reflect long-standing national

30. DEBORAH OLSZEWKI ET AL., YOUTH MEDIA, EUROPEAN MONITORING CENTRE FOR DRUGS AND DRUG ADDICTION (2005), *available at* http://www.emcdda.europa.eu/html.cfm/index34037EN.html.

31. Stephen Humphries, *Return of the Alien Invaders*, CHRISTIAN SCI. MONITOR, June 27, 2005, *available at* http://www.csmonitor.com/2005/0627/p11s01-altv.html.

32. *Id.*

33. *Id.*

34. THE BEAST FROM 20,000 FATHOMS (Warner Brothers Pictures 1953).

35. (Warner Brothers Pictures 1954).

36. (Universal Pictures 1955).

37. (20th Century Fox 1957).

38. (AB-PT Pictures Corp. 1957).

39. (Universal International Pictures 1957).

40. (20th Century Fox 1958).

41. (Crown International Pictures 1961).

42. (Benedict Bogeaus Production 1961). Note the shift from radiation- or nuclear-derived monsters to genetically created ones. Most notable is probably Spider-Man: in the original comics from the early sixties, Peter Parker was transformed from a normal teenager to superhero by the bite of a radioactive spider. In the more recent film version of the movie, Peter Parker was transformed by a genetically altered spider. SPIDERMAN (Columbia Pictures 2002). This shift reflects a change of fears from the Cold-War-era

anxieties. Furthermore, the film industry is often unable to reflect the national sentiment of recent or timely topics; films usually take years to be produced.[43]

B. Evidence of Media Effect on Public Policy[44]

The United States congressional record itself attests to the influence of the media on public policy. Upton Sinclair's *The Jungle*, a book published in 1906 that described the unsanitary conditions of a meatpacking plant, created a public outcry and resulted in the launch of a government investigation of the Chicago meatpacking industry that eventually led to the creation of the Food and Drug Administration.[45] Similarly, Rachel Carlson's *Silent Spring* is attributed with catalyzing the modern environmentalist movement and subsequent efforts to legislate the protection of the environment.[46]

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nuclear fears to the more pertinent fear of genetic mutations. *See* Dan Vergano & Susan Wloszczyna, *Genetics Take Starring Role on Silver Screen,* USA TODAY, June 17, 2002 (providing a list and more general discussion).

43. 40th Annual Film & Video Festival: For Grantmasters: Media Proposal Checklist, http://www.fundfilm.org/for_grant/for_grant_checklist.htm (last visited Jan. 7, 2009). Even timely documentaries are rarely that timely: "[o]n average, it takes a filmmaker about three years to raise the funds for a documentary or film, about a year to produce the film, and about a year to get the film into distribution. Some projects take much longer." *Id.*

44. Public policy has a significant effect on scientific advancement. In addition to the obvious issues relating to funding of the NIH and NSF, we can point to space exploration as a prime example. From the space race to the moon shot, the early advancement of space can arguably be said to be more about competing with Russia than about any effort to do real science. *See, e.g.*, Roger D. Launius, *A Waning Of Technocratic Faith — NASA and the Politics of the Space Shuttle Decision, 1967-1972*, 13 AAS HISTORY SERIES 179 (1992) (arguing that since at least the 1960s, NASA decisions have been taken away from the technocrats and put in the hands of the policy makers). More recently, NASA had to consider scrapping its repair mission to the Hubble and other scientific endeavors in favor of keeping the space shuttle—which is arguably less scientifically valuable—aloft past its retirement date. *Id.*; *see also* A. Lawler, *Space Exploration: Scientists Add Up Gains, Losses in Bush's New Vision for NASA*, 303 SCIENCE 444, 444-45, Jan. 23, 2004 (noting that successful robotic space exploration is slated to suffer in pursuit of President Bush's much touted Moon and Mars missions); *Editorial: Facing Reality at NASA*, 433 NATURE 443 (2005).

45. *See, e.g.*, *Safer and Healthier Foods*, 48 MORBIDITY & MORALITY WKLY. REP. 905, 905-13 (June 1999); Wallace F. Janssen, FDA Consumer – The Story Of The Laws Behind The Labels (1981), *available at* http://www.cfsan.fda.gov/~lrd/history1.html ("A single chapter in Upton Sinclair's novel, *The Jungle*, precipitated legislation expanding federal meat regulation to provide continuous inspection of all red meats for interstate distribution, a far more rigorous type of control than that provided by the pure food bill. Both measures became law the same day, June 30, 1906.").

46. *See* RACHEL CARSON, SILENT SPRING (Houghton Mifflin 1962). Portions of the book were initially published in a three-part series in *The New Yorker*, detailing the use and abuse of pesticides in the environment. *See* Lisa Budwig, *Breaking Nature's Silence:*

Other influential works include Ida Mae Tarbell's *The History of the Standard Oil Company*,[47] Lincoln Steffens's *The Shame of the Cities*,[48] and George Seldes's *In Fact*.[49] However, not all instances of the media's effect on public policy are as clear-cut as these examples.

This Article analyzes how science policy is influenced by the media in less-obvious instances. It is by no means a rigorous scientific study of this relationship. In scientific methodology, anecdotal evidence carries little, if any, weight—ten anecdotes are often no better than one. Nevertheless, this research embodies Aristotle's wisdom that "[t]he sum of coincidences equals certainty." Accordingly, this Article finds a non-mathematical correlation between media and policy.

C. Large Scale Studies on the Relationship of Media and Personal Decisions

This is not the first attempt to draw a causal relationship between fiction and real-life events. Numerous studies have attempted to, for example, describe correlations between media and violence,[50] media and suicide,[51] and media and drug use among teens.[52]

1. Violence in the Media

Research regarding the effect of violence portrayed on television and film has existed since the inception of broadcast

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Pennsylvania's Rachel Carson, http://www.depweb.state.pa.us/heritage/cwp/view.asp?a=3&Q=442627 (last visited Jan. 7, 2009). Parts of that article were read into the congressional record by Sen. William Proxmire (D-WI) and Rep. John Lindsay (R-NY), followed shortly thereafter by the formation of a task force by President John Kennedy. *Id.* The purpose of the task force was to examine the issues relating to pesticides in the environment. *Id. Time* reported that even forty years after its publication, Carson's *Silent Spring* is still regarded "as the cornerstone of the new environmentalism." Peter Matthiessen, *Environmentalist*, TIME, Mar. 29, 1999, *available at* http://www.time.com/time/magazine/article/0,9171,990622-3,00.html.

47. IDA TARBELL, THE HISTORY OF THE STANDARD OIL COMPANY (David M. Chalmers ed., 2003) (1904).

48. LINCOLN STEFFENS, THE SHAME OF THE CITIES (Dover Publications 2004) (1904).

49. IN FACT, (George Seldes ed., 1940-1950); *See generally* CARL JENSEN, STORIES THAT CHANGED AMERICA: MUCKRAKERS OF THE 20TH CENTURY (Seven Stories Press 2000).

50. *See* CTR. FOR COMM. & SOC. POL'Y, UNIV. OF CAL. SANTA BARBARA, NATIONAL TELEVISION VIOLENCE STUDY (1998) (noting that 60 percent of television is thought to contain some violence according to a recent study.).

51. *See infra* text accompanying notes 61-69.

52. *See infra* text accompanying notes 74-78.

television.[53] Even with the extensive history, exhaustive data, and numerous different study methodologies, however, there is no consensus among researchers as to the nature or even the existence of a correlation between violence on television and violence among television viewers.[54] Moreover, there remains a paucity of research regarding the effect on adults who watched violent television as children[55]—the main group that we are concerned with in this Article due to their ability to make policy decisions.[56]

Interestingly, in the legal field, when the courts have been asked to determine whether watching violent movies can lead to violence, they have refused to find the movie or its producers responsible for the violent actions. Even when considering one of the most violent movies of its time, *Natural Born Killers*,[57] which followed the violent and murderous exploits of characters Mickey and Mallory Knox in vivid detail and gore, a court did not hold the film industry responsible for the actions of copycats. Specifically, the court found that while the defendants accused of a copycat murder based on the movie "may very well have been inspired to imitate the actions of Mickey and Mallory Knox, . . . the film does not direct or encourage them to take such actions. Accordingly, as a matter of law, we find *Natural Born Killers* cannot be considered inciteful speech that would remove it from First Amendment protection."[58]

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53. J.G. Johnson et al., *Television Viewing and Aggressive Behavior During Adolescence and Adulthood*, 295 SCIENCE 2468 (2002); *see* J.B. Bingenheimer et al., *Firearm Violence Exposure and Serious Violent Behavior*, 308 SCIENCE 1323 (2005) (discussing the effect on a bystander of watching real-life gun violence and noting the relatively high probability that the bystander will commit violence later in life).

54. C.K. Olson, *Media Violence Research and Youth Violence Data: Why Do They Conflict?*, 28 ACAD. PSYCHIATRY 144, 144-50 (2004); *see also* L. Huesmann et al., *Longitudinal Relations Between Children's Exposure to TV Violence and Their Aggressive and Violent Behavior in Young Adulthood: 1977-1992*, 39 DEVELOPMENTAL PSYCHOL. 201 (2003) (noting a large effect); TANNIS MACBETH ET AL., THE IMPACT OF TELEVISION: A NATURAL EXPERIMENT IN THREE COMMUNITIES (Harcourt Brace Jovanovich 1986) (noting no effect).

55. *But see* L. Huesmann, 42 J. SOC. ISSUES 125 (1986).

56. Adults, not children, make policy decisions. But children growing up on a healthy diet of bad science – and even anti-science – movies will be influenced later in life to make bad science policy decisions.

57. NATURAL BORN KILLERS (Warner Bros. Studio 1994) The original, and more violent, screenplay was written by Quentin Tarantino. Natural Born Killers – Wikipedia, http://en.wikipedia.org/wiki/Natural_Born_Killers (last visitied Jan. 7, 2009).

58. Byers v. Edmondson, 2001-1184 (La. App. 1 Cir. 6/5/02); 826 So. 2d 551, 556; *see also* Beasley v. State, 502 S.E.2d 235, 238 (Ga. 1998); State v. Taylor, 838 So. 2d 729, 746 (La. 2003); State v. White, 565 S.E.2d 55, 62 (N.C. 2002); State v. Begay, 964 P.2d 102, 106 (N.M. 1998) (upholding a murder conviction, even though the prosecutor stated that the "evidence would show that Defendant liked the film, *Natural Born Killers*, had seen it numerous times, and had announced his desire to 'pull a fatality'"); Helen A. Anderson, *The*

Even if there were a conclusive correlation between media violence and real violence—in other words, if it could be conclusively shown that the media affected the public's actions—one could argue that there are significant differences between an analysis of the base human characteristic of violence and a more elevated understanding of the numerous variables that should be considered when examining the media's effects on its audiences. Perhaps violent people are, by definition, more likely to be affected by stimulatory television; moreover, perhaps violent television watchers are a self-selecting group. These are people who seek out violent television programming,[59] one could argue, whereas more dignified concepts of human interaction, as portrayed in the media, are less likely to influence audiences that already have a propensity for violence.[60]

2. Suicide in the Media

Numerous studies have shown that the portrayal of suicidal behavior on television may encourage suicidal proclivities and actions.[61] Studies have further shown that the more detailed the media account, the greater the impact of that particular portrayal. One study showed that suicide rates in young adults tended to track the rates of suicides depicted in the media.[62]

One particular study involved a British television show, *Casualty*,[63] depicting a suicide attempt by a Royal Air Force pilot who

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Freedom to Speak and the Freedom to Listen: The Admissibility of the Criminal Defendant's Taste in Entertainment, 83 OR. L. REV. 899 (2004). *But see* Michael Massing, *Movie Violence, Still Playing; The Liberals Just Don't Get It*, WASH. POST, July 4, 1999, at B01 (noting that courts will dismiss civil suits almost without exception).

59. C. W. Turner et al., 42 J. SOC. ISSUES 51 (1986); *see also* H. Paik & G. Comstock, 2 COMMUNITY RES. 516 (1994).

60. *See, e.g.*, Peter McGuffin & Anita Thapar, *The Genetic Basis of Bad Behavior in Adolescents*, 350 THE LANCET 411 (1997). Studies of twins have shown that violent adults are just as likely to be either violent or non-violent independent of their viewing habits that might indicate that there is a correlation but no causative evidence that the television created the aggressive adult. *Id; see also* D. R. Miles & G. Carey, *Genetic and Environmental Architecture of Human Aggression*, 72 J. PERSONALITY & SOC. PSYCHOL. 207 (1997).

61. *See generally* JANE PIRKIS & J. WARWICK BLOOD, SUICIDE IN THE MEDIA, A CRITICAL REVIEW, COMMONWEALTH DEP'T OF HEALTH AND AGED CARE (2000), *available at* http://www.health.gov.au/internet/mentalhealth/publishing.nsf/Content/doha-suicide-media-1.

62. Madelyn Gould et al., *Media Contagion and Suicide Among the Young*, 46 AM. BEHAV. SCIENTIST 1269 (2003).

63. *Casualty: Vital Signs* (BBC television broadcast Nov. 2, 1996); *See, e.g*, Keith Hawton et al., *Effects of a Drug Overdose in a Television Drama on Presentations to Hospital for Self Poisoning: Time Series and Questionnaire Study*, 218 BRIT. MED. J. 972

overdosed on paracetamol.[64] With advance notice of the airing, the authors of the study had the ability to design a comprehensive test to determine whether there would be a resulting uptick in that particular method of suicide. They found, through interviews of the people who came into the emergency room presenting cases of self-poisoning, that at least 20 percent admitted to being influenced by that particular program in their decision to overdose on the commonly available painkiller.[65] Studies have also shown that there is a dose-response relationship to suicides in the media: the increase in suicidal behavior following a media story is directly proportional to the duration, amount, and prominence of the coverage of that suicide in the media.[66]

Fictional representations of suicide are influential in their effect on actual suicide rates, but it has been shown that often non-fictional news portrayals have an even greater impact than fiction.[67] For example, a woman in Hong Kong reportedly killed herself by burning charcoal in a barbeque grill in a sealed apartment.[68] Within two months, that form of suicide became the third most common form of suicide in Hong Kong.[69]

(1999) (analyzing the effects of the show and a description of the episode), *available at* http://www.bmj.com/cgi/content/full/319/7217/1131.

64. An alternative name for this analgesic is acetaminophen, whose common brand name is Tylenol. Paracetamol – Wikipedia.org, http://en.wikipedia.org/wiki/Paracetamol (last visited Jan. 7, 2009).

65. Hawton et al., *supra* note 63.

66. E. Etzersdorfer et al., *A Dose-Response Relationship of Imitational Suicides with Newspaper Distribution*, 35 AUSTL. & N.Z. J. PSYCHIATRY 251 (2001).

67. S. Stack, *Suicide in the Media: A Quantitative Review of Studies Based on Non-fictional Stories*, 5 SUICIDE & LIFE THREATENING BEHAV. 121, 127 (2005) (applying logistic regression techniques in 55 different studies, and finding that, in general, news stories involving the suicide of a celebrity were 5.27 times more likely to result in a copycat effect. Conversely, news reports with a negative portrayal of suicide were 99% less likely to result in a copycat effect); *see also* H.S. Sudak & D.M. Sudak, *The Media and Suicide*, 29 ACAD. PSYCHIATRY 495 (2005); Gould et al., *supra* note 62.

68. Andy Howe et al., *Media Influence on Suicide*, 326 BRIT. MED. J. 498, 499 (2003), *available at* http://www.bmj.com/cgi/reprint/326/7387/498.

69. *Id.*

3. Other Instances of Media Influence

a. Medical Testing[70]

Recent reports noted a 21 percent upsurge in cervical cancer screenings after a character on a popular British soap opera, *Coronation Street*, died from cervical cancer.[71] The study found that as the story line progressed, local medical inquiries related to cervical cancer increased proportionally.[72] A related study revealed that the bulk of women coming in for genetic testing derived their knowledge of genetics from popular fiction.[73]

b. Drugs and Teenagers

Recently, a large-scale study examined the correlation between drug use by teens and the corresponding moral terminology associated with each drug in teen magazines. [74] Teens were more likely to use drugs that were either neutrally or positively described in magazines.[75] In general, studies have shown that teens are more likely to participate in a certain action, whether drinking, smoking, or even something positive, when there has been a positive portrayal of that action in the media.[76] For example, there has been a marked increase in the use of over-the-counter analgesics by teens who watch a lot of television, presumably with commercials for these analgesics.[77]

A study looking into the relationship between teen smoking and the depiction of smokers in movies showed "significant association between smoking in the movies and youth smoking . . . . U.S.

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70. What has become increasingly clear in recent years is that fictional television can also play a significant role in shaping public images about the state of our health care system and policy options for improving the delivery of care. *See* JOSEPH TUROW & RACHEL GANS, AS SEEN ON TV: HEALTH POLICY ISSUES IN TV'S MEDICAL DRAMAS, REPORT TO THE KAISER FAMILY FOUNDATION 1 (July 2002), *available at* http://www.kff.org/entmedia/John_Q_Report.pdf.

71. Howe et al., *supra* note 68, at 498.

72. *Id.*

73. Kirby, *The New Eugenics*, *infra* note 282.

74. Press Release, Economic and Social Research Council, How Images Of Smokers, Drinkers And Drug Takers Affect Young People's Own Lifestyles, (Oct. 2004), *available at* http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/PO/releases/2004/october/index2.aspx?ComponentId=6406&SourcePageId=6414#0.

75. *Id.*

76. *Id.*

77. Jan Van den Bulck et al., *Television and Adolescent Use of Over-the-Counter Analgesic Agents*, 39 ANNALS OF PHARMACOTHERAPY 58 (Jan. 2005), *available at* http://www.theannals.com/cgi/reprint/39/1/58.

adolescents, regardless of race or place of residence, have a higher risk of trying smoking as their exposure to movie smoking increases."[78]

c. CSI *Effect on Juries*

The television program *CSI: Crime Scene Investigation* and its various spin-offs are popular television programs in which crimes are solved by the detective work of members of high-end forensic labs.[79] In most cases, the characters are able to quickly process and analyze forensic evidence; more often than not, the evidence clearly identifies the criminal. Most real life cases do not mimic those on *CSI*, and the vast majority of forensic labs do not come close to the complexity of the one in the show.[80] Nevertheless, juries populated by people who watch these and similar shows come to expect very strong forensic evidence from the prosecution, and often, when the forensic evidence is lacking or weak, they will not convict.[81] Termed "the *CSI* effect," the phenomena encourages juries who have been fed forensic science from television programming to believe that the lack of incriminating forensic evidence or the weakness of any evidence presented is indicative of a weak case even when there is strong alternative evidence.[82]

II. WHY THIS CURRENT ANALYSIS IS IMPORTANT

Unlike the previous scenario, where there is the possibility of self-selecting groups, such as those prone to violence choosing to watch it on television, there are few if any who watch fictional television programs or movies for their educational value regarding science policy. Studies suggest that the vast majority of science learned from television is not from documentaries, but rather from non-scientific shows that happen to contain bits of scientific or pseudoscientific

78. Press Release, National Cancer Institute, Increasing Evidence Points to Link Between Youth Smoking and Exposure to Smoking in Movies (Nov. 7, 2005), *available at* http://www.nih.gov/news/pr/nov2005/nci-07b.htm.

79. *CSI: Crime Scene Investigation* (CBS television broadcast); *CSI: Miami* (CBS television broadcast); *CSI: NY* (CBS television broadcast).

80. Richard Catalani, *supra* note 22.

81. Tom R. Tyler, *Viewing CSI and The Threshold of Guild: Managing Truth and Justice in Reality and Fiction*, 115 Yale L. J. 1050 (2006).

82. *Id. See also* Mark Hansen, *The Uncertain Science of Evidence*, A.B.A. J. (Jul. 2005), *available at* www.abajournal.com/magazine/the_uncertain_science_of_evidence (citing cases wherein strong eyewitness testimony was glossed over because of the lack of forensic evidence).

information.[83] As a consequence, the greater part of the population is being fed scientific information from potentially misleading sources.

The forthcoming analysis differs from previous studies both in its focus—the particular national effects of media on science and science policy—and in its methodology. Instead of relying on large-scale surveys, this Article looks at the media both as a source of influence and as a reflection of that influence. To this end the Article will: (1) describe the historical context of the film's release; (2) provide a plot synopsis highlighting the scientific and science policy issues within the film; and (3) look to national reactions to the film, particularly financial and political.

A. Method/Ability to Analyze

This Article will examine the influence of numerous blockbuster films on society's understanding of science. It will also look at media outlets as mirrors and indicators of the influence of that particular film within society. Thus, a movie that has a significant impact may stay in the news through many cycles and assert an impact on other news stories and events, potentially even becoming a cliché or metaphor that becomes part of our lexicon and incorporated into science-policy debates. As expressed earlier, while this early analysis is not per se statistically rigorous, but rather limited to an analysis of a few select films as examples of how the media can affect science policy, it nevertheless strives to provide an initial and broad look into how scientists and science policy are actually affected by fictional films. In general, the films in this analysis represent a cross section of relatively recent blockbuster films, each relating to a politically charged area of science. Each film purportedly attempted to faithfully represent the underlying science.

Future analysis may look to all blockbuster films in the past couple of decades, comparing American and European responses, or perhaps consider other forms of media as well. Additionally, while acknowledging the various motivations behind filmmaking, this Article will not dwell on these driving forces. It will instead serve as an introduction to potentially deeper analyses that may come in the future, while raising relevant issues and providing policy solutions to the current situation.

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83. Note, though, that these studies predate the explosion of science-oriented cable channels. *See* Joanna Ploeger-Tsoulos & Robbie Shumate, Science Programs, The Museum of Broadcast Communications, http://www.museum.tv/archives/etv/S/htmlS/scienceprogr/scienceprogr.htm (last visited Jan. 7, 2009) (providing a short history of science on television).

B. Challenges to (and Limitations on) This Kind of Analysis

While anecdotally it may be easy to find cases where the mainstream media has seemingly played a direct and influential role in our society in general, it is particularly difficult to show that some sort of science policy has been affected by the public's understanding of science, which itself was influenced by media portrayals of scientific fact.[84] Science policy is purportedly the result of lengthy studies and rigorous research into a particular problem and, as such, would seem less likely to be affected by a layman's misunderstanding of an issue.[85] In fact, Jane Gregory and Steve Miller, authors of *Science in Public*, doubt the ability of anyone to measure a direct effect of the media on how the public thinks about science and that a direct effect on policy can ever be measured.[86]

1. Nature of the Cause and Effect Relationship

a. Why We Believe in Films

This Article assumes that an obviously fictional movie can create a different and skewed understanding of reality. This assumption is based on the proposition that we are often lulled into the belief that what we hear or see in the media is real.[87] Hollywood excels at creating an environment for the willful suspension of disbelief: in order for a television show or movie to be an effective form of entertainment, it has to create a sense of believability among its target audience. Given the ever-increasing complexity of special effects in movies,[88] Hollywood continues to up the ante in regards to

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84. *See, e.g.*, JOAN SHORENSTEIN CENTER ON THE PRESS, POLITICS, AND PUBLIC POLICY OF THE KENNEDY SCHOOL OF GOVERNMENT AT HARVARD UNIVERSITY, SCIENCE AND PUBLIC POLICY COLLIDE: THE CASE OF FOOD AND BIOTECHNOLOGY, *available at* http://www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Summaries_-_reports_and_pubs/hhs_pew_agbiotech_event_0503.pdf.

85. JANE GREGORY & STEVE MILLER, SCIENCE IN PUBLIC: COMMUNICATION, CULTURE, AND CREDIBILITY 127 (Perseus Publishing 2000). *But see* Stuart N. Soroka, *Media, Public Opinion, and Foreign Policy*, 8 HARV. INT'L J. OF PRESS/POL., 27, 27-48 (Jan. 2003) and papers cited therein (contrasting American and foreign policies).

86. GREGORY & MILLER, *supra* note 85.

87. Olszewski et al., *supra* note 30 (showing through a study conducted by Ipsos-RSL Media—one of the largest media research companies in Europe—comprised of over 2,000 face-to-face interviews that 62% of people between the ages of 10 and 64 believe what they read).

88. *See, e.g.*, RICHARD RICKITT, SPECIAL EFFECTS: THE HISTORY AND TECHNIQUE (2000).

how much the audience is willing to accept; when it comes to the outlandish plot or implausible alien, it has to reinforce the realism of the rest of the story.[89] To this end, filmmakers often include subtle cues in their films; the unconscious familiarity with these cues allows the audience to believe the film's related images. For example, in *Jurassic Park*, Spielberg created dinosaurs that not only looked like what we would imagine a dinosaur would look like, but also acted in a strikingly similar manner to animals that we were likely to have some familiarity with in our regular lives.[90] Essentially, we walk away from the film, consciously or at least subconsciously, accepting this very believable bad science as reality.

b. Other Effects of Bad Science in Film and Television

In addition to portraying overtly bad science, Hollywood often presents oversimplified arguments on one side of a complex scientific debate as the absolute truth. Scholars like Professors Lievrouw and Kirby note that the popularization of a science position among the public allows that position to gain currency both in the public sphere, acting as a "virtual witnessing technolog[y]," and in the scientific sphere.[91] The media's goal of providing a scientific explanation to the public in the simplest fashion, both in the news media and in the entertainment sector, should concern policymakers and scientists. This trend of oversimplifying science and exaggerating results or even providing false information for the sake of keeping it simple misinforms and does a grave disservice to the public.[92]

The media exerts a tremendous amount of influence that affects not only how lay viewers appreciate and understand science, but also how scientific debates are resolved and how projects are funded. Particular egregious examples include instances where one side in a well-publicized scientific debate is victorious because the opposing view is quashed by the overwhelming public support for the theories professed in a film or on television. In the public eye, the

89. T. H. Crawford, *Screening Science: Pedagogy and Practice in William Dieterle's Film Biographies of Scientists*, 6 COMMON KNOWLEDGE 52 (1997) (Crawford refers to the use of special effects as a witnessing technology); *See also*, JOEL BLACK, THE REALITY EFFECT: FILM CULTURE AND THE GRAPHIC IMPERATIVE (1992).

90. Michael Barnett et al., *The Impact of Science Fiction Film on Student Understanding of Science*, 15 J. SCI. EDUC. & TECH. 179, 180 (2006).

91. *See, e.g.*, Kirby, *Science Consultants*, *infra* note 356, at 283 (noting, for example, that NASA considered its consultancy on the film *Deep Impact* to be of particular importance because it informed the public of the potential hazards of terrestrial objects impacts).

92. *Id.* at 254.

winning theory is not likely to be one of many alternative options, but the one portrayed as an absolute truth on the screen.[93]

Ironically, while the media is chastised for unfairly supporting one side in a scientific debate, it is also criticized for trying too hard to provide a perceptibly fair and balanced account of a scientific issue.[94] Here, critics charge that by showing multiple views on a scientific issue, the media will give credence to even crackpot theories in the name of unbiased presentation.[95] In these instances, given most people's inexperience with science, they may even be unable to see the radical hypotheses for what they are, eventually and inadvertently raising theories from obscurity into the public discussion.[96] For example, movies tend to take sides in scientific debate, presenting one side as absolute, to the arguable detriment of the unwary audience. Consider the cloning science portrayed in *Boys from Brazil*,[97] which represented the research of the film's only scientific consultant and was not fully accepted at the time of the film, yet was portrayed as definitive fact.[98] Thus, "a picture is not only worth a thousand words; however inaccurate, it may be worth a wealth of documented evidence to the contrary."[99]

Finally, the media often presents an overly hyped version of science to the public, often creating unrealistic expectations regarding

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93. *Id.* at 148. Ironically, there is concern that the media has decided for the public which side of the general debate regarding the influence of media on society is the truth. For example, there has recently been evidence that the media generally downplays many of the studies that have found a causal connection between media and violence. *Compare* K. Durkin, *Chasing the Effects of Media Violence*, 1995 ABA UPDATE: NEWSLETTER OF THE AUSTRL.BROADCASTING AUTHORITY 29, S. Fischoff, 5 J. MEDIA PSYCHOL. 4 (1999), *and* Melanie Brown, *The Portrayal of Violence in the Media: Impacts and Implications for Policy*, 55 TRENDS & ISSUES IN CRIME AND CRIM. JUST. (1996), *with* JOINT STATEMENT ON THE IMPACT OF ENTERTAINMENT VIOLENCE ON CHILDREN, CONGRESSIONAL PUBLIC HEALTH SUMMIT (July 26, 2000), *available at* http://www.aap.org/advocacy/releases/jstmtevc.htm, *and* C.K. Olsen, *Media Violence Research and Youth Violence Data: Why Do They Conflict?*, 28 ACAD. PSYCHIATRY 144, 144-50 (2004).

94. Chris Mooney, *Blinded By Science: How 'Balanced' Coverage Lets the Scientific Fringe Hijack Reality*, 6 COLUM. JOURNALISM REV. (2004).

95. *Id.*

96. *See, e.g.* Kirby, *infra* note 356 at 236.

97. THE BOYS FROM BRAZIL, *infra* note 226. In the movie, Dr. Josef Mengele, the Nazi chief doctor at the Auschwitz concentration camp in Poland during World War II, plans the rebirth of the Nazi empire in South America by cloning Hitler. *Id.*

98. *Id.*

99. *Id.* ("The popular reconstruction of pterosaurs assumed an important role in establishing the acceptance of the bat-winged image, in spite of the lack of evidence then or now for it.") (citing paleontologist Kevin Padian's lament that the film's representation of pterosaurs is totally inaccurate).

the research.[100] Thus, the media, frequently swept up in a wave of exuberance, will present information to the public that, but for the pressure of keeping up with the most recent developments, would have been vetted out before being presented. The 2002 Cloneaid debacle is indicative of this sort of herd mentality that keeps the media from properly informing the public.[101]

C. Important Caveats Regarding This Analysis

Hollywood blockbusters suffer from many scientific inaccuracies, from shotgun blasts that blow people across the room to the bullets that spark when they hit things[102] to giant vengeful sharks[103] and slow but killer quicksand.[104] Science in general, and basic laws of physics in particular, is flouted in almost every film; much of it has become Hollywood clichés. There are websites devoted to finding the minutest physical inaccuracies in film,[105] as well as consultants who are hired to achieve some semblance of scientific accuracy in films down to the writing on the blackboards in the background, but whose suggestions are often disregarded by the director who might favor unscientific but familiar cues in an effort to create an entertaining film.[106]

Additionally, not all movies can have a cataclysmic, let alone any, effect on science and public policy. One would be hard pressed to find anti-cloning propaganda stemming from a movie like *The 6th*

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100. *See, e.g.*, Timothy Caulfield, *Biotechnology and the Popular Press: Hype and the Selling of Sciences*, 22 TRENDS IN BIOTECHNOLOGY 337 (2004) (focusing primarily on "genohype"—media hype surrounding genetic technologies).

101. *Id.*

102. *See, e.g.*, Tom Rogers, INSULTINGLY STUPID MOVIE PHYSICS (Sourcebooks Hysteria 2007).

103. JAWS (Universal Pictures 1975).

104. THE HOUND OF THE BASKERVILLES (United Artists 1959); *see also* A. Khaldoun, G. Wegdam, E. Eiser and Daniel Bonn, *Quicksand!*, 37 EUROPHYSICS NEWS 18 (2006).

105. *See, e.g.*, Intuitor Insultingly Stupid Movie Physics, http://www.intuitor.com/moviephysics (last visited Jan. 7, 2009).

106. *See, e.g.*, Hollywood Math and Science Film Consulting, http://www.hollywoodmath.com/index.htm (last visited Jan. 7, 2009) ("Hollywood Math and Science Film Consulting will ensure that the technical details and jargon in your script sound believable, whether they be mathematical, scientific, or medical. We will ensure that the backdrops in your scenes—*the writing on the blackboards*, the equipment in the labs—look realistic; that your universities look like universities and your academics act like academics." (emphasis added)). Note also that Donna Cline, the medical advisor for the film *Outbreak*, spent thousands of dollars on IV equipment to make sure that it looked authentic, and even went out of her way to accurately depict the stethoscopes that were used in the first scene of the movie, purportedly occurring in 1967. *See* Semmler, *infra* note 298.

Day;[107] while the movie raises general issues related to cloning, and actually shows how society parses the morality of cloning (allowing pets but not humans to be cloned), it does not delve deeply into the issue, thus leaving little for a moviegoer to grasp onto in a discussion on cloning. Similarly, a movie like *Twelve Monkeys* that deals with issues relating to bioterrorism is also less likely to result in a public-policy shift; while the plot relates to deadly viruses, the movie directs the audience to other themes, leaving the virus issue mostly in the background.[108]

There is a something special yet indescribable about a movie that can lead to changes in public policy, or at the minimum initiate discussion within society. The secret to creating buzz on the street in response to a film will probably always be elusive, both to those who study films and to those who create them.

In film, where does one draw the line in determining what is dangerous science—portrayals of science that misinform and unduly influence the public—and what is bad but benign science? At what point on the slippery slope do we say that one film's portrayal of scientific inaccuracies is fine, but another's could cause irreparable harm to science policy? One easy place to draw the line is when Hollywood purports to reflect reality, but gets it wrong. When the audience is told that what they are seeing on screen is the real thing, but in reality it is very far off, then scientists should step in and correct the public.[109] And when the media uses "genetic pornography" just to "titillate, excite, and frighten," the scientific community should become involved so that the misinformation does not become part of a national debate.[110]

Unfortunately, it is often difficult to predict ex ante the exact nature of the science policy fallout from a film, if any at all. Any

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107. THE 6TH DAY (Columbia/Tristar Studios 2000) (depicting actor Arnold Schwarzenegger's character's discovery that his life has been co-opted by a clone in a vast evil conspiracy to clone humans.).

108. Review of TWELVE MONKEYS (Universal Pictures 1995); *see* Twelve Monkeys (1995), http://www.imdb.com/title/tt0114746 (last visited Jan. 7, 2009) (summarizing the plot of *Twelve Monkeys*).

109. *See, e.g.*, Dale Dye, *Stumped*, http://centerstage.net/stumped/Articles/dale-dye-article.html (last visited Jan. 7, 2009). (noting, for example that many former combat soldiers were drawn to become consultants to war films because the films purported to tell the story of what war is really like, but the former combat soldiers felt that Hollywood got the portrayal wrong) (last visited Jan. 7, 2009).

110. *See* Wolpert, *infra* note 117 ("The image of Frankenstein has been turned by the media into genetic pornography, whose real aim is to titillate, excite, and frighten. The bio-moralists are triumphant with the aid of genetic pornography to titillate and frighten, purveyed by the media.").

attempt to regulate all films based on any portrayal of science would have a devastating chilling effect on artistic expression in film, not to mention raising significant First Amendment concerns. However, ignoring all scientific misrepresentation could lead to misinformed science policies. The difficulty lies in determining the proper and effective balance.

One way to separate the potentially dangerous films vis-à-vis scientific policy from the relatively benign ones is to use focus groups, an expensive and overwhelming process if applied to all films.[111] Alternatively, any action on the issue of film affecting science policy may need to be applied post facto—potentially limiting the efficacy of such actions. Therefore, an open and informed dialogue between the scientific community and the media is probably one of the best options.

III. PRELIMINARY SUGGESTIONS OF EFFECT

Scientists and science policymakers have every reason to be concerned about the images of science conveyed on the screen day after day. The American Association for the Advancement of Science, the largest science lobbying group, found that lots of classroom science has less to do with our present understanding of science and more to do with a number of societal influences, notably the entertainment media.[112] For example, the issue of mammalian cloning has been "deeply distorted in the popular understanding by the lurid nightmares of science fiction."[113] Surprisingly, the influence of the media is also evident within the profession of science and medicine itself.[114]

While a majority of Americans get their scientific information from the mass media[115]—particularly from movies and television shows that contain science and/or scientists in their plots—to what

111. The costs would be substantial (both in time and money) to determine and correct for anti-science biases that might creep into the production of a movie.

112. AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, BENCHMARKS FOR SCIENCE LITERACY (Oxford University Press 1994).

113. Nigel Hawkes, *Legal Barriers Will Prevent Apocalypse Now, If Not Later*, N.Y. TIMES, Feb. 26, 1997, at A23.

114. *See, e.g.*, Gail Geller et al., *The Media and Public Reaction to Genetic Research*, 287 J. AM. MED. ASS'N 287, 773 (2003), *available at* http://jama.ama-assn.org/cgi/content/full/287/6/773.

115. See, e.g. National Institute of Higher Education, Research, Science and Technology (NIHERST), Survey on the Public Perception of Science, 2005, *availible at* http://www.niherst.gov.tt/st-statistics/survey-highlights/survey-on-the-public-perception-of-science-2005.htm.

extent do these shows and movies have an effect on the public's conception of scientific issues? And more importantly, do these potential effects somehow translate into science policy or have other effects on the scientific community?[116]

A. Science Already Gets a Bad Rap

Society as a whole has an uneasy relationship with science.[117] While we marvel at the incredible results of scientific endeavors, we are also fearful of science's power and mystery. "The popular market for science . . . is a mixture of great expectations, fears, utilitarian interests, curiosities, ancient prejudices, and superstitions," and "mass media appeal to all of these."[118] The continued questioning of the legitimacy of scientific knowledge is further evidence of this pervasive uneasiness with science.[119]

This is not to say that getting scientific information from scientists is risk free; admittedly, science is far from infallible. Scientists are inherent skeptics, and often legitimately question scientific results and theories themselves; they are also notoriously argumentative and enjoy debating theories with one another.[120] Scientific theories and principles are routinely subjected to close examination and systematic testing. Importantly, however, scientists argue and disagree within the bounds of the scientific method.[121] Science fiction has its place; the best science-fiction writers often project forward from leading edge science and their predictions often

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116. *See* Jonathan Knight, *Science in the Movies: Hollywood or Bust*, 430 NATURE 720, 720-22 (2004), *available at* http://www.nature.com/nature/journal/v430/n7001/full/430720a.html.

117. *See, e.g.*, Lewis Wolpert, Nobel Symposium Speech, (May 26-29, 2002), *available at* http://nobelprize.org/nobel/nobel-foundation/symposia/interdisciplinary/ns120/lectures/wolpert.pdf ("Indeed the whole of Western literature has not been kind to scientists and is filled with images of scientists meddling with nature with disastrous results. Just consider Shelley's *Frankenstein*, Goethe's *Faust*, and Huxley's *Brave New World*. One will search with very little success for a novel in which scientists come out well - the persistent image is that of scientists as a soulless group, unconcerned with ethical issues. And where is there a movie sympathetic to science? Scientists are perceived as middle-aged, emotionally impaired, and dangerous males.").

118. George Gerbner, *Science on Television: How It Affects Public Conceptions*, 3 ISSUES SCI. & TECH. 109, 110 (1987).

119. Peter Weingart, *Of Power Maniacs and Unethical Geniuses: Science and Scientists in Fiction Film*, 12 PUB. UNDERSTANDING OF SCI. 208 (2003).

120. Alan. I. Leshner, *Redefining Science*, 309 SCIENCE 221 (2005).

121. *See, e.g.*, Brian S. Baigrie and J. N. Hattiangadi, *On Consensus and Stability in Science*, 43 THE BRITISH JOURNAL FOR THE PHILOSOPHY OF SCIENCE 435 (1992).

have some substantive validity.[122] Even pseudoscience has its place—but it should not be misrepresented as science. For example, in reference to the teaching of intelligent design in science classes, Alan Leshner, CEO of the American Association for the Advancement of Science, notes that while intelligent design has its place,

> what is taught in science class should be limited to science. Redefining science to get a particular belief into the classroom simply isn't educationally sound. Just as the scientific community has broad responsibilities to monitor the integrity with which its members conduct their work, it also must take some responsibility for the uses of science and for how it is portrayed to the public. That requires us to be clear about what science is and to distinguish clearly between scientific and belief systems, in schools and in various public venues devoted to science.[123]

Thus, while there is value to even the most egregious unscientific fictions, they nevertheless can have extremely damaging effects, particularly when pseudoscience and other fictions masquerade as actual science and mislead the public into believing that they should be considered on par with rigorous scientific studies.

B. Science Gets a Bad Rap in Movies and Television

Historians have long criticized docudramas as distorting the public's perception of history and politics. When the writers of these docudramas—and there is only a relatively small group of successful writers—intermingle their imaginary stories with historical fact, that blurring carries over into the general public's perception of the reality, thus literally rewriting history.[124]

The same may be said for science in film. The same, relatively small cadre of writers tends not to treat science and scientists well in

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122. *See, e.g.*, Rosanne Bersten, *Oracles of Invention*, THE AGE.COM, July 18, 2002, http://www.theage.com.au/articles/2002/07/18/1026898878589.html.

123. *Id.*

124. *See, e.g.*, *Do TV 'Docu-Dramas' Distort History?*, U.S. NEWS & WORLD REPORT, May 21, 1979, at 51.

> The danger, historians say, is that fact and fiction will be linked forever in the minds of millions of viewers who seldom read much or are rarely presented with serious information from sources other than TV and films. Many scholars fear that distortions of reality may make it harder for democracy to function well in the future. . . . [M]isapprehensions about important events could have serious national consequences . . . . William M. Young, an Illinois educator who studied television violence for the National PTA, observes that misleading TV shows have altered many Americans' perception of the truth. "Both adults and children have been affected," he asserts. "Their misconceptions have put great strains on our society."

Id. This article also mentions the movie *The China Syndrome* as one example of entertainment warping our sense of reality. *Id.*

movies and television.[125] In particular, "[e]xposure to science and technology through television entertainment appears to cultivate a generally less favorable orientation toward science."[126] Scientists, too, tend to get the short end of the stick in terms of the portrayal of their profession in film.[127] This negative image of scientists raises two main concerns: it furthers the persistence of the negative feelings and uneasiness that society as a whole has for science,[128] and it lowers the general interest in science as a profession, which is a policy issue in and of itself.[129]

As Susan Sontag wrote in her memorable article on science-fiction films, "Scientific advancement, experimentation, with its technological implementation is often the basis of the disaster depicted. Here we find so often the evil or mad [or] obsessed or misguided scientist."[130] In the same article, she discussed in detail why society as a whole appreciates disaster science-fiction movies. She defined the science-fiction movies of the post-World War II period as representational of the atomic bomb, expounding on the misuse of science and how it can lead to disaster.[131] Sontag particularly highlighted how the imagery in science-fiction movies is more adept than the words in a novel at creating a negative image of scientists. In the end, most science fiction serves to perpetuate a vicious cycle of anti-science.[132]

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125. *See* SUSAN SONTAG, THE IMAGINATION OF DISASTER, in AGAINST INTERPRETATION AND OTHER ESSAYS (Macmillan 2001). ("The most ingrained contemporary mistrust of the intellect is visited, in these movies, upon the scientist-as-intellectual."); *see also Gregory Benford on Science Fiction,* SCI. & SPIRIT, July 22, 2005, *available at* http://www.science-spirit.org/newdirections.php?article_id=527.

126. Gerbner, *supra* note 118, at 112.

127. *Id.* (noting that one in ten scientists is likely to get killed and one in five will kill someone else in the course of a fictionalized event in the media); *see also* ANDREW TUDOR, MONSTERS & MAD SCIENTISTS: A CULTURAL HISTORY OF THE HORROR MOVIE 20 (Basil Blackwell, Inc. 1989) (noting that mad scientists are one of the top sources of trouble in a horror movie after psychotics, and are antagonists in horror movies in greater numbers than zombies, werewolves, and mummies combined); Weingart et al., *infra* note 128, at 283 (noting that scientists in movies, even when they are not villains, are shown to be easily manipulated, corruptible, too ambitious and blind to the consequences of their actions).

128. *See* Peter Weignart et al., *Of Power Maniacs and Unethical Geniuses: Science and Scientists in Fiction Film*, 12 PUB. UNDERSTANDING SCI. 279, 281 (2003) ("The depiction of science [in movies] reveals the fundamental uneasiness, distrust and even mystification of science on the part of the moviemakers that must, in some way, reflect the sentiments of the crowds that watch their products.").

129. *Id.*

130. *See* SONTAG, *supra* note 125, at 216.

131. *Id.*

132. *See* Weingart, *supra* note 128.

IV. PARTICULAR EXAMPLES

This section will examine a number of films to determine whether they had, or attempted to have, an effect on science-policy decisions. As stated previously, it is important to differentiate at the outset between those films with a distinct anti-science message and those that use/abuse the medium to promote their writers' ideologies, between the more common movies whose purpose is to make money (in which the negative scientific imagery and message are just coincidental) and those that legitimately question a scientific premise.[133] The next section presents a number of films that had that "special something" in that they created a buzz that has resulted in dialogue on science public-policy issues, and potentially even large scale public-perception and public-policy shifts.

A. Movies in General

The movies characterized below represent a genre "parasitic upon public affairs [using facts] where convenient, for believability, and impl[ying], falsely, that the fiction is a light coating on a heavy core of fact."[134] While they constitute only a small proportion of our entertainment, movies have a profound effect on our culture.[135] The movie industry continues to break revenue records, raking in hundreds of millions of dollars in box-office receipts.[136] Movies are a large part of our culture, determining, for instance, what Americans will discuss at the water cooler. The importance of movies in our culture is somewhat reflected by the manner in which movies become big hits. Huge box office fortunes are often largely the result of word of mouth among moviegoers. Thus, the same people who tend to influence us on general issues are the people who entice us to see a particular movie.[137]

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133. *See supra* note 112-133 and accompanying text.

134. George F. Will, *A Film About Greed*, NEWSWEEK, Apr. 2, 1979, at 96 (referring to the movie *The China Syndrome* in particular).

135. In 2004 total consumer spending on entertainment media in the United States was $190 billion dollars, according to the firm Veronis Suhler Stevenson. Of this, $9.4 billion was spent on watching films, according to Mike Snider, *DVD's Success Steals the Show*, USA TODAY, Jan. 8, 2004.

136. *See, e.g.*, The Numbers – Movie Records, http://www.the-numbers.com/movies/records/#alltime (last visited Jan. 7, 2009).

137. *See, e.g.*, MALCOLM GLADWELL, THE TIPPING POINT: HOW LITTLE THINGS CAN MAKE A BIG DIFFERENCE 171 (Little Brown 2000).

B. Specific Movies

1. *Godzilla* and the Atomic Bomb

Godzilla[138] was "a dark, poetic production that dealt openly with Japanese misgivings about the nuclear menace, environmental degradation and the traumatic experience associated with World War II."[139] Many of those involved in the production of the original *Godzilla* movie were interested in presenting an anti-nuclear message to the Japanese public; *Godzilla* director Ishiro Honda said prior to his death in 1993 that he had always hoped that *Godzilla* could help bring an end to nuclear testing and arms proliferation.[140] According to *Godzilla* producer Tomoyuki Tanate, "The theme of the film, from the beginning, was the terror of the bomb. Mankind had created the bomb, and now nature was going to take revenge on mankind."[141]

The *Godzilla* movie series, beginning in 1954 and with over 20 spinoffs thus far, was an immediate box office hit in Japan, sparking a whole new genre of Japanese filmmaking.[142] Not surprisingly, *Godzilla*, the most expensive Japanese film of its time, had a huge impact on Japanese culture, tugging at the fears of further nuclear tragedies. Although it could be argued that there was already earlier film representation of nuclear fears throughout Japan in the early 1950s,[143] and that *Godzilla* itself is suspected of being inspired by the American nuclear-science-fiction movie *The Beast from 20,000 Fathoms*,[144] no film was as explicit in its message or—more importantly—as wildly popular as *Godzilla*.

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138. GOJIRA (Toho Film (Eiga) Co. Ltd. 1954).

139. Brent Staples, *Meanwhile: Finally Getting to Know the Real Godzilla*, N.Y. TIMES, May 4, 2005.

140. Steve Ryfle, *Godzilla's Footprint*, Winter 2005 VA. Q. REV. 44 [hereinafter Ryfle, *Godzilla's Footprint*].

141. *Id.*

142. GOJIRA was released in the United States in 1956, retiled GODZILLA, KING OF THE MONSTERS. GODZILLA, KING OF THE MONSTERS! (Toho Company 1956).

143. Mick Broderick, From Atoms to Apocalypse: Film and the Nuclear Issue from Nuclear Movies, http://wwwmcc.murdoch.edu.au/~mickbrod/postmodm/m/text/n_fromatom.html#Heading9; *see also* Susan Sontag, *supra* note 125.

144. This film was released in the United States in 1953 with a similar plot line involving a dinosaur awakened by atomic testing near the North Pole. THE BEAST FROM 20,000 FATHOMS (Jack Dietz Production 1953).

a. Plot Synopsis

We tend to think of *Godzilla* as a low budget B-movie with bad acting and, most memorably, a guy in a bad lizard costume stomping on cheap sets—in other words, a cult monster film.[145] Foreigners, until recently, were only privy to a poorly dubbed, extensively cut version of the movie, lacking much of the original anti-nuclear message.[146] Director Ishiro Honda's original uncut movie, now re-released stateside, was full of nuclear references,[147] including the monster's origins, the fact that it spewed atomic breath, and dialogue referencing Hiroshima and Nagasaki.[148] Godzilla himself was intended to be an obvious metaphor for the atomic bomb: a colossal, prehistoric, uncontrollable monster who, in hibernation off of the Japanese coast since the Mesozoic era, is awakened by human intervention—namely, hydrogen-bomb testing in the Pacific.[149]

The movie begins with the Japanese government concerned about strange events off the coast; numerous ships had started exploding and sinking inexplicably (these attacks on the boats seem more like bomb flashes than attacks by a monster—reiterating the metaphor of the bomb). The islanders on Ono Island recognize the source of the attacks as the legendary Godzilla, and try to offer sacrifices to mollify him. In response to their offerings, Godzilla comes ashore and kills numerous people.[150]

Still unsure of the cause of the inexplicable sinking of ships, and hearing of the attack on Ono, the authorities send an expedition to the island to investigate. The team learns of Godzilla and its history, witnesses its wrath, and collects radioactive samples. As a result of the information, the government decides that the populace should be warned of an imminent attack by the monster.

Godzilla, with seemingly excessive ferocity, a giant force of nature with no apparent agenda and no ability to distinguish its

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145. *See, e.g.*, Analee Newitz, *What Makes Things Cheesy: Satire Multinationalism and B-Movies*, 18 SOC. TEXT 59 (2000).

146. William Tsutsui, *Godzilla and Postwar Japan*, 5 E.-W. CONNECTIONS: REV. OF ASIAN STUD. 1 (2005).

147. GODZILLA, KING OF THE MONSTERS! (Simitar Video 1998) (re-release of the American version).

148. GOJIRA (Toho Film (Eiga) Co. Ltd. 1954).

149. The area was later determined, in subsequent movies, to be the U.S. testing site on Bikini Atoll in 1954. *See, e.g.*, Nancy Anisfield, *Godzilla/Gojiro: Evolution of the Nuclear Metaphor*, 29 J. POPULAR CULTURE 53, 53-62 (1995).

150. Review of GODZILLA, KING OF THE MONSTERS!, *supra* note 147; *see* Godzilla, King of the Monsters! (1956), http://www.imdb.com/title/tt0197521/ (last visited Jan. 7, 2009) (summarizing the plot of GODZILLA, KING OF THE MONSTERS!).

victims, then destroys Tokyo. The movie's hero, a scientist named Dr. Daisuke Serizawa, finally destroys the monster with his doomsday weapon, the Oxygen destroyer.[151] Following the death of Godzilla, a scientist forewarns the audience: "If we continue testing H-bombs, another Godzilla will one day appear again, somewhere in the world."[152]

b. Political and Historical Background

The commercial success of *Godzilla* came at a time when Japan was just beginning to recover from nearly a decade of post-war American occupation and the country was brimming with fear of another nuclear attack.[153] With the country sandwiched between the Soviet Union and American nuclear-testing grounds in the Marshall Islands, and with the Korean Peninsula escalation in the news, there was a pervasive fear of another nuclear attack in the region and potential nuclear fallout in Japan.[154] In March of the year that *Godzilla* was released (*Godzilla* was released in November 1954), a Japanese fishing boat, Fukuryu Maru, or the Fifth Lucky Dragon, strayed into the radioactive cloud of an American fifteen-megaton[155] hydrogen bomb, killing a crew member and injuring the rest of the twenty-three man crew.[156] In addition to the immediate strain upon Japanese-U.S. relations, the fear of nuclear contamination pervading Japan became more pronounced.[157]

While pervasive, the fear of future nuclear bombs, as well as the atomic bombing of Hiroshima and Nagasaki, were not discussed publicly.[158] *Godzilla* brought these underlying fears into the open.

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151. STEVE RYFLE, JAPAN'S FAVORITE MON-STAR: THE UNAUTHORIZED BIOGRAPHY OF GODZILLA (ECW Press 1999) [hereinafter RYFLE, JAPAN'S FAVORITE MON-STAR].

152. Ryfle, *Godzilla's Footprint*, *supra* note 140.

153. *See* Morris Low, *Displaying the Future: Techno-Nationalism and the Rise of the Consumer in Postwar Japan*, 19 HIST. & TECH. 197, 203 (2003).

154. *See, e.g.*, Tsutsui, *supra* note 146.

155. This bomb in particular was 750 to 1,000 times as powerful than the bomb dropped on Japan during the war. It obliterated a large part of Bikini Atoll and sent a large radioactive plume over a large swath of the Pacific. *See, e.g.*, Nao Shimoyachi, *Bikini Test Survivors Still Living With Blast*, THE JAPAN TIMES, Feb. 27, 2004.

156. *See, e.g.*, Daigo Fukuryu Maru – Wikipedia, http://en.wikipedia.org/wiki/Daigo_Fukuryu_Maru (last visited on Jan. 7, 2009).

157. *See, e.g.*, Tsutsui, *supra* note 146.

158. *See* Claudia Dreifus, *From Hiroshima's Shadow, Turning Radiation into Renewal: A Conversation with Ritsuko Komaki*, N.Y. TIMES, Aug. 2, 2005, at F2 ("That's not what Japanese people do. Japanese people try to avoid unpleasant subjects. This tendency is a problem even now with ordinary cancer patients in Japan. They often do not go for help because they want to avoid unpleasantness.").

Within a year of the release of *Godzilla*, and nearly two years after the American test on Bikini Atoll, the Japan Council Against Atomic and Hydrogen Bombs (Gensuikyo), which continues to promote the eradication of all nuclear bombs, was founded.[159] After collecting over 34 million signatures—the majority of eligible Japanese voters—the Council helped push through the Basic Atomic Energy Law of 1956, which limited the research, development, and utilization of atomic energy to peaceful uses only.[160] Since then, national policy has embodied "three non-nuclear principles"—forbidding the nation to possess or manufacture nuclear weapons, or to allow them to be introduced.[161]

c. Analysis

While there is no denying the importance of the immediately preceding events in the wake of Japan's enactment of restrictions on nuclear-bomb technology, it is likely that the country's pervasive awareness was at least partially due to the huge interest in *Godzilla*. While the earlier death of a crew member on the Fukuryu Maru was a tragedy, he was the only one who died as a direct result of the atomic blast, and his death occurred thousands of miles away from Japan.[162] It is unlikely that this single casualty alone was the impetus for Japan's anti-nuclear-bomb position. In fact, it seems likely that, even with all of the other nuclear-oriented events occurring in the region, the movie provided much of the momentum for the Japanese position on nuclear weapons.

Even while acknowledging that the effect of the bombing of Hiroshima and Nagasaki was a large, if not primary, reason for the Basic Atomic Energy Law, it seems unusual that the Japanese government would wait a decade to introduce it. In fact, there seems to be some evidence that Japan was not moving in this direction prior to the release of *Godzilla*: (1) the Potsdam Declaration,[163] which effectively demilitarized Japan, did not include the later restrictions

159. The Japan Council against Atomic and Hydrogen Bombs, http://www10.plala.or.jp/antiatom/en/index.html (last visited Jan. 7, 2009).

160. Atomic Energy Basic Law, Law No. 186 of 1955, art. 2, *available at* http://www.jaea.go.jp/jnc/kaihatu/hukaku/english/atomiclaw.htm.

161. Nuclear Weapons Program - Japan, http://www.fas.org/nuke/guide/japan/nuke (last visited Jan. 7, 2009).

162. Daigo Fukuryu Maru – Wikipedia, *supra* note 156.

163. *See* Potsdam Declaration: Proclamation Defining Terms for Japanese Surrender, U.S.-U.K-P.R.C., July 26, 1945, DEP'T ST. BULL. No. 318, 137-38, *available at* http://www.ndl.go.jp/constitution/e/etc/c06.html.

on research into nuclear weapons;[164] (2) U.S. occupation and censorship over post-war Japan lasted until 1952, significantly prior to the 1956 passing of the Atomic Energy Law;[165] (3) following the implementation of the San Francisco Peace Treaty,[166] all prior restrictions on atomic research were lifted;[167] (4) following the end of U.S. occupation, and actually at the behest of the United States, Japan began to rearm itself, creating a 75,000-troop paramilitary force;[168] (5) the Japan Council against Atomic and Hydrogen Bombs (Gensuikyo) was established in 1955, a decade after the end of the war;[169] (6) while the Science Council of Japan had released a statement that it had no intention of ever using nuclear technology for warfare as early as 1950, the Basic Atomic Energy Law came more than half a decade later;[170] and (7) the Japanese government, immediately following the test blast in Bikini Atoll, appropriated 235 million yen for the construction of nuclear reactors, hardly the reaction of an anti-nuclear government fearful of the misuse of nuclear energy.[171]

Interestingly, the 1998 remake of *Godzilla* did not resonate as well with the younger Japanese generation, possibly due to the cultural shift away from a fear of nuclear threats to other socioeconomic issues that are more imminent and relevant today.[172] In fact, Japan has recently revived the idea that it may develop nuclear capability.[173] Perhaps the general lack of enthusiasm for the film indicates that a film's greatest effect on policy occurs when there

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164. *See* EMMA CHANLETT-AVERY and MARY BETH NITKITIN, JAPAN'S NUCLEAR FUTURE: POLICY DEBATE, PROSPECTS AND US INTERESTS, CONGRESSIONAL RESEARCH SERVICE REPORT FOR CONGRESS (May 9, 2008).

165. *See, e.g.*, Hiroshi Masuda, *The Occupation of Japan – The Rearmament of Japan*, *available at* http://academic.lexisnexis.com/upa/upa-subject-area.aspx?pid=2828&type=IS&parentid=2816.

166. Treaty of Peace with Japan; *Nihon-koku tono Heiwa-Jyaku, available at* http://www.uni-erfurt.de/ostasiatische_geschichte/texte/japan/dokumente/19/19510908_treaty.htm.

167. *Id.*; *See* Shoji Sawada, *The Influence of Hiroshima and Nagasaki on Scientists in Japan*, BULL. (22 INT'L NETWORK ENGINEERS & SCI. AGAINST PROLIFERATION), Dec. 2003.

168. *See* Masuda, *supra* note 165.

169. The Japan Council against Atomic and Hydrogen Bombs, *supra* note 159.

170. *See* Sawada, *supra* note 167.

171. *Id.*

172. *See* Andrew L. Oros, *Godzilla's Return: The New Nuclear Politics in an Insecure Japan in* JAPAN'S NUCLEAR OPTION: SECURITY, POLITICS, AND POLICY IN THE 21ST CENTURY 49 (Benjamin Self and Jeffrey Thompson eds. 2003), *available at* http://www.stimson.org/japan/pdf/JNO-Political_Context.pdf.

173. *See* Nuclear Weapons Program – Report, http://www.globalsecurity.org/wmd/world/japan/nuke.htm.

is a nexus of an historical event coinciding with a plot that relates (sometimes unintentionally) to that event. The next film is possibly the best example of such a nexus.

2. *The China Syndrome* and Nuclear Power

The China Syndrome was a late 1970s thriller detailing a reporter's discovery of a cover-up at a nuclear facility. *The China Syndrome*, like other movies cited in this Article, benefited from contemporaneous real-world events in terms of both box-office results and its effect on policy: both its profit margin and its societal influence were undeniably aided by the public's strong association between the movie and the subsequent partial core meltdown of a nuclear power reactor at Pennsylvania's Three Mile Island nuclear power generating station.[174] Shares in nuclear-power companies plunged while there was simultaneously an upsurge in Columbia Pictures shares.[175]

The term "China Syndrome," an actual phrase used in the nuclear industry at the time the film was released, referred to the fear that the heat from a core meltdown would be so intense that the core itself would burrow through the Earth all the way to China.[176] The cast, producers, technical advisors,[177] and director[178] all had strong

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174. Malcolm Forbes, Editorial, FORBES, July 9, 1979 ("The timing of the film's appearance with the Three Mile Island nuclear nightmare was the most extraordinary coincidence ever."); *see* TIME, *infra* note 179 ("Reassuring statements spewed from the plant's press spokesmen, sounding as if they were taken right out of the script for *The China Syndrome*."); *see also* NEWSWEEK, Apr. 9, 1979 ("The greatest risk of all was a catastrophic 'meltdown' of the sort fictionalized in a popular new film called *The China Syndrome*.")

175. Forbes, *supra* note 174.

176. *See* Production Notes, THE CHINA SYNDROME (DVD SPECIAL EDITION) (Sony Pictures re-released 2004) (stating that the movie's name was kept secret until its release for fear that the term would give up the whole story to those who were in the nuclear industry).

177. George F. Will, *A Film About Greed*, NEWSWEEK, Apr. 2, 1979, at 96.

178. *The China Syndrome* has obvious anti-nuclear sympathies. Screenwriter Michael Gray sought the advice of nuclear critics, and anti-nuclear activist Jane Fonda signed on to play a soft-news television reporter who stumbles onto the big story. Dennis A. Williams, *National Affairs; Beyond 'The China Syndrome'*, NEWSWEEK, Apr. 16, 1979, at 31. Still, the word "nuclear" never appeared in the $2.1 million television publicity campaign used to launch the film. *Id.* "'We were afraid we would politically polarize the audience before they were in the theater,' explains producer and co-star Michael Douglas." Id. Contrast this with the statement by the director of the movie stating that while *The China Syndrome* was about a nuclear mishap, "[it] wasn't really anti-technology. Bureaucracy was the monster, not something disgorged by science amok." THE CHINA SYNDROME, *supra* note 176.
"*The China Syndrome* is really just an attack on greed." Jane Fonda, Barbara Walters Special (ABC television broadcast July 1979).

anti-nuclear-power agendas, and the movie's plot reflected this fact.[179] Although not entirely realistic in its portrayal of the inner workings of a reactor, it provided a vehicle for the anti-nuclear campaign to gain momentum and influence the viewing public.[180] *The China Syndrome*, immediately exploited by anti-nuclear activists to promote their goals,[181] became their cult classic, and it remains so today.[182] Much of the popular backlash following the accident at Three Mile Island—an accident that most credible sources would say was essentially benign[183]—can probably be attributed to the movie.[184]

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179. In discussing Jane Fonda and her husband, *Time* wrote in its October 8, 1979, issue:

> It was the biggest antinuclear rally in U.S. history . . . . 200,000 blue-jeaned, banner-waving protesters thronged Manhattan's Battery Park . . . . Bella Abzug was there. So were consumer advocate Ralph Nader and environmentalist Barry Commoner. And so, in another flashback to the '60s, were actress Jane Fonda and her husband activist Tom Hayden, this time talking of a nuclear armageddon.

Tom and Jane vs. Big Business, TIME, Oct. 8, 1979, *available at* http://www.time.com/time/magazine/article/0,9171,916872,00.html. A *Washington Post* article noted the extent to which the public identified Jane Fonda with the anti-nuclear movement: "James R. Schlesinger Jr. . . . is as firmly identified in the public mind with pro-nuclear forces as actress Jane Fonda is with the opposition." Edward Walsh, *Nothing Indicates Change in Carter View of A-Power Needs*, WASH. POST,. May 20, 1979, *available at* http://pqasb.pqarchiver.com/washingtonpost_historical/access/131807962.html?dids=131807962:131807962&FMT=ABS&FMTS=ABS:AI&date=May+20%2C+1979&author=By+Edward+Walsh+Washington+Post+Staff+Writer&pub=The+Washington+Post++(1974-Current+file)&edition=&startpage=A10&desc=Nothing+Indicates+Change+in+Carter+View+of+A-Power+Needs.

180. *See* Patrick P. McCurdy, *The China Syndrome May Cloak A Fear Of Living*, CHEMICAL WEEK, Apr. 11, 1979, at 5 ("Many commentators have tried to liken Three Mile Island to the film *The China Syndrome*. They have it all wrong. What Three Mile Island shows is that the film is a grotesque parody. In the real world, reactors don't act that way and people don't act that way. Only Jane Fonda and Jack Lemmon act that way. They may have shown what real acting is all about. But real people living in a real world have shown what the human spirit is all about. Behind *The China Syndrome* is a syndrome perhaps more fearsome than the potential problems the film explores: fear of living.").

181. THE CHINA SYNDROME (Columbia/Tristar Studios 1979).

182. *See, e.g.*, Deborah Norville, Politicizing a summer movie: Should science fiction movies be fodder for political debate? MSNBC available at http://www.msnbc.msn.com/id/5060911/.

183. *See, e.g.*, Nuclear Energy Institute, FACT SHEET. The TMI 2 Accident: Its Impact, Its Lessons December 2007, *available at* http://www.nei.org/filefolder/The_TMI_2_Accident_-_Its_Impact_Its_Lessons_1207logo.pdf.

184. *See* Bob Theberge, *CSIS Briefings: New Prospects For Nuclear Energy*, 7 WASH. Q. 146, 146 (1984).

> During a recent CSIS Science and Technology seminar, Harold Agnew, president of General Atomic Technologies and former director of the Los Alamos National Laboratory [stated that] . . . [d]ue to the Three Mile Island accident and the movie *The China Syndrome*, the public has, in large part, become wary of nuclear power plant safety capabilities. The anti-nuclear movement has grown rapidly and become more vociferous. Although Agnew suggested that opponents of

a. Plot Synopsis[185]

In the film, the characters played by Michael Douglas and Jane Fonda learn of an unreported accident in a nuclear power plant. Although the power company sees the incident as a minor accident and refuses to report it, a senior member of the control room in the reactor, played by Jack Lemmon, is convinced that there is a greater but unclear threat to the reactor. Over the course of the movie, his character develops. At the outset of the film, he believes fully in the safety of the reactor and preaches at any opportunity about the significant safety redundancies inherent in the system. However, by the end of the film, he loses faith in the technology's ability to keep the reactor and the surrounding populace safe.

Meanwhile, intent on covering up the accident so that their other, newer nuclear power plant can become operational, and to protect their bottom line, the fictional power company stops at nothing to keep the press from learning of the accident. In the course of trying to prevent news of the accident going public, the private security team of CG&E (the fictional utility company in charge of the nuclear plant) forces one of the protagonists off the road, causing his car to crash and nearly killing him. It is not coincidental that the scene is very similar to an accident that killed Karen Silkwood on November 13, 1974.[186] Ms. Silkwood, a technician at Kerr-Mcgee's plutonium fuels production plant in Crescent, Oklahoma, was allegedly on her way to meet with a reporter to expose safety issues at the plant but never made it to the meeting.[187] The similarities between the two events were not lost on the audience, further fueling distrust of the nuclear industry.[188]

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nuclear power tend to be poorly informed on the technological issues—objecting to nuclear power for the wrong reasons—neither government nor industry has made a concerted effort to reverse current perceptions.

Id. *See also* Eli I. Goodman, *Public Information Problem II*, AM. NUCLEAR SOC. 29 (Dec. 1982); John Caughey, Address: Twenty Miles Out: Patterns of Response to Three-Mile Island, American Studies Association (Oct. 29-Nov. 1, 1981).

185. *See, e.g.*, Review of THE CHINA SYNDROME (1979), http://www.imdb.com/title/tt0078966 (last visited Jan. 8, 2008).

186. *See, e.g.*, The China Syndrome – Wikipedia, http://en.wikipedia.org/wiki/The_China_Syndrome (last visited Jan. 8, 2009).

187. *The Karen Silkwood Story*, 23 LOS ALAMOS SCIENCE, Nov. 23, 1995, *available at* http://www.fas.org/sgp/othergov/doe/lanl/00326645.pdf.

188. Even the trial regarding the incidents relating to the death of Karen Silkwood was possibly tainted by this movie. *See, e.g.*, Bill Curry, Op-Ed., *Silkwood Family Awarded $10.5 Million in Damages; Jury Awards $10.5 Million to Silkwood Family*, WASH. POST, May 19, 1979, at A1. ("A federal jury awarded $10.5 million in damages today to the relatives in [sic] Karen Silkwood, the young plutonium plant worker whose celebrated case

Finally, in a last-ditch effort to inform the public of the safety issues in the nuclear power plant, Mr. Lemmon's character takes over the plant and demands that a news team be brought in so that he can tell his side of the story regarding the accident and its greater significance. Although he is killed by a SWAT team called in to regain control of the power plant, he is vindicated at the end of the movie when the nuclear plant fails and the dangers associated with it become apparent.

b. Political and Historical Background

Three Mile Island colloquially refers to two nuclear reactors on an island in the Susquehanna River located ten miles from Harrisburg, Pennsylvania.[189] On March 28, 1979, at four in the morning, the safety procedures at Three Mile Island failed and a small amount of radiation escaped from the plant.[190] This failure created, as Jane Fonda, one of the film's stars, put it, "the most shocking synchronicity between real-life catastrophe and movie fiction ever to have occurred."[191] The accident on Three Mile Island, in and of itself, was not a huge accident;[192] there was only one resulting death, and the U.S. Nuclear Regulatory Commission immediately informed the public that the release of radioactivity was within safety limits and that subsequent tests showed little, if any, containment breach. Even the workers on duty were not harmed.[193] Notwithstanding these facts,

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began with her mysterious death almost five years ago . . . . The Silkwood trial, spanning eleven weeks, was played out against a backdrop of publicity unfavorable to the nuclear power industry, including the Three Mile Island power plant accident and the movie *The China Syndrome*. Federal Judge Frank Theis had ordered the jurors to ignore both.").

189. *See, e.g.*, Three Mile Island – Wikipedia, http://en.wikipedia.org/wiki/Three_Mile_Island (last visited Jan. 8, 2009).

190. *See, e.g.*, U.S. NUCLEAR REG. COMM'N, FACT SHEET ON THE ACCIDENT AT THREE MILE ISLAND, *available at* http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/3mile-isle.html.

191. Amity Shlaes, *Getting Over Our China Syndrome*, FREEREPUBLIC.COM, Apr. 28, 2005, http://www.freerepublic.com/focus/f-news/1392954/posts.

192. *See, e.g.*, G. KEMENY, THE NEED FOR CHANGE: THE LEGACY OF TMI, REPORT OF THE PRESIDENT'S COMMISSION ON THE ACCIDENT AT THREE MILE ISLAND (1979); N. COLE ET AL., SPECIMENS REMOVED FROM THE DAMAGED TMI REACTOR VESSEL 81-91 (1994); ORG. FOR ECON. COOPERATION & DEV., THREE MILE ISLAND REACTOR PRESSURE VESSEL INVESTIGATION PROJECT: ACHIEVEMENTS AND SIGNIFICANT RESULTS (1993) (proceedings of an October 1993 open forum sponsored by the OECD Nuclear Energy Agency and the U.S. Nuclear Regulatory Commission in Boston, Massachusetts).

193. M. A. Meyera, *The Nuclear Community and the Public: Cognitive and Cultural Influences on Thinking About Nuclear Risk*, LOS ALAMOS NAT'L LABORATORY REP. LA-UR-94-3768, *reprinted in* NUCLEAR SAFETY § 37: 2, 97-108 (Apr.-June 1996). Contrast this with other non-governmental reports. *See, e.g.*, Seo Takeshi, NRC's Gross Underestimation of the Radioactive Releases and Population Doses During the TMI-2 Accident (unpublished

no new nuclear reactor has been ordered in the United States since the accident on Three Mile Island.[194]

Before the accident at Chernobyl, there had never been a serious nuclear disaster in eleven thousand cumulative reactor-years of operation worldwide.[195] And only the Chernobyl accident ever resulted in any significant radiation exposure; all other incidents at nuclear reactors have been confined to the plant.[196] Additionally, apart from Chernobyl, no nuclear workers or civilians have ever died as a result of radiation exposure from a commercial nuclear reactor.[197] In fact, most of the serious radiological incidents and deaths that occur each year are the result of exposure to abandoned medical or industrial equipment.[198] Contrast these figures with reported fatalities for other forms of energy production that are generally considered to be safer: over the twenty-year period from 1972 to 1992, accidents at coal power plants have resulted in 6,400 deaths; at hydroelectric plants, 4,000 have been killed on the job; and 1,200 have died in the production of natural-gas-derived electricity.[199]

c. Analysis

While it is generally known that the public's understanding of the risk associated with running nuclear reactors differs greatly from that of people working within the field of nuclear safety—illustrated through Mr. Lemmon's character's confidence in the reliability of the plant—it is unclear why this is the case.[200] Further justifying this schism between public perception and nuclear experts, the movie's only supporter of the nuclear industry's safety record, the character

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manuscript), *quoted in* HARVEY WASSERMAN & NORMAN SOLOMON, KILLING OUR OWN: THE DISASTER OF AMERICA'S EXPERIENCE WITH ATOMIC RADIATION (1982), *available at* http://www.ratical.org/radiation/KillingOurOwn/KOO12.html.

194. Granted the nuclear industry was already in decline at this point, but this decline does not justify the total lack of new orders. *See, e.g.*, The U.S. Nuclear Regulatory Commission (NRC) 2008–2009 Information Digest, Appendix A for a complete listing of power generating nuclear reactors in the United States including the dates the construction permits were issued and the dates that the plant went on line.

195. Safety of Nuclear Reactors, World Nuclear Association (2008), http://world-nuclear.org/info/inf06.html (last visited Jan. 8, 2009).

196. *Id.*

197. *Id.*

198. *Id.*

199. Safety of Nuclear Power Reactors – World Nuclear Association, http://world-nuclear.org/info/inf06app.html (last visited Jan. 8, 2009).

200. *See, e.g.*, JOHN B. RITCH III, NUCLEAR GREEN, 41 IAEA BULLETIN 2 (1999) ("And yet public understanding of nuclear power remains shrouded in myths and fears quite disproportionate to the facts.").

played by Mr. Lemmon, loses confidence in nuclear safety over the course of the film.

Although criticized as scientifically and factually inaccurate and not representative of reality[201]—the concept of a "China Syndrome" has been discredited[202]—the film benefited from the fact that the accident at Three Mile Island occurred less than two weeks after the release of the movie.[203] In typical fashion, the media sensationalism regarding the events at Three Mile Island in turn contributed to the success of the movie,[204] further indicating how the public entwined the two events.[205]

It should be noted that there were a number of other events, in addition to the release of *The China Syndrome*, that occurred during a relatively short time period surrounding the events at Three Mile Island that heightened the public's concern with nuclear safety. These events included the release of an edition of *National Geographic* magazine, distributed the last week of March 1979, which brought the promise and peril of atomic energy to the attention of its audience in a

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201. Samuel McCracken, *The Harrisburg Syndrome*, COMMENTARY, June 1979, at 27-39.

202. N. COLE, TMI-2, A LEARNING EXPERIENCE: ASSESSING THE DAMAGE (1985).

203. In an eerie coincidence, the movie makes the claim that the potential fallout from a nuclear disaster would affect an area the size of Pennsylvania. *See* THE CHINA SYNDROME (Columbia/Tristar Studios 1979).

204. Laverle Berry et al., *Media Interaction with the Public in Emergency Situations: Four Case Studies*, LIBR. CONGRESS, FED. RES. DIVISION, TERRORISM & CRIME STUD. (Aug. 1999), *available at* http://www.loc.gov/rr/frd/pdf-files/Media_Interaction.pdf.

205. *The Fonda Syndrome*, ECONOMIST, Apr. 7, 1979, at 112.

> It's an ill wind. The Harrisburg near-disaster that made mincemeat of nuclear energy stocks on Wall Street this week did nothing but good for Columbia Pictures. Columbia, distributors of a so-so Jane Fonda movie about just such a disaster called *The China Syndrome* that opened to a generally indifferent press only three weeks ago, suddenly has its biggest non-holiday moneymaker ever. It has now pulled in more than $18 million at the box office. Columbia's stock shot up more than 20% to $27 1/2 before profit-taking set in on Tuesday.

Id; *see also* Aljean Harmetz, N.Y. TIMES, Apr. 4, 1979, at 3:18.

> Box-office grosses of film *The China Syndrome* last weekend—[the third] weekend of its [national] run—were more than $5 million. Instead of anticipated [third] weekend drop, ticket sales per theater [averaged] $3,200, almost as high as opening weekend's $3,400. [This] film is [the] biggest non-holiday film in Columbia's history. [The] nuclear accident at Three Mile Island plant has stimulated extra interest in moviegoers. Columbia execs and film's makers have been uneasy ever since seriousness of accident at plant became evident. Producer and star Michael Douglas comments. Cancels his scheduled appearance on Johnny Carson show. Jack Lemmon, who also stars in film, declines appearance on CBS News special. Douglas and Columbia pres Frank Price lower publicity curtain in order to avoid even appearance of using accident to publicize film. Jane Fonda, who also appears in film, calls on Pres Carter to dismiss Energy Secretary.

thirty-six-page article entitled "What About Nuclear Energy?"[206] In addition, the General Accounting Office, on March 30, 1979, issued a study that began seventeen months earlier entitled "Areas Around Nuclear Facilities Should Be Better Prepared for Radiological Emergencies."[207] The study criticized procedures, which did not require emergency evacuation plans before nuclear reactors could be licensed. Additionally, the findings of the Reactor Safety Study (a.k.a. the Rasmussen Report),[208] which described the probabilities and risks associated with a nuclear meltdown, became obsolete in 1979.[209] The report had stated that its conclusions would be valid only until that year, as its computations did not take into account the aging of nuclear power plants.[210] Still, none of these events by themselves would have created the public outcry following the events at Three Mile Island if *The China Syndrome* not been a rallying point for all of the fears associated with nuclear fallout.

Following the release of the movie and as a result of the confluence of events described above, both Jane Fonda[211] and Michael Douglas[212] became anti-nuclear activists. Jane Fonda also credits the film as being instrumental in converting Ted Turner, owner of CNN and other media outlets, into an anti-nuclear activist.[213] Given Turner's control of CNN and Fonda's and Douglas's star power, it is likely that these three, among others, had a substantial role in keeping down the nuclear power industry in the United States.

The nuclear power industry is not the only enterprise that suffers from the public's inability to properly judge the risks

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206. *What about Nuclear Energy*, 155 NAT'L GEOGRAPHIC (1979).

207. AREAS AROUND NUCLEAR FACILITIES SHOULD BE BETTER PREPARED FOR RADIOLOGICAL EMERGENCIES, U.S. GEN. ACCT. OFF., COMPTROLLER GENERAL REP. TO U.S. CONG. (Mar. 30, 1979), *available at* http://archive.gao.gov/f0302/108990.pdf.

208. Norman C. Rasmussen, US Nuclear Regulatory Commission, Reactor Safety Study: An Assessment of Accident Risks in the U.S. Commercial Nuclear Power Plants, RSS WASH-1400 (1974).

209. *See* NUCLEAR REG. COMM'N, STATEMENT ON RISK ASSESSMENT AND THE REACTOR SAFETY STUDY REPORT WASH-1400 (Jan. 18, 1979). The Rasmussen Report concluded that in the worst case disaster scenario, —a complete meltdown of the nuclear fuel at a typical plant— 90 percent of the population would be evacuated from the area to safety within eight hours. Even then, immediate fatalities could exceed 3,000; delayed fatalities could exceed 45,000; radiation illness could affect more than 5,600; and property damage could exceed $6 billion. *Id.*

210. *Id.*

211. *See, e.g.*, Stephen J. Dubner and Steven D. Levitt, *Freakonomics: The Jane Fonda Effect*, N.Y. TIMES, Sept. 16, 2007.

212. *See, e.g.*, Radion Interview on National Public Radio's Talk of the Nation May 20, 2008, *available at* http://www.npr.org/templates/story/story.php?storyId=90628750).

213. Production notes, *supra* note 176, at 36.

associated with radiation.[214] There are beneficial procedures that, because they involve radiation, tend to scare people away. These include for example, the irradiation of meat[215] and mammograms.[216] The medical field even panders to this fear. Medicine has striven to remove any reference to nuclear technology from its terminology—as an example, consider the name change of a common diagnostic tool from "nuclear magnetic resonance" to "magnetic resonance imaging."[217] Understandably, there might be a concern that exaggerated fears of nuclear technology could limit advances in medicine or prevent some people from undergoing important medical procedures.

3. *Jurassic Park* and Cloning

Often, when we think of reasons to limit the advancement of cloning, images of *Jurassic Park* and cloned dinosaurs running amok—in defiance of their human handlers—come to mind. On the part of the filmmakers, that may have been intentional. Steven Spielberg's *Jurassic Park*,[218] released in 1993, was one of the most commercially successful films of all time, grossing close to a billion dollars in box office receipts and remaining on the top-ten movie list for more than four months.[219] The movie is an adaptation of Michael Crichton's 1990 best-selling genetic thriller of the same title, published only a couple of years after Steen Willadsen, who created the first cloned farm animal, and others began to successfully clone large mammals.[220]

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214. For a general discussion of the discrepancy between the public's understanding of risk and actual risk, see, e.g., LINDA BOTTERILL & NICOLE MAZUR, RISK AND RISK PERCEPTION: A LITERATURE REVIEW, RURAL INDUSTRIES RES. & DEV. CORP. Pub. No. 04/043, (Mar. 2004) (Austl), *available at* http://www.rirdc.gov.au/reports/HCC/04-043.pdf.

215. For a review on meat irradiation and its benefits, see J. Farkas, *Irradiation as a Method for Decontaminating Food: A Review*, 44 INT'L J. FOOD MICROBIOLOGY 189 (1998).

216. Douglas M. Chapin et al., *Nuclear Power Plants and Their Fuel as Terrorist Targets*, 297 SCIENCE 1997, 1999 (2002).

217. Edward P. Richards III, *Litigating Fear: Electrical and Magnetic Fields (EMF) and the Law*, 16 IEEE ENGINEERING MED. & BIOLOGY MAG. 176 (Sept.-Oct. 1997).

218. (Universal Pictures 1993).

219. Data from box-office numbers, derived from *Hollywood Reporter* and *LA Times* reporting box office receipts, data not shown.

220. *See generally* C.B. Fehilly & S.M. Willadsen, *Embryo Manipulation In Farm Animals*, 8 OXFORD REV. REPROD. BIOLOGY 379 (1986); S.M. Willadsen, *Nuclear Transplantation in Sheep Embryos*, 320 NATURE 63 (1986) (outlining an approach for nuclear transplantation in sheep embryos).

Both Spielberg and Crichton, who also wrote the screenplay, had a message they wanted to get across. In a *Wall Street Journal* article, Spielberg was quoted as saying, "Science is intrusive. I wouldn't ban molecular biology altogether, because it's useful in finding cures for AIDS, cancer, and other diseases. But it's also dangerous, and that's the theme of *Jurassic Park*."[221] And Crichton agrees with these sentiments: "Biotechnology and genetic engineering are very powerful. The film suggests that [science's] control of nature is elusive. And just as war is too important to leave to the generals, science is too important to leave to scientists. Everyone needs to be attentive."[222]

a. Plot Synopsis

In the film, dinosaur DNA, extracted from blood found in prehistoric mosquitoes and preserved in amber, is used to recreate long-extinct dinosaurs on a small island off the coast of Costa Rica.[223] The goal of the experiment is to create a dinosaur theme park with living dinosaurs including brachiosaurs, dilophosaurs, triceratops, velociraptors, and a tyrannosaurus rex. The film suggests that such a theme park epitomizes unregulated genetic engineering in the pursuit of profits. The owner of the theme park, a wealthy eccentric played by Sir Richard Attenborough, invites a chaos theorist and two paleontologists to certify the island as safe for insurance purposes. Meanwhile, an unscrupulous computer programmer causes the security systems in the park to fail, resulting in rampaging dinosaurs and a couple of people being eaten. By the end of the film everyone, convinced of the dangers of playing God, evacuates the island.

b. Analysis

Over the course of the film, the audience is treated to state-of-the-art animatronics and computer-generated imagery. The special effects crew, we are told in the production notes, spared no effort in making the creatures as scientifically plausible and lifelike as possible, following the latest and most innovative research.[224] The

221. Patrick Cox, *Jurassic Park, a Luddite Monster*, WALL ST. J., July 9, 1993, at A8.

222. Sharon Begley et al., *Here Come the DNAsaurs*, NEWSWEEK, June 14, 1993, at 61.

223. JURASSIC PARK (Universal Pictures 1993).

224. Stephen Nottingham, *Representation of Science in Hollywood: Jurassic Park*, STEPHEN NOTTINGHAM: CINEMA, Jan. 1998, http://ourworld.compuserve.com/homepages/Stephen_Nottingham/cintxt3.htm.

science in the movie[225] is very convincing and presented in an easily understood manner: the audience is even privy to a relatively long cartoon movie—explaining cloning in very simplistic terms—that is shown to the movie's heroes as part of a ride in the amusement park.[226]

Jeff Goldblum's character, the chaos theorist, is the intellectual and philosophical center of the novel and, to a lesser degree, the film, and is against the concept of cloning dinosaurs from the outset.[227] His character spouts all the typical arguments against cloning: "playing God," "tampering with nature," "man getting ahead of himself," and the admonition that however man tries to beat nature, nature will always manage to find a way around man's tinkering.[228] "Don't you see the danger?" asks Jeff Goldblum's character in the movie. "The problem with scientific power is that there's no discipline to attain it and no responsibility for it. You have patented and packaged this procedure as fast as you could . . . . Genetic power is the most awesome force the planet's ever seen, but, you wield it like a kid that's found his dad's gun."[229]

The scientists who do the actual cloning are shown as confident and arrogant, ignoring all ethical questions in pursuit of proving their scientific prowess.[230] The good scientists—the heroes who save the others from being eaten by the rampaging dinosaurs—are modeled after real-life paleontologists. For example, the character of Dr. Alan Grant is modeled after Dr. Jack Horner, a consultant on the film and a major proponent of the proposition that some dinosaurs were warm-blooded, and that tyrannosaurus rex was mainly a scavenger species.[231] All of these theories are presented in the movie as the current state of thinking in the paleontology world.

Michael Crichton later tried, in a speech to the American Association for the Advancement of Science, to downplay the negativity expressed towards science in his books and the movie,

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225. Stephen Jay Gould, *Dinomania*, 40 N.Y. REV. BOOKS, Aug. 12, 1993, http://www.nybooks.com/articles/2483.

226. For a similar situation, see THE BOYS FROM BRAZIL (Incorporated Television Company 1978) (giving the audience, in 1978 terms, an accurate science lesson on cloning).

227. MICHAEL CRICHTON, JURASSIC PARK (Ballantine Books 1991).

228. *Id.*

229. *Id.*

230. *See, e.g.*, Stephanie S. Turner, *Jurassic Park Technology in the Bioinformatics Economy: How Cling Narratives Negotiate the Telos of DNA*, 74 AM. LITERATURE 887 (2002) (offering an intimate look at the scientists in *Jurassic Park*).

231. JOHN R. & DON LESSEM HORNER, THE COMPLETE T. REX (Simon & Schuster 1993).

claiming that all professions look bad in film.[232] But studies have shown that scientists look relatively worse in film and television, and Crichton just furthers these cinematic stereotypes.[233] In his speech, Crichton defended the negative outlook on science as portrayed in his books, including, among others, *The Andromedra Strain*,[234] *Congo*,[235] and *The Lost World*,[236] stating that most of science is oversold on its virtues and undersold on its hazards.[237] Crichton, who also has a medical degree, had genuine concerns with scientific advancements and believed that these concerns should be reflected in his films and the books upon which they are based.[238]

c. Policy

i. Effect on Scientific Theories

In addition to providing extensive imagery for audiences to associate with the timely underlying fear of genetics and cloning, *Jurassic Park* also directs the progression of science by pushing one theory of dinosaurs—the theory held by the film's consultants. While the theories of Dr. Horner were not widely accepted prior to the movies, and there is still a lack of consensus in the scientific community regarding many of his theories,[239] there has since been a marked increase in funding for research into those theories. [240]

ii. Effect on the Biotech Industry

Jurassic Park continued to have a societal impact throughout the nineties as further cloning success stories, as well as *Jurassic Park* sequels, emerged. The association between *Jurassic Park* and biotechnology has been documented to some degree: a Wellcome Trust report on the public perspectives on human cloning found that focus-

232. Michael Crichton, *Ritual Abuse, Hot Air, and Missed Opportunities*, 283 SCIENCE 1461 (1999).

233. *Id.*

234. (Knopf 1969).

235. (Knopf 1980).

236. (Knopf 1995).

237. *Id.*

238. Crichton, *supra* note 227.

239. *See The Science (and Non-Science) of Jurassic Park and Jurassic Park 2: The Lost World*, DINOSAUR.ORG, May, 1997, http://www.dinosaur.org/jparticles.htm.

240. *See* David A. Kirby, *Reflections: Science Advisors, Representation, and Hollywood Films*, 3 MOLECULAR INTERVENTIONS 54 (2003).

group members used films such as *Jurassic Park* and *Gattaca,* a science fiction thriller where people are placed into societal classes based solely on their genetic make-up, as anchors in their discussion of cloning.[241] An analysis of the American Stock Exchange Biotechnology index (BTK index) shows that a slump in the biotechnology industry began around the time that *Jurassic Park* was released, and lasted throughout the movie's tenure in the top-ten box-office position.[242] Interestingly, once the movie fell off the top-ten list, and below 1,000 screens nationwide, the BTK index saw a significant hiccup—an increase of 14 percent in the value of the index in the month of October 1993, the only double-digit increase in a sea of decreases until July 1994.[243]

This market movement potentially reflects the fears, both ethical and financial, that *Jurassic Park* raised and instilled in the public as well as biotech investors. As long as the movie was at the forefront of our national conscience, the biotech market suffered. Not coincidentally, *Jurassic Park*'s appearance in the print media started to take a steep dive around the same time.[244] The downward trend of the BTK index would not be that surprising if it were not for the fact that other financial indices were not in a slump during the same time. During that same period, there were positive increases in the Dow Jones index, the S&P 500, and even the high-tech-oriented NASDAQ indices; in other words, the biotech industry in particular seemed to take the brunt of the losses following the release of the *Jurassic Park* movie.

This effect of *Jurassic Park* on the biotechnology industry is further evidenced by the reaction of the Biotechnology Industry Organization (BIO), a trade group established around the same time of the release of the movie.[245] BIO also fought the release of *The Lost*

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241. *Public Perspectives on Human Cloning: A Social Research Study*, WELLCOME TR. MED. SOC'Y PROGRAMME § 6.2 (1998) (Austrl.), *available at* http://www.wellcome.ac.uk/stellent/groups/corporatesite/@msh_peda/documents/web_document/wtd003421.pdf (finding that titles and topics from the popular media were used among members of focus groups "in a metaphorical manner to which it was hoped others within the group would relate"); *see also* Benjamin R. Bates, *Public Culture and Public Understanding of Genetics: A Focus Group Study*, 14 PUB. UNDERSTANDING SCI. 47 (2005).

242. Hollywood reporter/LA times reporting box office receipts (Data not shown).

243. Data from Bloomberg Financial Services. Data not shown.

244. Data from LexisNexis. Data not shown.

245. G. Kirk Raab, BIO Milestones, in Biotechnology Industry Organization Annual Report 2003, *available at* http://www.bio.org/speeches/pubs/milestone03/raab.asp

> In 1993 and 1994, some of the thinking about biotechnology was antagonistic....There was fear of the Jurassic Park Syndrome, and we needed to make sure the leadership in Washington, and in the public and influential press, didn't think biotech and genetic engineering were things to be afraid of, but that

World,[246] the sequel to *Jurassic Park*, because of its fear that the movie would have a similar negative impact on the public's perception of the industry—and, ultimately, on the industry's bottom line. [247] In 1995 BIO members wrote of the negative influences that the *Jurassic Park* franchise had on the perception of science. Consequently, in anticipation of the pending release of *The Lost World*, BIO ran a huge counter-campaign replete with fact sheets, lectures, and media briefings to combat the negative publicity and influence of the movie.[248]

4. *Gattaca* and Genetic Engineering

While *Jurassic Park* represents our fear of altering nature, *Gattaca* speaks to our uneasiness about genetic manipulation and issues relating to discrimination based on genes. According to one of *Gattaca*'s producers," *Gattaca* is a science-fiction thriller about how we might come to live with the scientific powers we are currently discovering . . . ; [it] creates a complete and believable world of the future based on the genetic testing that is becoming a reality today."[249]

In the film, society is divided into those who are genetically perfect and those who are not. Those who have some sort of imperfection in their genomes are limited in the jobs that they can take and are considered lesser humans. Like *Jurassic Park* and *Alien: Resurrection,*[250] *Gattaca* was part of a group of films that introduced genetic engineering as a significant plot component in the mid-1990s. Interestingly, Francis Collins, director of the National Human Genome Research Institute, noted that he went to see the movie numerous times; he felt that it was important for scientists to know how genetics was perceived in popular culture.[251]

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these technologies were a tremendously positive thing for humankind....During that period, we developed successful programs that rationally conveyed how biotechnology works and how industry uses it to develop products that meet real human needs.

246. THE LOST WORLD: JURASSIC PARK (Amblin Entertainment 1998).

247. *See* Kathleen Day, *Biotech Firms Brace For 'Jurassic' Sequel*, CHI. SUN-TIMES, Dec. 27, 1995, at 52.

248. *See Id.*

249. Kirby, *The New Eugenics*, *infra* note 282 (quoting Stacey Sher, co-producer *of Gattaca* (Columbia/Tristar Studios 1997)).

250. ALIEN: RESURRECTION (Twentieth Century-Fox Film Corporation 1997).

251. *Id.*

a. Political and Historical Background

Even prior to the release of *Gattaca*, a Harris Poll showed that 85 percent of the population was somewhat concerned about the implications of genetic testing and was fearful of being discriminated against on the basis of genetic makeup.[252] In 1995 anti-genetic-discrimination bills were floated around Congress, but never passed.[253] Much of this fear stemmed from the study and application of eugenics by a wide variety of actors earlier in the twentieth century.[254]

Eugenics, the now-controversial study of improving the mental and physical makeup of humanity through selective and controlled breeding, has a long and convoluted history.[255] Mendelian genetic theory, which explained simple genetic heredity, was rediscovered at the beginning of the nineteenth century, giving scientific credibility to a host of racial and biased laws, and allowed even some of the greatest scientific minds to support eugenics; eugenics chairs were endowed in many universities, and scientific, eugenics-themed journals were prominent around the world.[256] There were also a large number of films that dealt with the subject.[257] In 1927 the U.S. Supreme Court upheld the validity of mandatory sterilization in *Buck v. Bell*,[258] cited during the Nuremberg trials as the precedent for numerous Nazi programs.[259] In 1930 Aldous Huxley published *Brave New World*, a book describing a fictionalized future society based on eugenics.[260] While losing much of its popularity after the discovery of Nazi atrocities during World War II, modern concern over genetic

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252. *Legislation Sought Against Gene Bias*, 9 HUMAN GENOME NEWS, Jan. 1998, *available at* http://www.ornl.gov/sci/techresources/Human_Genome/publicat/hgn/v9n1/15bias.shtml.

253. *See, e.g.*, Coalition for Genetic Fairness, http://www.geneticfairness.org/act.html (last visited Jan. 9, 2008).

254. For a history of eugenics, see, e.g., Eugenics – Wikipedia, http://en.wikipedia.org/wiki/Eugenics (last visited Jan. 9, 2009).

255. See, e.g. Daniel J. Kevles, *Eugenics and Human Rights*, 319 BRITISH MEDICAL JOURNAL 435 (1999).

256. *See, e.g.*, Paul A. Lombardo, *"The American Breed": Nazi Eugenics and the Origins of the Pioneer Fund*, 65 ALB. L. REV. 743 (2002).

257. MARTIN PERNICK, THE BLACK STORK: EUGENICS AND THE DEATH OF "DEFECTIVE" BABIES IN AMERICAN MEDICINE AND MOTION PICTURES SINCE 1915 (Oxford University Press 1999).

258. Buck v. Bell, 274 U.S. 200, 205-08 (1927).

259. *See, e.g.*, Michael G. Silver, *Eugenics and Compulsory Sterilization Laws: Providing Redress for the Victims of a Shameful Era in United States History*, 72 GEO. WASH. L. REV. 862 (2004).

260. ALDOUS HUXLEY, BRAVE NEW WORLD (reprint ed. Harper 1998).

discrimination has its roots in the 1970s when, for example, some companies denied jobs to African Americans if they were identified as carriers of sickle-cell anemia—even if they themselves were not, and would never be, affected by the disease.[261]

Gattaca, released late in 1997, followed the highly publicized announcements regarding the first complete sequencing of the genome of a higher organism,[262] early mapping efforts of the human genome,[263] and the cloning of a sheep.[264] Needless to say, by the time that the movie was released, the public was very interested in genetics and its potential effects on society. Indeed, thirty-one states had enacted, or were actively thinking about enacting, their own state law against genetic discrimination by the time of *Gattaca*'s release. Still, most of these laws were very narrowly constructed, the vast majority dealing only with genetic testing.[265] Furthermore, on May 18, 1997, shortly before the release of *Gattaca* but after months of relatively intensive press coverage about the movie, President Bill Clinton, at a commencement address at Morgan State University, called on Congress "to pass bipartisan legislation to prohibit insurance companies from using genetic information to determine the premium rate or eligibility of Americans for health insurance."[266]

b. Plot Synopsis[267]

Gattaca, a Huxley-esque movie,[268] is set sometime in the near future.[269] Given the scientists' ability to easily extract and analyze genetic information from any cellular source, society in this film

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261. News Release, National Human Genome Research Institute, Health Insurance in the Age of Genetics (1997), *available at* http://www.genome.gov/10000879.

262. *See, e.g.*, A Goffeau et al., *Life With 6000 Genes*, 274 SCIENCE 546 (1996).

263. *See, e.g.*, G. D. Schuler et al., *A Gene Map of the Human Genome*, 274 SCIENCE 540 (1996).

264. *See* I. Wilmut et al., *Viable Offspring Derived From Fetal and Adult Mammalian Cells*, 385 NATURE 810 (1997). Also, Polly, born later the same year, was the first genetically engineered sheep to be cloned—in this case, through genetically altered fetal cells modified with a human gene. *See, e.g.*, A. Colman, *Dolly, Polly and Other Oollys': Likely Impact of Cloning Technology on Biomedical Uses of Livestock*, 15 GENETIC ANALYSIS 167 (1999).

265. News Release, National Human Genome Research Institute, *supra* note 261.

266. William Clinton, President of the United States, Commencement Address by the President at Morgan State University (May 18, 1997), *available at* http://www.ed.gov/PressReleases/05-1997/97-05-18.html.

267. Review of GATTACA (1997), http://www.imdb.com/title/tt0119177/plotsummary (last visited Jan. 9, 2009).

268. *See also* Aldous Huxley, A BRAVE NEW WORLD, *supra* note 260.

269. GATTACA (Columbia/Tristar Studios 1997).

discriminates at every opportunity on the basis of genetic makeup. At every turn, characters may call upon bodily fluids and hair samples to prove an individual's genetic birthright to be a "Valid." Ethan Hawke's character, Vincent, is genetically flawed; unlike the bulk of his peers, his birth is natural and not the result of genetic manipulation to remove all possible imperfections and prevent all diseases. Vincent's dream is to fly to Titan, a moon of Saturn, but this dream is unattainable to those who are not genetically perfect. As a result, Vincent purchases the genetic identity of one particular Valid, played by Jude Law, who, crippled in an accident, no longer has the need to present himself as a Valid. The movie details how Vincent goes to great lengths to maintain his cover, including preparing blood and urine samples, as well as working out methods for their delivery to his company, which conducts rigorous genetic testing on its employees. Vincent is also careful to vacuum up anything biologically shed from his body at his workspace so that he leaves nothing behind that could be used to identify him as an "In-Valid."

Vincent's dream of getting to Titan is nearing reality when it is suddenly threatened by a murder investigation that involves his true, In-Valid identity as a suspect. The police investigation (headed by Vincent's genetically superior brother, albeit oblivious to the relationship) has found an eyelash belonging to Vincent that obviously does not belong at the company where In-Valids cannot work. The movie's suspense builds through Vincent's efforts to prevent others—and most importantly, his Valid brother—from finding out about his genetic imperfections.

c. Analysis

i. National Debate on Genetic Discrimination

The movie is thematically rich and explores a host of issues, most notably the discrimination against the main character on the basis of his genetic makeup. Around the beginning of the filming of the movie, there was a relatively large increase in the amount of discussion of genetic discrimination in the media.[270] While the media coverage of this issue spiked a number of times throughout the

270. The film began shooting in the late spring of 1996. *See, e.g.*, Tori Minton, *Marin Civic Center Enters Space Age: Futuristic Thriller Being Filmed There*, THE SAN FRANCISCO CHRONICLE, May 20, 1996, at B1.

nineties, the introduction of *Gattaca* in the media coincides with the first real jump in the media's discussion of genetic discrimination.[271]

This film is a good example of the media taking a very complex issue, simplifying it, and presenting it as a black-or-white question. Nevertheless, it was helpful in raising the national consciousness of the issues surrounding the creation of a national genetic database, eugenic breeding, and intrusive genetic testing.[272] For the most part, the movie takes a negative view of any genetic manipulation, but to its credit, the movie tries to show that we are not confined by our genetic destiny—that even someone with a poor genetic disposition can overcome it. Vincent, while not genetically perfect, can still, through diligence and hard work, out-swim his perfect brother. However, the film makes this point by confusing issues relating to genetic predisposition, confounding the genetic probability of getting a disease with the certainty of getting that disease, and assuming a lesser quality of life given that predisposition.[273]

Moreover, the film seems to gloss over the fact that the society portrayed in the film not only discriminates against an In-Valid, but also people like the character played by Jude Law, who, while born genetically perfect, suffered an accident that crippled him. This is more than just genetic discrimination; it is discrimination against anyone who is not perfect, independent of the cause of that imperfection. Unfortunately, the film directs the audience's abhorrence of discrimination towards genetic discrimination, and not towards the larger discrimination that is actually occurring in the film. While general discrimination is without merit, genetic discrimination does have some positive potential. Pharmacogenomics involves the creation and design of drugs for particular genotypes in the population, and therefore advocates for genetic discrimination in the prescription of drugs—but for legitimate medical reasons.[274]

The movie seems somewhat simple-minded in implying that genetic discrimination in the choice of astronauts for a flight to Titan

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271. Data collected and on file with Author.

272. See, for example, Elizabeth E. Joh, *Reclaiming "Abandoned" DNA: The Fourth Amendment and Genetic Privacy*, 100 NW. U.L. REV. 857 (2006), for concerns regarding the use of DNA in the public sphere.

273. Ethan Hawke's character is destined to menial jobs and the inability to advance beyond his station in life. *See* GATTACA, *supra* note 269 (As he says: "The only time you're going to see the inside of a space shuttle is if you're cleaning it.' . . . 'Unacceptable risk of heart failure.' . . . 'I think that's what the manual says. The only trip I'll take in space is around the sun on this satellite right here.'").

274. *See, e.g.*, R. Das et al., *Global Perspectives on Proteins: Comparing Genomes in Terms of Folds, Pathways and Beyond*, 1 PHARMACOGENOMICS 115 (2001); *see also Illuminating BiDil*, 23 NATURE BIOTECHNOLOGY 903 (2005).

is categorically wrong. After all, if Titan is far enough away that it would take years to get there, then it might make sense to limit the astronaut pool to people who will more probably than not survive the duration of the flight, and exclude those who may suffer a heart attack or other debilitating condition during the flight. The movie also takes a very simplistic view in the nature-versus-nurture debate, ascribing our physical flaws and diseases to nature and ignoring the more accepted idea that extrinsic factors play a large role in how our genetic dispositions play out.[275]

Unfortunately, the movie also takes a singular view on many other genetic issues as well—for example, the issue of genetic testing. The filmmakers could have shown how genetic testing could be used for good in prenatal genetic testing for treatable disorders, or how a national database could be used to solve actual crimes. Instead, the film exclusively showed the abuse of the database by an investigator who tirelessly (and enigmatically) pursues a single suspect for a crime that the audience knows he did not commit.

ii. Genetic Information Nondiscrimination Act

Two months after filming began on *Gattaca* and within a year of the screenplay being publicly shopped around (an event that garnered a lot of attention in the Hollywood press), Senator Olympia Snowe (R-ME), on June 24, 1996, assumed her leading role in what became an annual cycle of federal genetic nondiscrimination bills that eventually culminated in the Genetic Information Nondiscrimination Act (GINA).[276] It was well known in the Hollywood trade papers, in addition to random references in the mainstream press, that *Gattaca* was in production long before it was released,[277] so it is not surprising that by the time the movie came out there was already proposed legislation to prevent exactly what the film predicted. While *Gattaca* may have influenced legislators to draft a bill, it took nearly a decade

275. *See, e.g.*, Kevin Davies, *Discrimination Down to a Science*, 390 NATURE 33 (1997) (reviewing GATTACA); *see also* Stephen Nottingham, *Chapter Seven: All in the Genes?*, *in* SCREENING DNA: EXPLORING THE CINEMA-GENETICS INTERFACE (1999), *available at* http://ourworld.compuserve.com/homepages/Stephen_Nottingham/DNA8.htm.

276. Genetic Information Nondiscrimination Act of 2008, Pub. L. No. 110-233, 122 Stat. 881 (2008).

277. *See, e.g.*, trade newspapers such as *Variety* in the months preceding and during production. Gattaca was of particular interest in the trade press as it was the first film of a young rising writer/director Andrew Niccol. Niccol was already in the midst of working on his next project, THE TRUMAN SHOW, starring Jim Carey when he started and completed Gattaca. *See, e.g.*, Internet Movie Database, Andrew Niccol, *available at* http://www.imdb.com/name/nm0629272/bio.

for the bill, hailed by Senator Edward Kennedy (D-MA) as the "first civil-rights bill of the new century" but disliked by powerful insurance and other related lobbies,[278] to be passed as the Genetic Information Nondiscrimination Act (GINA).[279] *Gattaca* may have only been part of the influence on the public's perception of genetics; other films or events may have persuaded the public, including other genetics-based movies like *The 6th Day* starring Arnold Schwarzenegger.[280]

In an attempt to create buzz for the movie, Sony created a false advertising campaign for a fictional company, Gattaca, that would allow parents to chose specific physical attributes of their children and remove mutations and inheritable diseases from their genetic makeup.[281] This campaign is further indicative of the movie's extensive interaction with society: it provided a real-life test for the moral question that it raised in the film. Should we be fiddling with our genes to remove all potential negative traits and include those traits that we subjectively feel to be positive? Thousands called the fake toll-free number in the ad to sign up for the service.[282] Even today, a decade after the release of the film, constant references to the movie can be seen in the media and even in scholarly literature discussing current issues such as GINA[283] or preimplantation genetic diagnosis.[284]

5. *Outbreak* and AIDS

In the post-Cold War era, viruses have taken up the position of the insidious enemy that threatens us all. Thus, like aliens in the past,[285] viruses have begun to show up periodically in film, depending on the mood of the nation and the state of its obsession over health.[286] Like the way that many of the other films in this analysis benefitted

278. Hands off, maybe, THE ECONOMIST, May 1, 2008, *available at* http://www.economist.com/world/unitedstates/displaystory.cfm?story_id=11293939.

279. *See, e.g.*, Genetic Information Non-Discrimination Act, *available at http://www.sourcewatch.org/index.php?title=Genetic_Information_Non-Discrimination_Act.*

280. THE 6TH DAY, *supra* note 107.

281. *See* Review of *Gattaca*, *supra* note 267.

282. David A. Kirby, *The New Eugenics in Cinema: Genetic Determinism and Gene Therapy in GATTACA*, 27 SCI. FICTION STUD. 81 (July 2000), *available at* http://www.depauw.edu/sfs/essays/gattaca.htm.

283. Genetic Information Nondiscrimination Act of 2008, Pub. L. No. 110-233, 122 Stat. 881 (2008).

284. *See generally* Preimplantation genetic diagnosis – Wikipedia, http://en.wikipedia.org/wiki/Preimplantation_genetic_diagnosis (last visited Jan. 9, 2009).

285. Humphries, *supra* note 31.

286. Carl Elliott, *Thrills of Public Health*, 310 BRIT. MED. J. 1015 (Apr. 1995).

from current events, *Outbreak*'s popularity may have benefited from the outbreak of a real hemorrhagic-fever-causing virus, Ebola, which later that year killed 244 individuals in Kikwit, Zaire.[287]

The movie is loosely inspired by the best-selling novel *The Hot Zone* by Richard Preston,[288] which itself was based on an actual event in Reston, Virginia, where the Ebola virus suddenly appeared in a group of monkeys at the Hazleton Research Products' Reston Primate Quarantine Unit.[289] Ebola, first discovered in 1976 in the Yambuku region of Zaire near the Ebola River, is a highly pathogenic virus, killing close to 90 percent of those infected with it.[290] Given that there is no known treatment both prior to and after exposure, and that as a hemorrhagic-fever-causing virus it is generally considered a potential candidate for a bio-weapon,[291] Ebola makes for a very scary virus.[292]

Like other representatives of movies presented in this Article, those intimately involved in the production of *Outbreak* were interested in social commentary and affecting social change.[293] *Outbreak* is an interesting example of a movie that had an effect on science policy only tenuously related to the plot of the actual movie: anecdotal evidence suggests that the movie was responsible for influencing the public's perception of the AIDS virus.[294]

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287. *See, e.g.*, Centers for Disease Control & Prevention, *Outbreak of Ebola Viral Hemorrhagic Fever - Zaire, 1995*, MORBIDITY & MORTALITY WKLY. REP. 44, May 19, 1995 (originally reporting to the CDC on May 6, 1995).

288. RICHARD PRESTON, THE HOT ZONE (Random House 1994). Fox was going to make Preston's book into a movie, but it was never actually filmed. *See, e.g.*, Claudia Eller Fox, *Obst contract virus pic*, VARIETY Jan. 25, 1993, *available at* http://www.variety.com/index.asp?layout=print_story&articleid=VR103313&categoryid=13.

289. *See, e.g.*, PE Rollin, Ebola (subtype Reston) virus among quarantined nonhuman primates recently imported from the Philippines to the United States, 179 JOURNAL OF INFECTIOUS DISEASE S108 (1999) (discussing the earlier outbreak as well).

290. Thomas Hoenena, Allison Groseth, Darryl Falzarano and Heinz Feldmann, *Ebola virus: unraveling pathogenesis to combat a deadly disease*, 12 TRENDS IN MOLECULAR MEDICINE 206 (2006).

291. Andrea Polesky & Gulshan Bhatia, *Ebola Hemorrhagic Fever in the Era of Bioterrorism*, 18 SEMINARS RESPIRATORY INFECTIONS 206 (Sept. 2003).

292. Heinz Feldmann et al., *Ebola Virus Ecology: A Continuing Mystery*, 12 TRENDS MICROBIOLOGY 433 (Oct. 2004).

293. Rebecca Ascher-Walsh, *Crisis in the Plot Zone*, ENT. WKLY.COM, Mar. 24, 1995, *available at* http://www.ew.com/ew/article/0,,296497,00.html ("I wanted to make an important movie that would effect social change.") (quoting OUTBREAK'S Academy Award-winning producer, Arnold Kopelson).

294. Owen Gleiberman, *Viral Scare Case*, ENT. WKLY.COM, Mar. 17, 1995, *available at* http://www.ew.com/ew/article/0,,296401,00.html ("Motaba virus isn't quite a metaphor for AIDS (it leaps about far too readily), yet there's no doubt that the movie is exploiting the antiseptic, don't-stand-so-close-to-me anxieties of the AIDS era.").

a. Plot Synopsis

In *Outbreak*, the audience is immediately introduced to the utter devastation of the fictional Motaba virus in a small village in Africa.[295] More lethal than Ebola, which takes two days to kill its victims,[296] the fictional Motaba virus kills within hours of infection. Two American doctors take blood samples of the remaining inhabitants and promise medical aid to the survivors. A plane does arrive, purportedly to bring in much-needed provisions, but instead of dropping medical supplies, it drops a bomb, wiping out the entire village.

Colonel Sam Daniels, played by Dustin Hoffman, an army doctor familiar with the devastation of the Motaba virus, has to fight the government, the military, and, in particular, his superior who was involved in initially extracting the virus from the doomed village—played by Morgan Freeman—in an effort to contain the virus when it comes to America via a smuggled monkey. The audience is privy to the fact that the military, which extracted blood samples from the initial outbreak in Africa, has developed an antidote to the virus, but is keeping it secret; the military, in typical Hollywood fashion, is interested in the virus for its martial applications as a biological weapon.

Cedar Creek, a small town in California, is home to the U.S. outbreak of the Motaba virus and thus targeted by the government for destruction. The film follows Dr. Daniels as he first discovers that the military has an anti-serum, and then discovers that the virus has mutated, and finally finds the monkey that started it all. He extracts an anti-serum from the monkey and saves his ex-wife, the town, and the country.

b. Analysis

When asked why the Ebola and Marburg viruses are so interesting to the American public, *The Hot Zone* author Richard Preston stated that, "[T]here's a deep curiosity, there's a sense of horror. And I also think that in the backs of people's minds, ever present, is the AIDS virus."[297] Although scientifically vastly different, Ebola and the fictionalized Motaba virus became closely associated

295. OUTBREAK (Warner Bros. Pictures 1995).

296. *Id.*

297. *Why Viruses Push Our Hot Buttons*, NEWSWEEK, May 22, 1995, at 54, *available at* http://www.newsweek.com/id/103914.

with the AIDS virus as the film depicted the fear that often accompanies the public's perception of AIDS.

Dr. Robin Cook, author of the book *Outbreak*, which preceded *The Hot Zone*, lamented the scientific inaccuracies in the film: "*Outbreak* suffers from [having] not much of a story, and it's totally unrealistic. In that sense, it does a disservice. As a writer and a physician too, dealing with a subject like a virus, you should at least be scientifically correct . . . ."[298] Further confounding the problem of misinformation is the fact that science fiction and academic publications on virology have had their boundaries blurred in the last couple of years; this lack of a distinct boundary has allowed fiction to pervade fact.[299]

Although not overtly, Hollywood may have used Motaba as a proxy for AIDS. Hollywood undoubtedly wished to avoid the delicate issues surrounding AIDS, but probably wanted to tap into society's pervasive fear of the disease; a fictional virus like Motaba, transmitted through body fluids, is a perfect stand-in.[300] Further supporting this idea is the fact that Donald Francis of Genentech, who is most famous for his research on an AIDS vaccine, acted as a science consultant for the film.[301] In fact, *Outbreak* does have its strong points of scientific accuracy. One scientifically savvy critic found that "the best part of the film . . . [was] where we are led, documentary fashion, through different laboratories devoted to the study of ever more contagious diseases."[302]

c. Science Policy

In May 1995, following the outbreak of Ebola in Zaire, there was a pervasive fear that the release of the movie would cause people to conflate the high contagiousness of the movie virus with that of AIDS and thereby prompt increased prejudicial attitudes towards people with HIV/AIDS.[303] It is difficult to assess whether or not these fears actually came to fruition. What is interesting, however, is that

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298. Iliana Semmler, *Ebola Goes Pop: The Filovirus from Literature into Film*, 17 LITERATURE & MED. 149, 160 (1998), *available at* http://muse.jhu.edu/journals/literature_and_medicine/v017/17.1semmler.html.

299. *Id.* at 167.

300. *Id.* at 154-55.

301. David Kirby, *Scientists on the Set: Science Consultants and the Communication of Science in Visual Fiction*, 12 PUB. UNDERSTANDING SCI. 261, 261-78 (2003).

302. John Simon, *From Disaster to Disaster*, NAT'L REV., Apr. 17, 1995, at 65.

303. *Why Viruses Push Our Hot Buttons*, *supra* note 297 ("There's a deep curiosity, there's a sense of horror. And I also think that in the backs of people's minds, ever presented, is the AIDS virus." (quoting Richard Preston)).

during the time period from when the movie began to be mentioned in the general press (a couple months prior to its release) to the time that the film eventually left the top-ten box-office list in late April 1995,[304] there was an increasing usage of the terms "contagious" and "HIV" together in the media.[305] There were also two subsequent spikes in the mentioning of the two terms together: once when Ebola broke out in Zaire in May 1995—again reflecting the public's association of the movie's Motaba virus (a fictionalized Ebola virus) and AIDS—and again in October of 1995 when Magic Johnson, a star basketball player infected with HIV, was denied access to Taiwan.[306] The confounding of fact and fiction was not limited to the lay public's understanding of AIDS. In fact, the media used footage from the film in their reporting on the Ebola outbreak in Zaire.[307]

6. *The Day After Tomorrow* & Global Warming

a. Political and Historical Background

The Day After Tomorrow was a major special effects tour de force, attempting to show the devastating results of abrupt climate change, characterized by a sudden and dramatic shift in Earth's weather patterns.[308] The director of *The Day After Tomorrow*, Roland Emmerich, a loyal member of the German Green Party, was quoted in the *Toronto Star* as saying, "[A]brupt climate change is the biggest threat the world faces and what does the government do? They try to keep it a secret!"[309] On the film's website, the filmmakers suggested that the global-warming effects in the movie have already started.[310] Emmerich is also quoted as saying, "I wish I knew why people believe

304. The Times Film Index, LA TIMES, April 25, 1995 D4 (on file with author).

305. Author's analysis. Data on file with the author.

306. *See, e.g.*, *Taiwan Bars Magic Johnson*, ASSOCIATED PRESS, Oct. 5, 1995, *available at* http://www.aegis.com/news/ap/1995/AP951005.html.

307. Semmler, *supra* note 298, at 149 (citing John Schwartz, *Ebola Virus Spawns an Epidemic of Myths*, ALBANY (N.Y.) TIMES UNION, May 15, 1995, at A2.).

308. Robert B. Gagosian, *President and Director Woods Hole Oceanographic Institution, Abrupt Climate Change: Should We Be Worried?* World Economic Forum, Davos, Switzerland, Jan. 27, 2003, *available at* http://www.whoi.edu/page.do?pid=12455&tid=282&cid=9986.

309. *See, e.g.*, Stephen Leahy, *ENVIRONMENT DAY: Climate Change Film Has Potential to Change Minds*, INTER PRESS SERVICE NEWS AGENCY, June 2, 2004, http://www.ipsnews.net/interna.asp?idnews=24026.

310. Patrick J. Michaels, *Apocalypse Soon? No, But This Movie (and Democrats) Hope You'll Think So*, WASH. POST, May 16, 2004, at B01, *available at* http://www.washingtonpost.com/ac2/wp-dyn/A28338-2004May14.

more in movies than anything else . . . . I just think that we, as filmmakers, should fight more for our beliefs."[311]

Released in the heat of the 2004 United States presidential election campaign, and with the Democratic Party leading on environmental issues, many liberals viewed *The Day After Tomorrow* as a vehicle to promote their side's environmental policies in the presidential race.[312] In Europe, the movie was deemed to be so influential that it prompted the *London Guardian* to call the United States' presidential election for the Democrats eight months prior to the vote.[313]

There was a general concern that the public might rely on the film for scientific information regarding global warming.[314] Moreover, there was fear that a disaster film on global warming could cause panic among the public. For example, NASA sent out memos stating that "[n]o one from NASA is to do interviews or otherwise comment on anything having to do with [the film] . . . . Any news media wanting to discuss science fiction vs. science fact about climate change will need to seek comment from individuals or organizations not associated with NASA."[315] NASA's concerns were clearly founded as the film created national interest in abrupt climate change, resulting in many science groups taking advantage of the situation to present information regarding the issue.[316] The National Oceanic and Atmospheric Administration (NOAA) timed the release of a website with information about abrupt climate change to coincide with the release of the movie.[317] Coincidentally, just like the administration in *The Day After Tomorrow* seems to be impeding the distribution of

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311. Patrick Goldstein, *A Wallop of an Eco Warning*, TORONTO STAR, May 29, 2004, at H13.

312. *See, e.g.*, *Hollywood Flick Generates Political Interest*, CNN.COM, May 25, 2004, http://www.cnn.com/2004/ALLPOLITICS/05/24/movie.politics/index.html.

313. Goldstein, *supra* note 311.

314. *See, e.g.*, Andrew Balmford et al., Letter to the Editor, *Hollywood, Climate Change, and the Public*, 305 SCIENCE 1713 (Sept. 17, 2004).

315. Andrew C. Revkin, *NASA Curbs Comments on Ice Age Disaster Movie*, N.Y. TIMES, Apr. 25, 2004, at 1:16, *available at* http://query.nytimes.com/gst/fullpage.html ?res=980DE3D9133AF936A15757C0A9629C8B63.

316. *See, e.g.*, Abrupt Climate Change FAQ – Union of Concerned Scientists, http://www.ucsusa.org/global_warming/science/abrupt-climate-change-faq.html (last visited Jan. 9, 2009); Environmental Literacy Council – Climate Change, http://www.enviroliteracy.org/article.php/1146.html (last visited Jan. 9, 2009); News: "The Day After Tomorrow" Q&A, http://www.nsidc.org/news/press/day_after/ (last visited Jan. 9, 2009).

317. NOAA Satellite and Information Service, http://www.ncdc.noaa.gov /paleo/abrupt/ (last visited Feb. 2, 2009).

important information to the public, NOAA claimed that the Bush administration worked to delay the release of the website.[318]

b. Plot Synopsis

In *The Day After Tomorrow*, climatologist Jack Hall, played by Dennis Quaid, believes that we are on the verge of an ice age that could, at a moment's notice, change the global climate.[319] Dr. Hall has single-handedly made this determination, and his computer simulations predicted a huge weather anomaly in New York. No one else agrees. Expectedly, the government, even in the face of mounting evidence, continues to ignore him. Over the course of a couple of days, however, a huge climate change begins to take place, bringing tornados to Los Angeles and torrential flooding to Manhattan. The movie portrays catastrophic destruction and death throughout the northern hemisphere, but the protagonists survive, and the southern population of the country eventually makes its way to safer ground in Mexico.

c. Analysis

The environment, which has long been a partisan issue, became much more political during President George W. Bush's administration. The National Academy of Sciences, at the behest of the Bush administration, recently reviewed the current research on climate change and concluded that pollution was a factor in recent climate changes.[320] Democrats charged that the Bush administration was purposely burying EPA reports related to global warming,[321] while the Bush administration claimed that more information was needed to come to a conclusion on the issue, and recently announced a

318. *See, e.g.* Amanda Griscom, *The Day After Tomorrow Never Dies: Film Plot Rings True as NOAA Runs Up Against White House*, GRIST: ENVTL. NEWS & COMMENT, June 3, 2004, http://www.grist.org/news/muck/2004/06/03/griscom-NOAA/.

319. THE DAY AFTER TOMORROW (20th Century Fox 2004).

320. Press Release, National Research Council, Leading Climate Scientists Advise White House on Global Warming (June 13, 2001), *available at* http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=10139; *see also* COMM. ON THE SCIENCE OF CLIMATE CHANGE, CLIMATE CHANGE SCIENCE: AN ANALYSIS OF SOME KEY QUESTIONS (National Academy Press 2001).

321. *See, e.g.,* 111th Congress Administration Oversight, Environment, Politics and Science Committee Report: White House Engaged in Systematic Effort to Manipulate Climate Change Science, Wednesday, December 12, 2007, *available at* http://oversight.house.gov/story.asp?id=1653; see also Andrew C. Revkin with Katharine Q. Seelye, *Report By E.P.A. Leaves Out Data On Climate Change*, N.Y. TIMES, June 19, 2003.

ten-year study on the matter.[322] There is even dissent within the political parties themselves: for example, the Chairman of the Senate Environmental Committee, Senator James Inhofe (R-OK), considers global warming to be a hoax pursued by a few rogue scientists,[323] while Governor Arnold Schwarzenegger (R-CA) recently declared global warming to be an indisputable threat, and called for a stark reduction in California's emissions of greenhouse gasses.[324]

d. Science Policy[325]

Although panned universally for its plot and dialogue,[326] *The Day After Tomorrow* drew crowds for its special effects and political message. Groups such as Greenpeace, the National Resources Defense Council, and MoveOn.org set up websites touting the film's environmental message.[327] Environmental Defense, while acknowledging that the movie portrayed exaggerated events, nonetheless claimed that it raised important issues, stating that in a "greenhouse future . . . weather-related shutdowns could become the rule rather than the exception."[328] On the other side, conservative groups used the film as a rallying point against liberal and centrist environmental policies, highlighting the radical environmental agenda of the Democrats.[329]

Former Vice President Al Gore, at a rally only blocks from the New York premier, acknowledged that while some of the science in the film was stretched, it nevertheless offered "a rare opportunity to have a national conversation about what truly should be seen as a global

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322. *Feet to the Fire*, NEWARK STAR-LEDGER, Aug. 10, 2003.

323. *See, e.g.*, James M. Inhofe, Chairman, Committee on Environmental and Public Works, Senate Floor Statement: The Science of Climate Change (July 28, 2003), *available at* http://inhofe.senate.gov/pressreleases/climate.htm.

324. Miguel Bustillo, *Gov. Vows Attack on Global Warming*, L.A. TIMES, June 2, 2005, at B1, *available at* http://articles.latimes.com/2005/jun/02/local/me-greenhouse2.

325. *See* COMM. ON ABRUPT CLIMATE CHANGE ET AL., ABRUPT CLIMATE CHANGE: INEVITABLE SURPRISES (National Academy Press 2002).

326. *See generally* the reviews on Rotten Tomatoes, http://www.rottentomatoes.com /m/day_after_tomorrow/ (last visited Feb. 2, 2009).

327. *See, e.g.*, Press Release, Natural Resources Defense Council, Controversial Disaster Film Casts Spotlight on Global Warming (May, 4, 2004), *available at* http://www.nrdc.org/media/pressreleases/040504.asp.

328. Press Release, Environmental Defense Fund, Summer Film Shows Difference Between Science Fiction & Science Fact (May 12, 2004), *available at* http://www.edf.org/pressrelease.cfm?contentID=3756.

329. *See, e.g.*, ANN COULTER, HOW TO TALK TO A LIBERAL (IF YOU MUST): THE WORLD ACCORDING TO ANN COULTER (Crown Forum 2004) ("The hyper-silly disaster epic is based on a book coauthored by UFO/black-helicopter/the-CIA-is-beaming-microwaves-into-my-teeth-fillings guru and late-night AM radio maven Art Bell.").

climate emergency."[330] Moreover, he claimed that the "Bush administration is in some ways even more fictional than the movie—in trying to convince people that there is no real problem, that there is no real degree of certainty on the part of scientists about the issue and sort of accepting the big polluters."[331]

Some in the lay public, particularly those against substantial efforts by the government to deal with climate change, perceived that "Gore and others are using the film to push for extreme environmental policies—such as the Kyoto Protocol and the McCain-Lieberman climate change bill."[332] Even Al Gore's Oscar-winning documentary, *An Inconvenient Truth*, benefited from the movie, using digitally created images of the Antarctic ice sheet created for *The Day After Tomorrow* in the film.[333] While the director created this film purportedly as a vehicle for social change, and environmentalists had outwardly hoped that the film's reach would inspire audiences around the world to take global warming seriously,[334] the sheer cheesiness of the movie and the extreme plotline probably caused people to disregard the real threats, dismiss the science, and ignore the effects of global warming even more.[335]

V. SUGGESTIONS FOR BETTER REPRESENTING SCIENCE IN THE MEDIA

This Article concludes that there is a real risk of creating misguided public policy based on the media's representation of science. This stance is not an overreaction to the miscommunication of scientific principles by an entertainment industry that should not

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330. Marc Morano, *Gore Warns of 'Climate Emergency' While Promoting Disaster Film*, CYBERCAST NEWS SERVICES, May 12, 2004, *available at* http://www.christiananswers.net/spotlight/movies/2004/thedayaftertomorrow.html.

331. Matthew Nisbet, *Evaluating the Impact of The Day After Tomorrow: Can a Blockbuster Film Shape the Public's Understanding of a Science Controversy?*, COMMITTEE FOR SKEPTICAL INQUIRY, June 16, 2004, http://www.csicop.org/scienceandmedia/blockbuster/.

332. Multi-vu – The Real Disaster Will Come After "The Day After Tomorrow": The Special Effects May Be Great, But the Science is Shoddy, May 2004, http://www.prnewswire.com/mnr/dcg/12321 (last visited Jan. 9, 2009).

333. Noel Sheppard, *Gore Used Fictional Video to Illustrate 'Inconvenient Truth'*, NEWSBUSTERS.ORG, Apr. 22, 2008, http://newsbusters.org/node/20680?q=blogs/noel-sheppard/2008/04/22/abc-s-20-20-gore-used-fictional-film-clip-inconvenient-truth.

334. Andrew Norton and John Leaman, The Day After Tomorrow: Public Opinion on Climate Change, MORI Social Research Institute (May 2004), *available at* http://climateprediction.net/schools/docs/mori_poll.pdf.

335. *See, e.g.*, David Edelstein, *The Ice Age Cometh: The Day After Tomorrow is Full of Hot Gas*, SLATE, May 27, 2004, http://slate.msn.com/id/2101386/. *But see* Anthony A. Leiserowitz, *Before and After the Day After Tomorrow: a US Study of Climate Change Risk Perception* 46 ENVIRONMENT 23 (2004).

have to worry about its role in educating the nation; rather, it is an acknowledgement that this is a real problem hampering the advancement of science. Furthermore, greater issues also loom as a result of this problem—after all, the nation's productivity and wealth is tied to its ability to be a world leader in science.[336]

Are the media's portrayals of science subversive enough for government intervention? The answer to the question, unfortunately, is a very ambiguous "potentially yes, sometimes." The examples laid out in the paper discuss, in hindsight, glaring and obvious misconceptions and miscommunications.[337] The problem of determining bad science is much more amorphous. How do we decide or predict that a specific theory or scientific principle espoused in a film is misleading, wrong and dangerous, and that it will have significant effects on the formation of science policy? Who decides that the science is inaccurate and potentially misleading? Are the potential false positives—the actions against film and television in anticipation of an issue that never arises—worth the investment of time, effort, and legal fees as well as the impediment of artistic license?

A. Issues in Dealing with Scientifically Inaccurate Films

Once the scientific community commits to dealing with the media, there are numerous issues that arise. This next section will deal with each issue individually.

1. Who is a Scientist and Who Legitimately Represents Science?

Who can call him/herself a scientist, gaining the recognition and validity that accompanies that designation? Recently, the definitive boundaries of the reporter corps have come into question. The Internet that has opened up the world to bloggers—and made

336. ALBERT EINSTEIN, THE WORLD AS I SEE IT 39 (Citadel Press, reissue ed., 1993) ("Where scientific enquiry is stunted the intellectual life of the nation dries up . . . .").

337. This is not to say that the scientific community does not also miscommunicate facts and information. For example, Harvey Brooks has said, "Scientists inexperienced in the political arena, and flattered by the unaccustomed attentions of men of power, are often inveigled into stating their conclusions with a confidence not warranted by the evidence, and . . . not subject to the same sort of prompt corrective processes that they would be if confined within the scientific community." John F. Ahearne, *Three Mile Island and Bhopal: Lessons Learned and Not Learned, in* HAZARDS: TECH. & FAIRNESS 197, 204 (National Academy Press 1986) (quoting Harvey Brooks, *Expertise and Politics: Problems and Tensions*, PROC. AM. PHIL. SOC'Y 119, 259 (1975)).

some of them as influential as mainstream media[338]—has also allowed anyone to publish their "science" without the integral gatekeeper function of peer review. While scientific research used to have to go through rigorous review by experts in the field in order to be published, with the advent of Internet publishing, open-article archives, and the extensive growth of journals, this is no longer the case.[339] While there are many positive aspects to publishing online with limited if any peer review,[340] there is a significant downside of allowing unsubstantiated research into the halls of science. Furthermore, even peer-reviewed research is far from reliable.[341] Not only have there been numerous retractions of articles containing falsified evidence in high-level journals,[342] but a recent *Boston Globe* article brought to light significant biases in peer-reviewed scientific research where scientists have incorporated their religious and political biases into their research.[343]

If anyone can publish as a scientist and even "legitimate" science can have dubious intentions, then who should, if necessary, police the media's interaction with scientists? Given the decentralized nature of research and the lack of any consensus, how can one say that the science in a movie is misleading if it can find some support among some or any "scientists"? There are a number of organizations that stand out as influential, scientific, and unbiased; each one is well

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338. *See, e.g.*, Randy Dotinga, *Are Bloggers Journalists? Do they Deserve Press Protections?*, CHRISTIAN SCI. MONITOR, Feb. 2, 2005, at 3, *available at* http://www.csmonitor.com/2005/0202/p03s02-usju.html.

339. *See, e.g.*, Dov Greenbaum et al., *An Analysis of the Present System of Scientific Publishing: What's Wrong and Where to Go From Here?*, 28 INTERDISC. SCI. REV. 254 (2003), *available at* http://papers.gersteinlab.org/e-print/epub/text-old.pdf.

340. The arXiv.org e-Print archive is one such example. *See generally* ArXiv.org – e-Print Archive, Cornell University Library, http://arxiv.org/ (last visited Jan. 9, 2009) ("arXiv is an e-print service in the fields of physics, mathematics, non-linear science, computer science, and quantitative biology. The contents of arXiv conform to Cornell University academic standards. arXiv is owned, operated and funded by Cornell University, a private not-for-profit educational institution. arXiv is also partially funded by the National Science Foundation.").

341. *See* John P.A. Ioannidis, *Why Most Published Research Findings are False*, 2 PLOS MED. 696 (Aug. 2005), *available at* http://medicine.plosjournals.org/archive/1549-1676/2/8/pdf/10.1371_journal.pmed.0020124-S.pdf.

342. PubMed Home, http://www.ncbi.nlm.nih.gov/pubmed (last visited Jan. 9, 2009) (showing a consistent growth in the number of retractions in the last decade upon a search of the Pubmed database using MeSH terms to denote a retracted publication).

343. *See also* Sir Joseph Rotblat, Editorial, *A Hippocratic Oath for Scientists*, 286 SCIENCE 1475 (1999) (suggesting that all scientists be obliged to take an oath, similar to the Hippocratic Oath of medical doctors, and advocating use of the pledge initiated by the Student Pugwash Group in the United States consisting of the following: "I will not use my education for any purpose intended to harm human beings or the environment. Throughout my career, I will consider the ethical implications of my work before I take action.").

suited to represent mainstream science and promote good and accurate science in the media. The foremost among them are The National Academy of Sciences,[344] The National Institutes of Health,[345] The National Science Foundation,[346] and the American Association for the Advancement of Science.[347]

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344. *See generally* National Academy of Sciences Home Page, http://www.nasonline.org/ (last visited Jan. 9, 2009). The National Academy of Sciences, established by President Abraham Lincoln at the height of the Civil War, is a non-partisan, apolitical, privately funded organization comprising nearly 2000 members, including 200 Nobel Laureates. *See id.* It was set up as an institution for the government to turn to for advice on scientific issues. *See id.* The all-volunteer membership is designed to work outside the confines of the Beltway in order to provide non-politicized expert advice on all things scientific. *See id.* The government has already empowered this group to be the impartial judge when it comes to many policy decisions and, as such, the National Academies are well suited for this role as arbiter of what is bad and misleading science. *See id.*

345. *See generally* National Institutes of Health, About NIH, http://www.nih.gov/about (last visited Jan. 9, 2009). The National Institutes of Health (NIH), composed of twenty-seven institutes and centers, with nearly $28 billion in annual funding from Congress, are part of the Department of Health and Human Services. *Id.* The NIH is "the steward of medical and behavioral research for the nation. Its mission is science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability." *Id.* To this end the NIH has four goals: (1) to foster "fundamental creative discoveries" in health; (2) to develop, maintain, and renew scientific human and physical resources to prevent disease; (3) to expand the knowledge base in medical and associated sciences; and (4) to "exemplify and promote the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science." *Id.* The NIH reaches these goals by supporting research that has been vetted through a granting process. *Id.*

346. *See generally* National Science Foundation, About the National Science Foundation, http://www.nsf.gov/about/ (last visited Jan. 9, 2009). This significantly younger organization was founded by Congress in the 1950s with an express mission "to promote the progress of science." *Id.* For the purposes of this organization, science includes all "fields of fundamental science and engineering" excepting medical science. *Id.* The NSF has slowly come to realize the importance of the scientific community's outreach to the media. *See, e.g.*, Krishna Ramanujan, *More science in Hollywood, on radio, TV and across the Web is new NSF mission, says public affairs director*, CORNELL CHRONICLE ONLINE, May 15, 2008, http://www.news.cornell.edu/stories/May08/Nesbit.kr.html.

347. *See generally* The American Association for the Advancement of Science, What is the AAAS, http://www.aaas.org/aboutaaas/ (last visited Jan. 9, 2009). The American Association for the Advancement of Science is the largest international organization of general science, and publisher of arguably, the most prestigious peer-reviewed journal, SCIENCE. *Id.* The AAAS, a not for profit organization and founded in 1848, has over ten million members worldwide. *Id.* The AAAS's mission is to "advance science and serve society" through initiatives in "science policy, international programs, science education, and more." *Id.*

2. Role of the Media

Any one of the aforementioned groups would be well suited to create committees or working groups to foster relationships and interactions with the media. But while each of these groups could deal with many of the black-and-white issues in science, of which there are relatively few, difficulties arise with the grayer concerns such as abortion or stem-cell research, where reasonable minds (and scientists) could differ as to optimal policies.

The scientific community has to be careful to set up strong limitations and boundaries when it attempts to cabin the national debate about scientific issues. For example, science should not limit the media in fostering honest discussion on ethical issues. In these situations, the media, if fair and unbiased, can perform a valuable service in educating the public. The media often helps to generate useful discussion among voters and interest groups, and while media presentation is often sensationalized and over-simplified in order to reach the general public, it is at the very least effective in reaching the general public. For example, "[m]any groups have come to believe that entertainment media can play an important positive role in educating the public about significant health messages."[348]

In 2000 the U.S. Centers for Disease Control and Prevention surveyed prime-time television viewers and found that a majority of respondents (52%) reported getting information that they trust to be accurate from television shows.[349] More than a quarter of this survey's respondents said that such shows were among their top three sources for health information.[350] Nine out of ten regular viewers said they learned something about diseases or disease prevention from television, with almost half citing evening or daytime entertainment shows.[351] Moreover, almost half of regular viewers who heard something about a health issue on a prime-time show said they took one or more actions as a result of the show, including telling someone about the storyline (42%), telling someone to do something or doing it

348. ENTERTAINMENT EDUCATION AND HEALTH IN THE UNITED STATES, THE HENRY J. KAISER FAMILY FOUNDATION 1 (Spring 2004), *available at* http://www.kff.org/entmedia/upload/Entertainment-Education-and-Health-in-the-United-States-Issue-Brief.pdf.

349. *Id.* (citing Centers for Disease Control – Health Marketing – Entertainment Education – 2000 Survey, http://www.cdc.gov/healthmarketing/entertainment_education/2000Survey.htm (last visited Jan. 9, 2009)).

350. *Id.*

351. *Id.*

themselves (such as using a condom or getting more exercise) (16%, or visiting a clinic or physician (9%).[352]

There are many positive aspects to the media's incorporation of science—even pseudo-science—into our entertainment; most importantly, it raises awareness. The suggestions in this Article are not directed at these types of issues, and are not meant for situations where the media provides a balanced view of the issues. The danger arises when the media is not balanced, when it intentionally misleads, or when the repercussions of bad science in terms of policies are worse than the benefits provided by opening public discourse on the subject. In these situations, the scientific community and/or the government need to intervene.

B. Intervention with the Media

1. Ex Ante

a. Consulting

This interaction with the media could occur at a number of points in time. There are already interactions between the producers and directors of both television programs and movies, with real scientists acting as scientific consultants for both.[353] Television and film companies have commercial reasons for hiring these scientists, not the least to make sure that their technical jargon sounds realistic and that the films are believable—an important component in satisfying an often savvy, sophisticated, and knowledgeable audience. These consultants are often involved in every stage of the production from the initial writing through to the final editing.[354] However, commercial interest is not enough to incentivize good science in film; even when a scientific consultant is used, that scientist is often the only one involved with the film, thus providing a narrow, and often minority,[355] view of the science. [356] *Boys from Brazil*,[357] for example, is

352. *Id.*

353. *See generally* Kirby, *Reflections*, *supra* note 240.

354. *See, e.g.*, S. Frank, *Reel Reality: Science Consultants in Hollywood*, 12 SCIENCE AS CULTURE 427 (2003).

355. The role of a science consultant was not always held in the highest esteem by the scientific community on account of many consultants' minority views.

356. David A. Kirby, *Science Consultants, Fictional Films, and Scientific*, 33 SOC. STUD. SCI. 231 (2003); *see also* THE BOYS FROM BRAZIL, *supra* note 226. *See also* earlier discussion regarding *Jurassic Park*, *supra* § V.B.III.

a movie where the film's consultant, Dr. Derek Bromhall, held minority views within the field of cloning that were not held in high regard by his colleagues, yet his views were portrayed in the film as the dominant, if not only, perspective on cloning.[358]

Instead of standing on the sidelines and letting the more commercially savvy scientists take advantage of the need for scientific consultants, one or more of the aforementioned science groups ought to provide a film-consulting service, potentially at a significantly reduced rate. Just as every scientist feels cultural pressures to involve him/herself in the peer-review process,[359] scientists should also feel compelled to involve themselves in the media's portrayal of their field.

One could speculate that a scientist already ostracized by his or her peers for having non-conforming scientific views is more likely to participate in film consulting, possibly seen by many as selling out for commercial gain as well as beneath the efforts of scientists. This possibility, however, may become less of an issue as academic science becomes more commercial and intertwined with industry.[360]

In July 2004 the American Film Institute (AFI), in conjunction with the Air Force Office of Scientific Research, hosted a now-annual program to introduce scientists to the art of screenwriting.[361] Noting that Hollywood needs better science in their films,[362] the AFI's catalyst workshop strives to get scientists more involved in creating realistic depictions of science in film.[363] This course could be expanded and offered at numerous academic and training institutions.

b. Industry-Wide Guidelines

In addition to acting as consultants throughout the process of producing a television show or movie, scientific groups should provide guidelines and easy-to-understand outlines of general scientific

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357. THE BOYS FROM BRAZIL (Producers Circle Company 1978); *see also* Review of THE BOYS FROM BRAZIL (1978), http://www.imdb.com/title/tt0077269/ (last visited Jan. 9, 2009) ("A Nazi hunter in Paraguay discovers a sinister and bizarre plot to rekindle the Third Reich.").

358. Kirby, *supra* note 356.

359. Editorial, *Striving for excellence in peer review*, 12 NATURE NEUROSCIENCE 1 (2009).

360. *See, e.g.*, JENNIFER WASHBURN, UNIVERSITY, INC.: THE CORPORATE CORRUPTION OF AMERICAN HIGHER EDUCATION (Basic Books 2005).

361. Knight, *supra* note 116.

362. The Sloan Foundation has a similar interest. *See* The Alfred P. Sloan Foundation – Public Understanding of Science and Technology, http://www.sloan.org/program/3 (last visited Jan. 9, 2009).

363. American Film Institute, Catalyst Workshop, http://www.afi.com/education/catalyst/default.aspx (last visited Feb. 2, 2009).

concepts that are often maligned in movies, including hot-button political issues such as cloning, global warming, and nuclear technology. These guides should be made available to the media in order to provide an initial line of defense against scientific misrepresentation. Thus, as more movies incorporate a particular take on a scientific issue, other movie producers will follow; since that particular depiction of science will be considered by the public to be the accurate version, other versions of that science would lack believability.

2. Ex Post

a. Scientifically Oriented Film Reviews

Scientists could also provide more ex post interactions. Scientific groups can be more aggressive in releasing reports and press releases when misleading or inaccurate science is portrayed in the media and in film. Many interest groups feel that the media is biased against them, and they often report these biases, either online or in periodic reviews.[364] Concerned scientists can and should do the same—point out factual and misleading errors in the news and other forms of media in order to chastise the most egregious violators of the public trust.[365]

The American Association for the Advancement of Science (AAAS) in particular, with its strong policy bent and its very influential scientific journal, *Science*,[366] should address this issue. For example, they could publish a semi-annual review that analyzes films for their scientific merit. By using terms like "lacking scientific merit," "implausible," "misleading," or "totally unrealistic," the journal

364. *See, e.g.*, CAMERA: Committee for Accuracy in Middle East Reporting in America, http://www.camera.org (last visited Jan. 9, 2009); Fairness & Accuracy in Reporting, http://www.fair.org/index.php (last visited Jan. 9, 2009); Media Research Center Home Page, http://www.mediaresearch.org/ (last visited Jan. 9, 2009); Who Makes the News? Global Media Monitoring Project 2005, http://centreforcommunicationrights.org/tools-and-training/40-tools/126--who-makes-the-news-global-media-monitoring-project-2005.html?layout=citation (last visited Jan. 9, 2009).

365. *Id.*

366. ISI Essential Science Indicators consistently ranks SCIENCE as the number one journal in many scientific fields in terms of its influence, as measured by the number of other articles in all scientific journals that cite articles published in SCIENCE. *Hottest Journals of the Millennium (so far)*, SCIENCEWATCH, Jan.-Feb. 2005, http://www.sciencewatch.com/jan-feb2005/sw_jan-feb2005_page1.htm. SCIENCE, having for example, on average, 78 citations per paper in the five year period between 1999 and 2004 for molecular biology and genetics papers. *Id.*

could denote the accuracy of the science in any given film. *Science* currently has a book-review section; why not add a film-review section, if not in the print version, then at least in the online version?[367] This analysis would be easily accessible to the world and should be released, in particular, to the news media. AAAS could promote and tout their reviews; given Hollywood's interest in realism and believability in its films and television, films might flout their "science rating" the same way they present their positive reviews: for example, "Ebert and Roeper: Two thumbs way up!" could be right next to "AAAS: The producer got the science dead on—this *could* happen!"

The scientific community would not be the first outside group to provide ratings to Hollywood films. The Humane Society, for example, provides ratings, reviews, and guidelines for the safe use of animals, as well as specific language to be used by films to note that no animals were harmed in the course of production.[368] The Dove Foundation has been putting its seal of approval on family-friendly entertainment with strong Judeo-Christian values for the last decade and a half. Furthermore, some large distribution companies include the Dove seal on approved DVDs.[369] In addition to groups that give a stamp of approval that can be attached to the film itself, other groups provide their membership with independent rating systems based on varied criteria.[370] Furthermore, during the awards season, awards could be given out by an AAAS committee to scientifically accurate movies, and acknowledgement could be made of the worst movies in terms of their science, akin to the Razzies or the Ig Nobel awards which now get reported in the mainstream media.[371]

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367. Note that *Chemical & Engineering News* has a section entitled "Reel Reviews" with the express intention of "encourag[ing] critical thinking about the way science is presented in film." *See, e.g.*, Rachel Petkewich, *Reel Science: WALL-E*, CHEMICAL & ENGINEERING NEWS, http://autonomy.caltech.edu/publications/journals/Chemical.pdf (last visited Jan. 9, 2009).

368. *See* Film and TV Unit – American Humane Society, http://www.americanhumane.org/protecting-animals/programs/no-animals-were-harmed/ (last visited Jan. 9, 2009).

369. *See* The Dove Foundation – Background, http://dove.org/aboutdove.asp (last visited Jan. 9, 2009).

370. *See, e.g.*, Insultingly Stupid Movie Physics, http://intuitor.com/moviephysics/ (last visited Jan. 9, 2009) (discussing its "Movie Physics Rating System"); Kids-In-Mind: Movie Ratings that Actually Work, http://www.kids-in-mind.com/help/about.htm (last visited Jan. 9, 2009) ("The purpose of Kids-In-Mind is to provide parents and other adults with objective and complete information about a film's content . . . ."); United States Conference of Catholic Bishops – Office for Film and Broadcasting, http://www.usccb.org/movies/ (last visited Jan. 9, 2009).

371. Home of the Golden Raspberry Award Foundation, http://www.razzies.com/ (last visited Jan. 9, 2009); Helen Bushby, *Berry gets Worst Actress Razzie*, BBC NEWS (U.K.), Feb. 27, 2005, http://news.bbc.co.uk/1/hi/entertainment/film/4301783.stm (last

b. Government Intervention

What if market forces are not strong enough to deal with this issue? What if viewers do not care that a film or television show is scientifically accurate? What if viewers want fictional science? Or what if Hollywood itself does not show interest in promoting itself as factually and scientifically accurate? In other words, are there other methods that can be used to induce scientific accuracy in film? The U.S. Supreme Court has emphasized that, "[i]f the First Amendment means anything, it means that regulating speech must be a last—not first—resort," so what sorts of solutions would that leave?[372]

Perhaps movies should be required to show a notice or disclaimer outlining the factual inaccuracies in the film, akin to disclaimers and warnings found on our pharmaceuticals, cigarette packages and food products. Another possible approach is a government-imposed rating system, similar to the non-governmental MPAA system that would rate a movie on a simple scale indicating the degree of scientific accuracy in the film.[373]

Alternatively, the federal government could provide financial incentives for good science, either in the form of tax breaks or government grants to filmmakers and television producers who are willing to strive for scientific accuracy as defined by a general scientific consensus or a representative board created to make such decisions. Taking an opposite approach, the government could also tax those movies that create overtly dangerous perceptions of science. Taxation is often used by the government when it attempts to impose a set of values without running afoul of constitutional issues.[374] For

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visited on Jan. 9, 2009); Improbable Research Home Page, The Ig Nobel Prizes, http://improbably.com/ig/ (last visited Nov. 24, 2008) ("The Ig Nobel Prizes honor achievements that first make people laugh, and then make them think. The prizes are intended to celebrate the unusual, honor the imaginative – and spur people's interest in science, medicine, and technology."); *see, e.g.*, Barbara D. Phillips, Opinion, *Presenting the 'Igs': A Different Kind of Nobel Prize*, WALL ST. J., Oct. 10, 2003, *available at* http://www.opinionjournal.com/taste/?id=110004143; Posting of Sean O'Neill to New Scientist Blog: Short Sharp Science, http://www.newscientist.com/blog/shortsharpscience/2007/03/ig-nobel-tour-unique-experience.html (Mar. 15, 2007, 14:36 EST).

372. Thompson v. W. States Med. Ctr., 535 U.S. 357, 373 (U.S. 2002).

373. Note that the movie industry has successfully avoided government control or censorship. *See generally* Richard M. Mosk, *The Jurisprudence of Ratings Symposium Part I: Motion Picture Ratings In The United States*, 15 CARDOZO ARTS & ENT. L.J. 135 (1997). Censorship, if any, is provided by the shadowy MPAA-ratings people. *Id.*

374. *See, e.g.*, Act of June 5, 1794, chs. 45, 48-49, 51, 1 Stat. 373, 373-81, 384-90 ("Because the activities covered by sin taxes are typically frowned upon . . . sin taxes are often aimed as much at discouraging the targeted behavior by making it more expensive as they are at raising revenue.") (quoted text on file with author); Eduardo Moises Penalver, *Regulatory Taxings*, 104 COLUM. L. REV. 2182, n. 94 (2004) ("In the case of sin taxes,

the tax to have any bite, it may need to be a percentage of a film's gross receipts rather than a flat rate that could simply be a miniscule cost for a large blockbuster. Alternatively, the government could impose some sort of tax on the actual actors appearing in the movies. Such a tax would create a strong disincentive for individuals actors, who obviously have more limited resources than film studios, to participate in such films. Taxing the actors might also place a stigma on these kind of roles, resulting in a smaller pool of potential actors for these films.

The most extreme solution would be to prevent, or at least severely limit, the showing of misrepresented science in film in a manner similar to the methods now used to control certain forms of pornography in film. Under this scenario, if a movie discusses some sort of science, the government would require the movie to limit itself to plausible science, with an exception for obvious science-fiction movies. Those movies that did not follow the government's orders could potentially be censored.[375]

The censoring of movies raises numerous issues. Most significant are the First Amendment concerns: does the First Amendment protect movie producers in their creation of misleading movies? The First Amendment proscribes a national commitment, promising that "debate on public issues should be uninhibited, robust, and wide-open."[376] To further this debate, "when the government, acting as censor, undertakes selectively to shield the public from some kinds of speech on the ground that they are more offensive than others, the First Amendment strictly limits its power."[377]

There are strong arguments on both sides as to whether the government should intervene in the presentation of false scientific information to the public:

> One of the fundamental premises of the First Amendment is that, except in the most extreme cases, the proper response to speech we deem inaccurate is not repression but rather counter speech. The Court adheres to this principle for

however, the affected products and activities are targeted . . . because they are disfavored for some reason by the state. . . . [T]ax[ing] morally suspect categories of personal property, such as snuff and liquor."); *4 Ex-Surgeons General Push Higher Cigarette Tax*, N.Y. TIMES, Feb. 4, 2004, at A14 ("Four former surgeons general offered a plan on Tuesday to cut cigarette smoking in part with a $ 2-a-pack tax increase. That move alone, they said, would prompt at least five million smokers to quit.").

375. Obviously obscure and/or technical issues that are evident only to experts in the field are not the types of scientific errors that are to be censored.

376. New York Times Co. v. Sullivan, 376 U.S. 254, 270 (1964).

377. Erznoznik v. City of Jacksonville, 422 U.S. 205, 209 (1975).

political speech, regardless of the speaker's motivation. There is no reason, in either to treat scientific expression any differently.[378]

On the other hand, while the founding fathers probably assumed a degree of political awareness among the masses, and assumed that the public would be able to distinguish between political arguments, this may not be the case with scientific knowledge where, while the lay public has a say (through their votes for presidents, senators, and congressmen) in how science is funded or controlled, they might not have the requisite knowledge or wisdom to distinguish between accurate and rigorous science, and patently bad research and results. Under these circumstances, one could argue that intentionally misleading scientific speech ought to be limited.

Further, independent of the legal and constitutional issues that a policy of government intervention would raise, there exists what Professor Redish refers to as the "principle of epistemological humility"[379]— that is, "whatever the currently prevailing beliefs may be, history teaches us that scientific or moral advances may at some future point make those beliefs appear either silly or monstrous . . . . [A]ny attempt by the government to impose a national scientific orthodoxy could undermine or inhibit the advance of scientific knowledge, thus undermining a key value of the First Amendment."[380] Those in favor of strong governmental control of science in film could point to the fact that the majority of American children and adults get their science from film and television and such a reality demands that we take science representation in film seriously.

i. Constitutionality of Censorship

At first blush, it seems that any government intervention would be unconstitutional: after all, "[e]ntertainment, as well as political and ideological speech, is protected by the First Amendment; motion pictures, programs broadcast by radio and television . . . [all] fall within the First Amendment guarantee."[381] Bad science does not fit into any of the typical categories of speech that lack all or partial

378. Martin H. Redish, *Product Health Claims and the First Amendment: Scientific Expression and the Twilight Zone of Commercial Speech*, 43 VAND. L. REV. 1433, 1460 (1990).

379. *Id.* at 1435.

380. *Id.*

381. Schad v. Mount Ephraim, 452 U.S. 61, 65 (1981).

First Amendment protection, such as commercial speech.[382] In fact, the Supreme Court has stated explicitly that the First Amendment "is a value-free provision whose protection is not dependent on the truth, popularity, or social utility of the ideas and beliefs which are offered.[383] The very purpose of the First Amendment is to foreclose public authority from assuming a guardianship of the public mind."[384] To allow the government to impose censorship on bad science would effectively grant the government the power to control the direction of scientific exploration.

Moreover, given the content-specific nature of any form of government censorship against inappropriate usage of science in film, such actions would be reviewed by the courts under a strict scrutiny standard, and at best narrowly construed.[385] Under this standard, a court could uphold "the restriction only if it is narrowly tailored to serve an overriding state interest."[386] It would be difficult to argue that bad science ought to be censorable under this standard; "it is the rare case in which [the Supreme Court has] held that a law survives strict scrutiny."[387]

Courts would also find it difficult to compel a film producer to present only good science: under a doctrine espoused in *Barnette,* students cannot be compelled to recite even the Pledge of Allegiance.[388] Additionally, under another First Amendment doctrine, the public forum doctrine, the government is even more limited in its ability to restrict speech that occurs in public forums, which includes

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382. Although note the controversial statement in ROBERT D. COOTER, THE STRATEGIC CONSTITUTION 325-30 (Princeton University Press 2002) (suggesting that false assertions are not protected under the First Amendment).

383. Am. Booksellers Ass'n v. Hudnut, 771 F.2d 323, 330 (7th Cir. 1985) (arguing that while the courts use the metaphor of the marketplace of ideas, defending the "freedom of speech on the grounds that the truth will prevail . . . the Constitution does not make the dominance of truth a necessary condition of freedom of speech. To say that it does will be to confuse an outcome of free speech with a necessary condition for the application of the amendment. . . . Under the First Amendment, however there is no such thing as a false idea so the government may not restrict speech on the ground that in a free exchange truth is not yet dominant." (internal citation omitted)).

384. Meyer v. Grant, 486 U.S. 414, 419 (1988) (citations and internal quotations omitted) (citing Grant v. Meyer, 828 F.2d 1446 (10th Cir. 1987)).

385. Cincinnati v. Discovery Network, 507 U.S. 410, 428 (1993) ("[G]overnment may impose reasonable restrictions on the time, place, or manner of engaging in protected speech provided that they are adequately justified 'without reference to the content of the regulated speech.'").

386. McIntyre v. Ohio Elections Comm'n, 514 U.S. 334, 337 (1995).

387. Burson v. Freeman, 504 U.S. 191, 211 (1992).

388. W. Va. State Bd. of Educ. v. Barnette, 319 U.S. 624 (1943); *see also* Pacific Gas & Elec. Co. v. Pub. Utils. Comm'n of Ca., 475 U.S. 1, 16 (1986) (finding that "the choice to speak includes within it the choice of what not to say.").

theatres.[389] Finally, courts have tried and failed on First Amendment grounds to limit access to other forms of speech that seem to have a causal relationship to bad behavior—for example, violent video games. In *American Amusement Machine Association v. Kendrick*, where the court enjoined the city of Indianapolis's ordinance that sought to limit access of minors to video games that depicted violence, Judge Posner concluded that "no showing has been made that games of the sort found in the record of this case" actually induce children to violence.[390] "The grounds" for such a law "must be compelling," not just plausible.[391] With this bar to restriction of speech in mind, it seems that there is at least an uphill battle to be won to prove compellingly that bad science in film leads to bad science policy.[392] Notwithstanding all of these hurdles, a thorough analysis of the doctrinal underpinnings of First Amendment rulings might still support such censorship.

ii. Historical First Amendment Analysis

Early First Amendment case law provides little if any protection for films: the Court in *Mutual Film Corp. v. Industrial Commission of Ohio*,[393] for example, found that the technology of film posed a distinct danger, particularly that "a prurient interest may be excited and appealed to," and thus ruled that "there are some things which should not have pictorial representation in public places and to all audiences."[394] Censorship within film continued into and past the middle half of the twentieth century.[395] Nevertheless, while the Court continued to be deferential toward the government's control of political

389. Perry Educ. Ass'n v. Perry Local Educators' Ass'n, 460 U.S. 37 (1983) ("In places which by long tradition or by government fiat are devoted to assembly and debate, the rights of the state to limit expressive activity are sharply circumscribed . . . . For the state to enforce a content-based exclusion it must show that its regulation is necessary to serve a compelling state interest and that it is narrowly drawn to achieve that end. The state may also enforce regulations of the time, place, and manner of expression which are content-neutral, are narrowly tailored to serve a significant government interest, and leave open ample alternative channels of communication.") (internal citations omitted).

390. Am. Amusement Mach. Ass'n v. Kendrick, 244 F.3d 572, 575 (7th Cir. Ind. 2001).

391. *Id.*

392. *Id.* at 576.

393. 236 U.S. 230, 242 (1915).

394. *Id.*

395. *See, e.g.*, Times Film Corp. v. City of Chicago, 365 U.S. 43, 69-78 (1961) (Warren, J., dissenting) (noting the degree "to which censorship has recently been used in this country").

dissent in the early half of the twentieth century,[396] minority opinions by Justices Holmes and Brandeis, formulating, for example, the "clear and present danger" test,[397] foreshadowed future decisions that eventually protected political dissent and narrowed defamation laws.[398] Lower courts also began to describe a distinction between expression that merely advocated seditious acts and expression that went further and incited such acts.[399]

The Supreme Court used its decision in *New York Times Co. v. Sullivan* to note its disgust with the Sedition Act[400] and underscore the Act's inconsistencies with a more modern understanding of the First Amendment.[401] The *Sullivan* decision was representative of the growing interest in providing a more rigorous interpretation of the First Amendment.[402]

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396. Gitlow v. New York, 268 U.S. 652 (1925) (ruling that the government need not defer action until "revolutionary utterances lead to actual disturbances"); Debs v. United States, 249 U.S. 211 (1919) (upholding convictions of protestors under the Espionage Act); Frohwerk v. United States, 249 U.S. 204 (1919); Schenk v. United States, 239 U.S. 47 (1919) (upholding the conviction of protesters who disseminated leaflets in opposition to the draft).

397. Abrams v. United States, 250 U.S. 616 (1919) (Holmes, J., dissenting) (arguing that speech ought not be punished unless it "so imminently threaten[ed] immediate interferences with the lawful and pressing purpose of the law that immediate check is required to save the country . . . . [T]he ultimate good is better reached by free trade in ideas"); *see also* Whitney v. California, 274 U.S. 357 (1927) (arguing that public order is secured by freedom rather than suppression of speech).

398. *See, e.g.*, Brandenburg v. Ohio, 395 U.S. 444 (1969) (introducing a sense of urgency when abridging First Amendment rights, including "imminent lawless action [that] is likely to incite or produce such action"). This sense of urgency can be coupled with the concept of the marketplace of ideas. Abridgment is necessary only when the Court feels that the market will be unable to counter the speech's dangerous potential. Dennis v. U.S. 341 U.S. 494 (1951) (ruling that the gravity of the resulting evil, "discounted by its improbability," justifies a restriction of free speech.); *Id.* at 905 (Douglas, J., dissenting) (arguing that the test should be further narrowed and that the constitutional protections of speech ought not be limited unless the speech fanned "such destructive flames that it must be halted in the interests of the safety of the Republic"); De Jonge v. Oregon, 299 U.S. 353 (1937) (requiring that abridgment of speech must be preceded by some sort of incitement to crime and violence); Herndon v. Lowry, 301 U.S. 242 (1937) (noting that expression could not be limited following "pure speculation as to further trends of though;" and noting instead that the courts require a "reasonable apprehension of danger to organized government").

399. *See, e.g.*, Masses Publ'g Co, v. Pattern, 244 F. 535 (S.D.N.Y. 1917). This distinction is necessary to prevent the overregulation of speech by the state. Thus, only in instances of emergency ought the state be able to limit speech. *See, e.g.*, Robert Post, *Reconciling Theory and Doctrine in First Amendment Jurisprudence*, 88 CAL. L. REV. 2353, 2361 (2000) [hereinafter Post, *Reconciling Theory*].

400. Act of July 14, 1798, 1 Stat. 596.

401. 376 U.S. 254 (1964).

402. *See, e.g,* DONALD E. LIVELY, RUSSELL L. WEAVER, UNDERSTANDING THE FIRST AMENDMENT (LexisNexis 2006).

While the Court continued on a trend towards broader and greater protection of speech for the greater part of the latter half of the century,[403] this protectionist trend now seems to be giving way to allowance of some limitations on speech. Scholars have defended the Court's more recent inconsistencies with earlier First Amendment rulings, asserting that current efforts to provide broad protections to speech may not actually reflect inconsistencies with older theories or a switch to an alternative theory. Instead, these scholars argue that the more recent opinions merely reflect a different societal reality. Thus, according to this view, as national insecurity fluxes, so does First Amendment jurisprudence.

iii. Current First Amendment Analysis: Subject Matter

There are two questions that any modern court must answer when faced with a First Amendment issue. First, is the particular category of speech in question entitled to protection under the First Amendment?[404] Generally, this protection entitlement is granted to all but obscenity,[405] defamation,[406] or fighting words.[407] It is unclear as to whether the Court's further expansion of the definition of

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403. As Professor Post notes, *supra* note 399, the concept of a marketplace of ideas effectively expanded First Amendment protection to all speech associated with information necessary to understand the world, independent of its political nature.

404. Note that even in instances where content is particularly offensive, the legislature cannot regulate the speech as it would be endorsing a particular viewpoint, and the state does not have the right to "declare one perspective right and silence opponents." *Hudnut*, 771 F.2d at 325.

405. Roth v. United States, 354 U.S. 476, 484 (1957) (defining obscenity as expression "utterly without redeeming social importance"); *see also* Miller v. California, 413 U.S. 15, 24 (1973). Subsequent to Roth, the Supreme Court, in an effort to provide protection to a potentially obscene literary classic created a three part test to determine "(a) whether the average person, applying contemporary community standards would find that the work, taken as a whole, appeals to the prurient interest, (b) whether the work depicts or describes in a patently offensive way, sexual conduct specifically defined by the applicable state law, and (c) whether the work, taken as a whole, lacks serious literary artistic, political or scientific value." *Id.* (citations and internal quotations omitted); Chaplinsky v. New Hampshire, 315 U.S. 568 (1942) (finding that obscenity is not granted any First Amendment protection as it has "no essential part of any exposition of ideas" or the discovery of truth).

406. Beauharnais v. Illinois, 343 U.S. 250 (1952) (noting that defamation also includes group libel). *But see* Bantam Books, Inc. v. Sullivan, 372 U.S. 58 (1963) ("[P]rofound national commitment to the principle of debate on public issues should be uninhibited . . . and they may well include vehement, caustic and sometimes unpleasantly sharp attacks on government and public officials.").

407. *Chaplinsky*, 315 U.S. at 572 (defining fighting words as those "which by their very utterance inflict injury or tend to incite an immediate breach of the peace"). *But see* Gooding v. Wilson, 405 U.S. 518 (1972) (narrowing fighting words to exclude opprobrious and abusive).

obscenity to include not only speech that utterly lacks any social value but also speech that just lacks "serious literary artistic political or scientific value"[408] would include films that indoctrinate bad science. The second question is whether the legislation in question is content neutral or content-specific.[409]

In addition to the two major questions, the Court uses a particular test, the *Central Hudson* test, to assess First Amendment restrictions specifically with regard to commercial speech.[410] In this test the Court:

> (1) must determine whether the expression is protected by the First Amendment; [(2)] [f]or commercial speech to come within that provision, it at least must concern lawful activity and not be misleading; [(3)] [n]ext, we ask whether the asserted governmental interest is substantial; [and (4)] [i]f both inquiries yield positive answers, we must determine whether the regulation directly advances the governmental interest asserted, and whether it is not more extensive than is necessary to serve that interest.[411]

Although some speech is per se not protected, other speech may be regulated following the balancing of regulatory and constitutional interests as determined by the judicial tests. For example, the right to privacy may in some instances trump First Amendment rights when the exposure to particular speech is out of the control of the individual being exposed.[412]

iv. Current First Amendment Analysis: Medium of Expression

In addition to limitations on First Amendment protections granted to subject matter, the Court has also limited First Amendment protections based on the nature of the medium delivering the speech. Thus, the *Pacifica* Court, which reinstated the Federal Communication Commission's ruling regarding George Carlin's

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408. *Miller*, 413 U.S. at 24, 37.

409. Police Dep't of Chicago v. Mosley, 408 U.S. 92 (1972) (finding that the restriction on speech is limited when it is based on "its message, its ideas, its subject matter, or its content"). In *United States v. O'Brien*, 391 U.S. 367 (1968), and subsequent cases, the Court allowed for regulation of speech when a court can find other regulatory interests at work that are unrelated to the actual supersession of speech; included within this concept is the idea that restrictions of expression resulting from secondary, indirect effects of legislation are also sometimes permitted. *See, e.g.*, City of Renton v. Playtime Theatres, Inc., 475 U.S. 41 (1986); City Council of Los Angeles v. Taxpayers for Vincent, 466 U.S. 789 (1984).

410. Cent. Hudson Gas & Elec. Corp. v. Pub. Serv. Comm'n of New York, 447 U.S. 557 (1980).

411. *Id.* at 566.

412. *See, e.g.*, Packer Corp. v. Utah, 285 U.S. 105 (1932); *see also* Pub. Util. Comm'n v. Pollak, 343 U.S. 451 (1952) (Douglas, J., dissenting).

midday airing of a bit entitled "Filthy Words"—also known as "Seven Dirty Words"[413]—and in general upheld the FCC's power to regulate indecent speech broadcasted over the radio, opined that broadcasting in particular ought to have the "most limited First Amendment protection."[414] Note, however, that while earlier decisions limited the extent of First Amendment protection for commercial speech, more recent decisions have now determined that commercial speech is somewhat more protected and almost on par with non-commercial speech.[415] First Amendment protection is also limited in instances where the recipient of the speech is particularly vulnerable.[416]

The Court has historically discriminated among different media technologies.[417] Thus, while in *Tornillo* the Court, in holding unconstitutional a statute that compelled a newspaper to provide editorial space for politicians to allow them the opportunity to respond to their opponents,[418] ruled that fair and balanced reporting or any other abrogation of editorial judgment in the context of newspaper reporting is a violation of the First Amendment.[419] In *Red Lion,* which addressed the fairness doctrine that required broadcasters to offer an individual who had been personally attacked in broadcasts or political opponents of candidates who were endorsed by a radio or television station, an opportunity to respond to those comments, the Court upheld FCC broadcast regulations requiring balanced broadcast time for issues of pubic importance.[420] Moreover, the Court found that the rights of the viewers (which it considered to be a captive audience)[421]

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413. *See generally* Glen Collins, *The Station That Dared to Defend Carlin's '7 Words' Looks Back*, N.Y. TIMES, June 25, 2008, at B3.

414. FCC v. Pacifica Found., 438 U.S. 726 (1978) (noting that the broadcast media is particularly pervasive in American culture, confronting citizens not only in the public sphere but also in the privacy of their own homes; also noting a concern regarding the unexpected nature of the content and the particular accessibility of that content to minors).

415. *See, e.g.*, Lorillard Tobacco Co. v. Reilly, 533 U.S. 525 (2001) (Thomas, J., concurring) (finding no historical or philosophical basis for distinguishing between commercial and non-commercial expression).

416. *See, e.g.*, Ohralik v. Ohio State Bar Ass'n, 436 U.S. 447 (1978) (finding that when lawyers advertise, there is the potential for fraud under "influence, intimidation, overreaching, and other forms of 'vexatious conduct,'" and thus justifying unique regulatory burdens on such speech).

417. The court is not always sure though where a particular technology fits within its spectrum. *See, e.g.*, City of Los Angeles v. Preferred Commc'ns, Inc., 476 U.S. 488 (1986) (expressing uncertainty as to the First Amendment standard of review for cable television).

418. Fla. Stat. Ann. § 104.38 (1973).

419. Miami Herald Publ'g Co. v. Tornillo, 418 U.S. 241 (1974).

420. Red Lion Broad. Co. v. FCC, 395 U.S. 367 (1969) (noting the particular nature of the broadcast medium, particularly the inherent scarcity of the spectrum).

421. *See also* Columbia Broad. Sys., Inc. v. Democratic Nat'l Comm., 412 U.S. 94 (1973) (further expressing concern for the pervasive nature of broadcasting).

to receive access to ideas was paramount, surpassing First Amendment concerns.[422]

v. Current First Amendment Analysis: Nature of the State's Control

Prior restraints on speech—those that are imposed prior to the actual dissemination of the speech—are particularly objectionable under First Amendment doctrine,[423] as they prevent ideas from ever reaching the consuming public.[424] As stated by the Supreme Court, "[t]he special vice of a prior restraint is that communication will be suppressed, either directly or by inducing excessive caution in the speaker, before an adequate determination that it is unprotected by the First Amendment."[425] The Court has been somewhat inconsistent in prior restraints on licensing movies.[426] In *Kingsley*, a New York statute that gave film censors the right to refuse to license objectionable films was found to be unlawful under the First Amendment.[427] In contrast, in *Times Film Corp v. City of Chicago*, the Court upheld a law that required all movies to be submitted to censors for review prior to their licensing, ruling that the First Amendment stance against prior restraints is not absolute.[428] Still, the Court recognized generally that "any censorship system for motion pictures

422. *Red Lion Broad.*, 395 U.S. at 390 (ironically finding that the court had to abridge the First Amendment rights of the broadcaster in order to meet the First Amendment goals of availability of diverse expression in the marketplace).

423. *See, e.g.*, Tory v. Cochran, 544 U.S. 734, 738 (2005) ("Prior restraints on speech and publication are the most serious and the least tolerable infringement on First Amendment rights.") (citing Pittsburgh Press Co. v. Pittsburgh Comm'n on Human Relations, 413 U.S. 376 (1973).

424. Bantam Books, Inc., v. Sullivan, 372 U.S. 58 (1963); *see also* New York Times Co. v. United States, 403 U.S. 713 (1971) (Brennan, J., concurring) (finding an absolute bar against prior restraints under the First Amendment).

425. *Pittsburgh Press Co.*, 413 U.S. at 390.

426. The Court's general view of movies in light of the First Amendment has evolved over the course of the last century. In *Mutual Film Corp. v. Industrial Commission of Ohio*, 236 U.S. 230 (1915), the Court ruled that movies were not even considered part of the protected press. The Court also expressed some concern with the motion picture's ability to propagate evil. *Id.* at 242. With this in mind, courts in the early history of movies ruled that they were outside the protection of the First Amendment. For a short history see, DARIEN A. MCWHIRTE, FREEDOM OF SPEECH, PRESS, AND ASSEMBLY 60-65 (Oryx Press 1994). Eventually, though, the Court did acknowledge that movies were protected speech. Joseph Burstyn, Inc. v. Wilson, 343 U.S. 495 (1952). But even after this acknowledgement, the Court, under the theory that protection varied by medium, gave the print media a greater degree of protection. *See, e.g.*, Kovacs v. Cooper, 336 U.S. 77 (1949) (Jackson, J., concurring) (differentiating among multiple mediums of speech).

427. Kingsley Int'l Pictures Corp. v. Regents of the Univ. of New York, 360 U.S. 684 (1959).

428. 365 U.S. 43 (1961).

presents peculiar dangers to constitutionally protected speech," particularly when the burden is placed initially on the distributor of the movie.[429] Notwithstanding that decision, the Court has signaled a leaning toward a lesser concern for the prior restraints on commercial speech.[430]

An alternative to censoring and licensing is the distribution of notices that inform the public of particularly objectionable material. One could conceive of a system wherein, a movie distributor or movie theatre would be required to post a notice at the entrance to a movie or on the cover of a DVD noting the particular use of unrealistic, objectionable or improbable science. Disclaimers in television commercials, noting that the seemingly exceptional handling of a car is actually occurring on a closed course under the control of a trained driver and, as such, probably irreproducible on your daily commute, are a close analogue. Courts have ruled that the creation of such blacklists represents prior restraints on expression.[431]

vi. First Amendment Theories

While there are a number of theories underlying the First Amendment, the Court has generally not singled out any one particular theory to serve as an underpinning to its First Amendment jurisprudence. One theory, though, that seems to be particularly favored by the Justices, relates to Meiklejohn's view that the First Amendment is designed to create and maintain an informed electorate and that restrictions on speech prevent this electorate from being adequately informed; the fewer restraints on speech, the stronger the democracy.[432]

Truth is not a prerequisite for First Amendment protection.[433] Neither is editorial balance or responsible reporting.[434] In reality,

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429. Freedman v. Maryland, 380 U.S. 51 (1965) (noting that the job of a censor is particularly fraught with peril vis-à-vis the First Amendment since they are not particularly responsible directly to the public).

430. Cent. Hudson Gas & Elec. Corp. v. Pub. Serv. Comm'n, 447 U.S. 557, 571 n. 13 (1980) ("We have observed that commercial speech is such a sturdy brand of expression that traditional prior restraint doctrine may not apply to it.").

431. Bantam Books, Inc. v. Sullivan, 372 U.S. 58 (1963). *But see Cent. Hudson*, 447 U.S. at 77 (Halan, J., dissenting) (noting that the censoring commission ought to be constitutionally entitled to express its views and to notify the public of such views).

432. ALEXANDER MEIKLEJOHN, FREE SPEECH AND ITS RELATION TO SELF-GOVERNMENT (Harper & Brothers 1948).

433. *Id.*; *see also* Post, *Reconciling Theory*, *supra* note 399 (noting that, under black-letter First Amendment law, it is clear that there is no such thing as a false idea).

434. *See* Miami Herald Publ'g Co. v. Tornillo, 418 U.S. 241 (1974).

however, government agencies often act to limit untruthful speech, particularly agencies like the FCC or the FDA; consider also state unfair competition laws in the commercial sector that allow the government to punish those who advertise falsely.[435] This discrepancy may arise from competing First Amendment theories. In the Meiklejohnian view, where democracy is analogized to a town-hall meeting with the state as the moderator, speech that is "inconsistent with responsible and regulated discussion can and should be suppressed."[436]

Other First Amendment doctrine rests on the participatory theory.[437] This theory requires that the state not prohibit citizens from participating in communicating any form of information; it is less interested in the citizenry as a whole, but rather, it safeguards the speech of each individual, even at the expense of the public, but, nevertheless to the benefit of a participatory public discourse.[438] In spite of this expansive view of speech, the participatory theory still allows for limitations on speech, particularly when that speech is not part of the public discourse, or when those whose speech is not being regulated are not themselves part of the discourse.[439] Limitations on commercial speech are valid under both theories. The participatory theorists do not view commercial actors as a significant part of the public discourse. In the Meiklejohnian view, commercial speech that hurts the integrity of the speech at the town-hall meeting can be limited.[440]

vii. False Statements in First Amendment Theory

According to the influential U.S. Court of Appeals for the D.C Circuit, "[a] statement is 'inherently' misleading when the particular method by which the information is imparted to consumers is inherently conducive to deception and coercion . . . . A health claim is

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435. *See, e.g.*, 15 U.S.C. §§ 45, 53; 21 U.S.C. § 1036; 21 C.F.R. § 99.101 (powers of the FTC, USDA, FDA, respectively).

436. Post, *Reconciling Theory*, *supra* note 399, at 2367 ("What is essential is not that everyone shall speak, but that everything worth saying shall be said.") (citing ALEXANDER MEIKLEJOHN, THE CONSTITUTIONAL POWERS OF THE PEOPLE 24-26 (Harper & Row 1948)). Thus, according to Meiklejohn, *supra* note 432, speech that is outrageous, offensive, exaggerated, or indecent would not be protected.

437. Post, *Reconciling Theory*, *supra* note 399, at 2367.

438. *Id.*

439. For example, in controlling speech through broadcast licensing, the Court noted that the broadcasters were merely trustees of the pubic rather than direct participants. *Id.* at 2370.

440. *Id.*

inherently misleading when the public lacks the necessary knowledge toevaluate it."[441]

Professor Post is somewhat confused by the requirement of the *Central Hudson* Court, which found that regulations banning promotional advertising by a utility company violated the First Amendment, that the information not be misleading if it is to fall under the rubric of First Amendment protection[442] in light of other statements by the Court implying that the truth does not play a part in First Amendment rights. He acknowledges that in some instances the *Central Hudson* Court's requirement might not contradict the Court's earlier understanding of the First Amendment, particularly when the "structural relationship between a speaker and her audience" is the source of the untruthfulness. But in instances when the state is impeding actual false information, Professor Post is concerned that the *Central Hudson* rule "invites the state to mutilate the thinking process of the community by censoring communication that the state believes might potentially be deceptive."[443] This sort of state intrusion into speech seems to be antithetical to the Meiklejohnian understanding of First Amendment doctrine and suggests that the public lacks sophistication. Given these concerns, Professor Post advocates that we narrow the misleading component of the *Central Hudson* test to apply only when the "relationship between a speaker and her audience" is misleading, but not the speech itself.[444]

Some might suggest that Professor Post's arguments reflect a general hostility to paternalism, a trait not looked highly upon by First Amendment doctrine. This Article disagrees with the general abhorrence to an anti-paternalism stance,[445] arguing that the public does lack a degree of sophistication and, indeed, can be easily confused and convinced to accept misleading ideas. As such, there is a place for government paternalism, particularly in instances when we cannot expect the audience to understand the complex scientific ideas presented.[446]

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441. Pearson v. Shalala, 14 F. Supp. 2d 10, 18 (D.D.C. 1998) (supporting a standard of "significant scientific agreement" for the threshold of a truthful statement).

442. *See* Cent. Hudson Gas & Elec. Corp. v. Pub. Serv. Comm'n, 447 U.S. 557, 571 n. 2 (1980).

443. Robert Post, *The Constitutional Status of Commercial Speech*, 48 UCLA L. REV. 1, 38 (2000).

444. *Id.*

445. *Id.* at 50.

446. Thompson v. W. States Med. Ctr., 535 U.S. 357, 373 (2002) (underscoring the idea that "bans against truthful, nonmisleading commercial speech . . . usually rest solely on the offensive assumption that the public will respond 'irrationally' to the truth. The First Amendment directs [the courts] to be especially skeptical of regulations that seek to

Unfortunately, movies and film are not considered commercial speech, so courts would seem to not be as concerned regarding the potential for misinforming the public, thus closing up this potential *Central Hudson* misinformation loophole:

> It cannot be doubted that motion pictures are a significant medium for the communication of ideas . . . . The importance of motion pictures as an organ of public opinion is not lessened by the fact that they are designed to entertain as well as to inform . . . . [S]old for profit does not prevent them from being a form of expression whose liberty is safeguarded by the First Amendment . . . . [W]e conclude that expression by means of motion pictures is included within the free speech and free press guaranty of the First and Fourteenth Amendments. To the extent that language in the opinion in *Mutual Film Corp* . . . is out of harmony with the views here set forth, we no longer adhere to it. . . .[However] does it follow that motion pictures are necessarily subject to the precise rules governing any other particular method of expression. Each method tends to present its own peculiar problems.[447]

Nonetheless, even considering films to be non-commercial speech, Professor Post might support censorship when statements are made with "knowledge or reckless disregard for its falsity."[448] "Like all rights, however, free speech must be exercised with due respect for the rights of others." When speech infringes those rights, it may be regulated by law unless the value of the speech is so great that it justifies the infringement. Speech also may be regulated in cases where it does not constitute a fundamental right.[449] In this instance, one could argue that there is a compelling state interest in educating our youth.[450] Given the reality that children are strongly influenced

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keep people in the dark for what the government perceives to be their own good," but also indicating that bans on misleading information may be allowable"); *see also* Dowhal v. SmithKline Beecham Consumer Healthcare, 88 P.3d 1, 14 (Cal. 2004) (noting that the Supreme Court has "rejected the notion that the government has an interest in preventing the dissemination of truthful commercial information in order to prevent members of the public from making bad decisions with the information" (citing *Thompson*, 535 U.S. at 374)).

447. Joseph Burstyn, Inc. v. Wilson, 343 U.S. 495, 501-03 (1952) ("The line between the informing and the entertaining is too elusive for the protection of that basic right [of a free press]. Everyone is familiar with instances of propaganda through fiction. What is one man's amusement, teaches another's doctrine.") (citing Winters v. New York, 333 U.S. 507, 510 (1948)); *see also* New York v. Ferber, 458 U.S. 747, 771 (1982) (finding that film ought to be protected as it, too, is pure speech); Freedman v. Maryland, 380 U.S. 51, 58-61 (1965).

448. Reuland v. Hynes, 460 F.3d 409, 414 (2d Cir. 2006) (citing multiple instances of Supreme Court precedent for requiring such a standard for defamation of a public figure).

449. Steven J. Heyman, *Ideological Conflict and the First Amendment*, 78 CHI.-KENT. L. REV. 531, 574 (2003).

450. Universal Declaration of Human Rights, G.A. Res. 217A, at 31, U.N. GAOR Res. 71, U.N. Doc A/810, art. 26(1) (Dec. 12, 1948) ("Everyone has the right to education. Education shall be free, at least in the elementary and fundamental stages. Elementary education shall be compulsory. Technical and professional education shall be made generally available and higher education shall be equally accessible to all on the basis of

by what they see on television and in the movie theater, it is not hard to argue that there is a compelling state interest to somehow prevent children from learning bad science from movies and the media.

Even if the courts were to find that restrictions on speech based on science content are unconstitutional, the mere threat of government action may nevertheless encourage film makers to shape up. Take, for example, the current debate regarding violence on television:[451] courts have already found that restrictions on speech based on violent content are unconstitutional; nevertheless, the FCC may choose to regulate such programming with knowledge that just the potential threat may get television programmers more inclined to limit violence on television.

viii. Crime-Facilitating Speech

California is currently considering enacting the Animal Enterprise Protection Act, which would prohibit, among other things, "the public posting or the public display on the Internet of a home address, home telephone number, or image of any employee of an animal enterprise if that individual has made a written demand of that person, business, or association to not disclose his or her home address or home telephone number."[452] The theory behind the bill's limitations on free speech may reflect the position that information that makes it easier for people to commit crimes, even though there may be legal uses for that same speech, should not be constitutionally protected speech.[453] Although the Supreme Court has not yet considered whether the First Amendment protects crime-facilitating

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merit.") (reaffirmed by UNESCO, Convention Against Discrimination in Education, Dec. 14, 1960, 429 U.N.T.S. 93; reaffirmed by the Covenant on Economic, Social and Cultural Rights, opened for signature Dec. 19, 1966, 993 U.N.T.A. 3; reaffirmed by the Convention on the Rights of the Child, Nov. 20, 1989, G.A. Res. 44/25, 44 U.N. GAOR. Supp. No. 49, at 165, U.N. Doc. A/44/736 (1989)).

451. *See, e.g.*, Press Release, Jay Rockefeller, Senator, Rockefeller Calls on FCC to Provide Real Solutions to TV Violence: Senator Calls Commissioner McDowell's Recent Remarks Shortsighted (Mar. 5, 2007), *available at* http://rockefeller.senate.gov/press/record.cfm?id=281593.

452. The Animal Enterprise Protection Act, A.B. 2296, (Cal. 2007-08), *available at* http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_2251-2300/ab_2296_bill_20080401_amended_asm_v98.pdf.

453. Invention Secrecy Act, 35 U.S.C. §§ 181, 186 (2000) (limiting the distribution of information on inventions that are important for national security); United States v. Progressive, Inc., 486 F. Supp. 5 (W.D. Wis. 1979) (preventing the publication of a paper describing instructions for building an H-bomb); *see generally* Eugene Volokh, *Crime-Facilitating Speech*, 57 STAN. L. REV. 1095 (2005).

speech, some lower courts have confronted the issue on occasion, but they have not arrived at any settled rule.[454]

Like other dual-use forms of speech such as crime-facilitating speech, misleading science in the media can be seen as both useful as a form of entertainment and dangerously seditious as a conscious effort to misdirect public policy. And like crime-facilitating speech and libel laws, courts may want to consider the mens rea of the producer of the movie portraying the offensive junk science, and punish only those who knowingly or recklessly promote bad science that then encourages bad policy decisions. However, like crime-facilitating speech, there may be concerns for overuse of limitations, preventing even legitimate speech.

c. Non-Governmental Intervention

Without the ability to rely on the government to step in and police the media, science has to become more directly involved in the interaction between media and science. It cannot be content to abscond from its responsibilities; in addition to the aforementioned possibilities in actively chastising the media, scientific groups could support alternative programs that do not mislead or do a better job of educating.

At the end of the day, however, the scientific community needs to embrace the reality that bad science in movies is not going to go away completely, nor can we discount the power of Hollywood to overwhelm all positive science programming. The best solution is to work with the system as it is. Federal granting agencies, such as the National Science Foundation or the National Institutes of Health, should promote consulting among researchers and scientists. Research institutions should train their students not only to interact with other scientists, but also to interact with the world at large, promoting good science in all forms of media. Efforts can be made to include courses that promote the communication of science to the masses through, for example, science journalism and consultation courses. Movie producers should be invited to talk to and interact with science students, fostering a dialogue between the two groups. Educators should incorporate movies into the education process, using them to show scientific principles either by example or to show what is not possible in science to highlight the fact to students that often the science shown in movies is inaccurate and unreliable.

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454. Volokh, *supra* note 453, at 1099 n. 19.

VI. CONCLUSION: USING THE MEDIA TO SCIENCE'S ADVANTAGE

This Article has mostly focused on the negative effect that popular culture has on science public policy. The scientific community should acknowledge this fact and use it to its advantage.[455] Knowing what we know about popular media and culture and its effects on how we think and vote, scientists should enlist the media in efforts to educate. Scientists should coax the media into portraying the field and scientists in a more positive light, hopefully enticing a generation of children and young adults to pursue science rather than to fear it.

More research needs to be done to examine the issues presented in this Article. Efforts to control bad science should begin with the overly bad science that is politically motivated. These are the simple, relatively black-and-white issues. We should see how effective the scientific community is in countering these misrepresentations, deciding what is useful and what are fruitless efforts to counteract the media. Research also needs to be done in an effort to determine why movies and television are so influential in the creation of science policy and to determine the extent to which other media sources, such as the print and network news media, are influential in the creation of bad policy. This Article has focused primarily on the American response, but another line of research could compare and contrast international responses to bad science in film and its effect on science public policy.[456]

"Moral posturing is easy when responsibility is remote."[457] The scientific community needs to take responsibility for the science education of our nation. This Article has presented an issue that, while needing further study and analysis, nevertheless requires immediate actions to counter the potential effects of bad science in the media.

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455. The late Carl Sagan suggested that a television show be created to explore scientific questions in a scientific manner; in other words, a "Solved Mysteries" program that looks into "fundamental misunderstandings" in science and technology. *See* Carl Sagan, *What TV Could Do For America*, PARADE, June 4, 1995, at 12.

456. *See, e.g.*, Jon Turney, *In the Grip of the Monstrous Myth*, 3 PUB. UNDERSTANDING SCI. 225 (1994) (thoroughly analyzing Frankenstein and its effect on the public's understanding of science).

457. George Will, *A Film About Greed*, NEWSWEEK, Apr. 2, 1979, at 96.