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# MANUFACTURED SCIENTIFIC CONTROVERSY: SCIENCE, RHETORIC, AND PUBLIC DEBATE

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LEAH CECCARELLI

*This article examines three cases that have been identified by scholars as “manufactured” scientific controversies, in which rhetors seek to promote or delay public policy by announcing that there is an ongoing scientific debate about a matter for which there is actually an overwhelming scientific consensus. The comparative study of argumentative dynamics in the cases of AIDS dissent, global warming skepticism, and intelligent design reveals the deployment of rhetorical traps that take advantage of balancing norms and appeals to democratic values. It also reveals the ineffectual counterarguments marshalled by defenders of mainstream science. By exploring the inventional possibilities available to those who would respond to manufactured scientific controversies, this article equips readers and their students to confute deceptive arguments about science and engage in a more productive public debate. In so doing, this article initiates an Isocratean orientation to the rhetoric of science as a field of study.*

Soon after Thabo Mbeki became president of South Africa in 1999, he formed a Presidential AIDS Advisory Panel that included a number of people who claimed that an ongoing scientific controversy existed about whether the human immunodeficiency virus (HIV) causes acquired immune deficiency syndrome (AIDS). Simultaneously, Mbeki prohibited government hospitals from distributing antiretroviral (ARV) drugs to those who were infected with HIV.<sup>1</sup> Prior to elections in 2003, a popular movement forced

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Mbeki to publicly reverse this policy, but his years of support for those who disputed the overwhelming scientific consensus on AIDS had tragic effects on public health. A study published in 2008 estimates that over 330,000 South Africans died prematurely as a result of the Mbeki administration's refusal to accept freely donated ARV drugs and obstruction of Global Fund grants, and 35,000 babies acquired HIV who would not have done so had the drugs been made available.<sup>2</sup> What makes this situation more appalling is that before becoming president, Mbeki vigorously supported the distribution of ARV drugs; he even supported an unproven drug to fight HIV with the argument that we cannot wait for scientific research to eliminate all uncertainty because action needs to be taken quickly for dying AIDS patients.<sup>3</sup> After he became president, though, Mbeki's argumentative tactics changed; he made the opposite case that scientific uncertainty justified his new policy to deny drug distribution. It was not long before his actions "mirrored the machinations of self-interested obstructionists" everywhere, who have "manufactured controversy" over scientific claims in the public sphere to further a policy objective.<sup>4</sup> The dire consequences to public welfare that can result from the manufactured scientific controversy justify increased scholarly attention to this phenomenon.

A scientific controversy is "manufactured" in the public sphere when an arguer announces that there is an ongoing scientific debate in the technical sphere about a matter for which there is actually an overwhelming scientific consensus.<sup>5</sup> The manufactured scientific controversy can be seen as a special type of "public scientific controversy" in which "strategically distorted communication" works to corrode the democratic process.<sup>6</sup> This article will explore the argumentative dynamics of three cases that have been identified by scholars of rhetoric as "manufactured" scientific controversies.

In separate case studies that richly detail the specific civic epistemologies involved in each, rhetoricians have demonstrated how AIDS dissent, global warming skepticism, and intelligent design have been used to manufacture scientific controversy in the public sphere.<sup>7</sup> But no one study has yet detailed the common arguments and counterarguments deployed in all three cases. Reading these case studies separately, one might conclude that the purpose of the manufactured scientific controversy is to preclude the resolution of an issue in government action, or contrarily, that its purpose is actually to necessitate and legitimize government action.<sup>8</sup> The comparative study of arguments produced in all three cases will demonstrate how both ends can be served by the tactic; those who manufacture a scientific controversy in

the public sphere use the same rhetorical strategies to initiate an “epistemological filibuster” that delays policy change (like the regulation of carbon emissions), or to insert a “fairplay wedge” that enacts policy change (like a state government’s introduction of new “teach the controversy” directives for science education).<sup>9</sup>

Scholars outside the field of rhetorical inquiry who have studied this tactic have told us a great deal about the use and misuse of scientific uncertainty in the public sphere. For example, epidemiologist David Michaels details a number of cases where industries have deployed a strategy he calls “manufacturing uncertainty” in which “mercenary scientists” are hired to skillfully turn “what should be a debate over policy into a debate over science.”<sup>10</sup> Historian of science Robert Proctor invented the term “agnogenesis” to refer to the use of ignorance “as a deliberately engineered and *strategic ploy*” in cases like the tobacco industry’s response to cancer studies or the petrochemical industry’s promotion of global warming skepticism—cases where doubt or uncertainty becomes “something that is made, maintained, and manipulated by means of certain arts and sciences.”<sup>11</sup> Sociologists William R. Freudenburg, Robert Gramling, and Debra J. Davidson coined the term “scientific certainty argumentation methods,” or SCAMs, to refer to “a clever and surprisingly effective political-economic tactic” that exploits the fact that “most scientific findings are inherently probabilistic and ambiguous”; they point out that “SCAMs can be remarkably effective even in cases where most scientists see findings as strong or robust—indeed, even in cases where the findings are backed by clear and emphatic statements of scientific consensus from the most prestigious scientific organizations in the world.”<sup>12</sup>

Because these scholars focus on the manufacture of scientific *uncertainty* in the public sphere, they do an excellent job of demonstrating how conventional ignorance claims in scientific articles are taken out of context, data is cherry-picked, and statistical methods are manipulated with evaluation standards being strengthened for studies that have inconvenient results. However, with their focus on *uncertainty* production, rather than *controversy* production, these scholars of public health policy, history of science, and sociology of science turn their analytic gaze away from some of the most significant rhetorical dynamics involved in manufacturing an ongoing scientific debate in the face of overwhelming scientific consensus. This article will focus on those rhetorical dynamics.

By undertaking a multiple-case rhetorical study of argument and counterargument in the manufacture of scientific controversy, this article

will reveal how opposition scientists are recruited by political agents and their voices are amplified through the exploitation of balancing norms in American journalistic, legal, political, and educational institutions. Appeals to open-mindedness, freedom of inquiry, and fairness create discursive traps to constrain the response of mainstream scientists and their allies. The topoi employed by those who manufacture scientific controversy in the public sphere insinuate that defenders of the scientific mainstream cannot refuse to debate without seeming dogmatically unscientific and opposed to democratic values. However, agreement to debate is taken by audiences to indicate that there are two equally strong sides on the matter within the scientific community. To further constrain the response of those who speak for mainstream science, those who manufacture scientific controversy describe academic practices like peer review and tenure as mechanisms for an orthodoxy to suppress those who have a dissenting view, thus weakening the very practices of science that could be used to contest the quality of the most dubious claims in such debates. The narrative of controversy thus produced identifies skeptics as heroes in an unfolding scientific revolution, oppressed by mainstream scientists who are ideologically deaf to their appeals and who try to silence them so that others are not exposed to their heresy.

Without a clear understanding of these argumentative constraints, those who respond to manufactured scientific controversy often fall into the traps that have been set for them, replying with arrogant dismissal that serves only to confirm their opponents' charges in the eyes of the audience. By examining the available means of persuasion in these cases, this rhetorical study exposes this argumentative dynamic and suggests some responses to the manufactured scientific controversy that are more sensitive to audience and burden of proof, reclaim democratic values for science, and highlight how opponents of mainstream science do not always embody the scientific and democratic values they claim to champion. Such responses would not try to shut down public debate on these matters, but rather, engage the debate with a better understanding of the inventional possibilities inherent in these disputes.

### **A NEW ORIENTATION TOWARD THE RHETORIC OF SCIENCE**

The analysis of these three cases is grounded on the proposition that each one involves a deception, a scientific controversy that has been manufactured for

public consumption, rather than a genuine controversy over scientific facts and their interpretation that deserves critical airing in a public forum. I will offer evidence that the identification of each of these scientific controversies as “manufactured” is correct. Most often that evidence comes in the form of consensus statements by multiple scientific professional organizations combined with “smoking gun” documents in which political agents acknowledge in private planning reports that they are manufacturing scientific controversy as a tactic to manipulate a susceptible public.<sup>13</sup>

On the basis of this proposition about the deceptive nature of the tactic, the orientation toward mainstream science that I adopt in this essay will be as a critic of its opponents, and by implication, a defender of the current scientific orthodoxy. This is an approach to the rhetoric of science that rarely appears in our journals. It is more common for scholars in the rhetoric of science to orient themselves as critics of the world-defining hegemony of scientific discourse, interpreting the complicated social and technical entanglements that coproduce scientific “discoveries,” and thus bringing the scientific establishment down a notch or two. This standard approach derives from the sophistic impulse that initiated the subfield and still motivates much of its scholarly energy. Our critical spirit calls rhetoricians of science to practice the “koractic” art of pollution, “an impious management of linguistic and social ambiguities” that works “in resistance to the forces of rationalistic domination and discipline.”<sup>14</sup> When Celeste Condit attempts to create a scientific controversy by critiquing the assumptions of brain sex researchers, or Carolyn R. Miller characterizes research on the biological effects of nonionizing radiation as part of an ongoing scientific controversy rather than a closed debate, the rhetorical critic plays the role of Protagoras, making the (currently) weaker case stronger in a critique that challenges the scientific orthodoxy.<sup>15</sup> I am not opposed to this standard approach; in fact, I strongly support it in most cases (including the studies by Condit and Miller), and I often adopt this stance in my own research.<sup>16</sup>

However, I have come to believe that there are also times when the rhetorical critic should be prepared to develop scholarly insights that can be turned to the defense of a scientific orthodoxy.<sup>17</sup> Others in the interdisciplinary field of science studies have made a similar point. A recent article in the official journal of the History of Science Society argues that “in the current political climate, historians may be surprised to find themselves defending sciences, when the usual stance of historians is to be critical.”<sup>18</sup> Bruno Latour, who famously argued in 1979 for the social construction of scientific knowledge,

now wonders, in the wake of “artificially maintained controversies” over subjects like global warming, if he was “foolishly mistaken” to show “*the lack of scientific certainty*” inherent in the construction of facts.” He now regrets that “entire Ph.D. programs are still running to make sure that good American kids are learning the hard way that facts are made up . . . while dangerous extremists are using the very same argument of social construction to destroy hard-won evidence that could save our lives.” Latour fears that our “critical spirit has sent us down the wrong path, encouraging us to fight the wrong enemies and, worst of all,” he says “to be considered as friends by the wrong sort of allies.”<sup>19</sup>

Regarding global warming skepticism and intelligent design, some of the rhetoricians of science I most admire have given institutional and intellectual support to those who oppose the scientific consensus.<sup>20</sup> They have thoughtful justifications for bringing the art of rhetoric to the aid of those countering the scientific consensus in these cases.<sup>21</sup> For the sake of fairness, though, I think other rhetorical critics should be prepared, on occasion, to develop scholarly insights that can be turned to the defense of the scientific orthodoxy in such cases.

This supportive orientation toward mainstream science might not be common in our journals, but it finds a rationale in the classical tradition. Aristotle believed the study of rhetoric was useful because “before some audiences not even the possession of the exactest knowledge will make it easy for what we say to produce conviction.” So Aristotle gave the rhetorician the task of exploring the available means of persuasion on opposite sides of a question so that “if another man argues unfairly, we on our part may be able to confute him.”<sup>22</sup> One need not adopt the positivist belief that scientists have “exactest knowledge” to see the merit in exploring ways to counter deceptive public arguments about the current state of scientific thinking on a subject. Isocrates, who rejected both Plato’s belief in objective truth and Gorgias’s relativism, carved out a space for this orientation toward rhetorical inquiry in the development of a pedagogy that both reflects and manifests civic virtue by helping to develop the character of his students.<sup>23</sup> Drawing on Isocrates, Bruce Kimball reminds us that today’s student who gets an education in science but not in the public rhetoric of science is developing a stunted character that contributes to a troubled state: “searching for truth without giving commensurate attention to the importance of public expression inevitably leads the individual to isolation and self-indulgence and the republic to amoralism and chaos.”<sup>24</sup>

Is it any surprise that when students are trained in science but not in how to engage public discourse about science, those who align with the scientific mainstream end up adopting a dismissive attitude toward attacks they perceive as politically motivated? Is it any surprise that they would prefer to shut down civic debate on scientific matters that they believe have already been adjudicated by expert communities?<sup>25</sup> Sensitivity to rhetorical concepts like stases and argument fields would help those who align with mainstream science to recognize that the matters being decided in these cases—matters such as medicine distribution, carbon emission regulations, and public school curricula—do not *only* involve matters of fact; they also involve matters of value and policy, and therefore *must* be decided by citizens in the public sphere. By discovering and sharing the means to respond to manufactured scientific controversies, scholars of rhetoric can provide each other and their students with the tools to respond adequately to deceptive arguments about science in public forums, so rather than dismissing those arguments or responding with hostility, defenders will enter into more productive public debates and, ultimately, encourage more informed decision making in the public sphere.

This Isocratean perspective aligns with Barry Brummett's claim that articles on rhetorical theory should be perceived as "pedagogical," directed to a community of scholars who interpret and pass on what they read in academic journals to students pursuing a liberal arts education. The type of comparative multiple-case study that I undertake here can be seen as this type of rhetorical theory, designed to "identify some rhetorical tactic, strategy, device, etc., and attempt to account for its effectiveness," rather than to explore "the epistemological, ontological, axiological, or ethical dimensions of communication" (rhetorical philosophy) or to make "historical, aesthetic, literary, or similar judgments about particular works" (textual studies).<sup>26</sup> This article does not undertake a search for a universal demarcation criterion that can distinguish manufactured scientific controversy from genuine scientific controversy, nor will I offer a close reading that interprets and judges a particular text in one of these cases. Instead, this study examines the rhetorical strategies employed on both sides of three cases that have been identified in the scholarly record as manufactured scientific controversies, and its purpose is to explore the argumentative commonalities of these cases to enrich the stock of general knowledge on this subject and thus increase the discursive choices available to readers of this journal and the rhetors that many of us teach.

Since this comparison of cases focuses on argumentative similarities, it can be faulted for overlooking the differences that a thick description of each separate case would reveal.<sup>27</sup> However, since several very good essays already have been published that explore the specific historical, cultural, social, and political valences that both underwrite and trouble the development of the current scientific consensus in each of these cases, there is much to be gained from a study that passes over those specificities in order to better recognize the commonalities of argumentation that appear in all three.<sup>28</sup> The similarities revealed by such a study, especially the deployment of discursive traps and the stumbling responses of those who fall into those traps, tell the story of a powerful argumentative tactic that is difficult to counter.

### *AIDS DISSENT*

The appeal to fairness that ennobles the dissident who fights a hidebound orthodoxy is a common argumentative move in these cases. To publically manufacture scientific controversy in the face of overwhelming scientific consensus, a rhetor claims that conflict exists, but is being suppressed by a scientific community that silences those who counter the dominant scientific theories. A letter that President Thabo Mbeki wrote to President Bill Clinton, U.N. Secretary-General Kofi Annan, and other world leaders in April 2000 demonstrates the power of this appeal. In an ironic turn that identifies Mbeki more closely with the ideals of science than its Western supporters in the mainstream scientific community, he claims the successful dissident's authority in post-apartheid South Africa to fight for freedom against the forces of dogmatic oppression. "It is suggested, for instance, that there are some scientists who are 'dangerous and discredited' with whom nobody, including ourselves, should communicate or interact," he says. After describing the conditions in apartheid South Africa, in which people were "prohibited from being quoted in private and in public because the established authority believed that their views were dangerous and discredited," he concludes that "we are now being asked to do precisely the same thing that the racist apartheid tyranny we opposed did, because, it is said, there exists a scientific view that is supported by the majority, against which dissent is prohibited." Mbeki then judges the scientific community harshly for this attitude: "People who otherwise would fight very hard to defend the critically important rights of freedom of thought and speech occupy, with regard to the HIV-AIDS issue, the frontline in the campaign of intellectual intimidation and terrorism which argues that the

only freedom we have is to agree with what they decree to be established scientific truths.” Making an analogy between the scientific orthodoxy and the church, he rejects “the comfort of the recitation of a catechism” that is not an appropriate response to African AIDS, and he envisions a frightful future in which scientists “conduct a holy crusade against the infidels” who dissent from their decree.<sup>29</sup> His words are moving, and coming from a freedom fighter who suffered under apartheid, they are difficult to dismiss. When asked to comment on the letter, the American Assistant Secretary of State for African Affairs admitted that it was “quite logical and quite compelling.”<sup>30</sup>

When a manufactured scientific controversy devolves into a wild conspiracy theory that has “no clear grounding, no correspondence to the motives we know in daily life,” it is relatively easy to dismiss.<sup>31</sup> Claims that the scientific establishment has coordinated a massive cover-up to mislead the public about a nonexistent or innocuous virus are less plausible than the more reasonable conclusion that a few dissidents are wrong. But when a rhetor invokes a closed-minded orthodoxy rather than a nefarious cabal, and when he points to institutional structures that reinforce that orthodoxy, such as peer review in publication and funding decisions that result in the rejection of research that fails to fit mainstream assumptions, the complaint that a minority is being “marginalised by a dominant and well funded consensus” gains plausibility.<sup>32</sup> Since a rhetor manufacturing a scientific controversy has no need to establish the plausibility of an alternative “dissident” paradigm, but seeks only to keep the debate open, his burden of proof is low; he need only claim that inquiry is being unfairly stifled, and then wait as outraged defenders of the orthodoxy unwittingly confirm that claim through their response.

In the case of Mbeki’s support of AIDS dissent, he did not have to wait very long for this response to appear. Three months after his letter to world leaders was leaked to the public, the journal *Nature* published “The Durban Declaration,” a two-page document introduced by the editors as having been “stimulated by the current controversy in South Africa about whether HIV is the cause of AIDS,” a public controversy that they say “has caused massive consternation among all scientists.” Using the form of a petition to show the force of expert opinion, the editors indicate that the declaration was “signed by over 5,000 people,” all of them MDs or PhDs, including the directors of most major scientific organizations.<sup>33</sup> After offering technical arguments for the conclusion that HIV causes AIDS, the declaration states: “Further compelling data are available. HIV causes AIDS. It is unfortunate that a few vocal people continue to deny the evidence. This position will cost

countless lives. . . . to tackle the disease, everyone must first understand that HIV is the enemy.”<sup>34</sup>

The authors of the declaration never address Mbeki’s claim about the silencing of dissent, nor do they assure readers that scientists have debated these issues to come to the conclusions they draw. Instead, the main activity of science is characterized as gathering “data,” and the declaration itself is in the form of a pledge or communal profession of faith, printed at the top of the page in red ink: “HIV causes AIDS. Curbing the spread of this virus must remain the first step towards eliminating this devastating disease.”<sup>35</sup> This response plays right into the hands of those who manufacture scientific controversy, presenting the face of a dogmatic and closed scientific community that is alarmed by the prospect of debate and demands assent to its credo. One AIDS dissenter emphasized this point in his letter to *Nature* printed two months later. Regarding the authors of the Durban Declaration, he says, “we reject as outrageous their attempt to outlaw open discussion of alternative viewpoints, because this reveals an intolerance which has no place in any branch of science.”<sup>36</sup>

The defenders of mainstream science thus stumble into a rhetorical trap in which their struggles to escape only serve to secure them more firmly in their opponent’s grip. A similar dynamic can be seen in both of the other cases of manufactured scientific controversy that we will examine.

### GLOBAL WARMING SKEPTICISM

One of the most striking illustrations that global warming skepticism is employed as a deliberate tactic to achieve a policy objective is the infamous Frank Luntz memo on the environment; used by Republicans in 2002 to guide their messaging on the issue of global warming, this talking points document was written by a self-described “language guy” who takes other people’s policies and discovers how to communicate them.<sup>37</sup> Before Luntz wrote the memo, the Intergovernmental Panel on Climate Change (IPCC) pronounced the scientific consensus position that it is “unequivocally” the case that the Earth’s climate is changing, and “*most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations.*”<sup>38</sup> This consensus was the result of much accumulated research, a point that was demonstrated when historian of science Naomi Oreskes analyzed 928 abstracts from refereed scientific journals with the keywords “global climate change” published from 1993 to 2003 and discovered that

none of the papers disagreed with the consensus.<sup>39</sup> However, most Americans remained unaware that a scientific consensus existed. Several public opinion polls, the earliest taken in 1997 and the latest in 2007, indicate that a majority of Americans believe there is “a lot of disagreement among scientists” over “whether or not global warming is happening.”<sup>40</sup>

Luntz takes advantage of this misperception when his memo on the environment urges his clients to recognize that there is still a “*window of opportunity to challenge the science*” of climate change. “Voters believe that there is *no consensus* about global warming within the scientific community,” he says, so his clients should “*be even more active in recruiting experts who are sympathetic to your view, and much more active in making them part of your message. . . .* If you wish to challenge the prevailing wisdom about global warming, it is more effective to have professionals making the case than politicians.”<sup>41</sup> Luntz’s memo points out that to create the public appearance of scientific controversy in the face of “the prevailing wisdom” of mainstream scientific thought, debaters must be recruited from the ranks of those scientists who disagree with the scientific consensus, and their message must be amplified in the public forum.

One reason Luntz found it easy to keep the window of opportunity open to this manufactured scientific controversy in America is the commitment to *dissoi logoi* in our institutions of journalism, law, and politics. We assume that there are always two sides to a debate, and we structure our institutional discursive forums around this belief with balancing norms that ensure both sides are given equal representation and equal time. Studies of news content have demonstrated that journalism’s balancing norm, in which the appearance of objectivity is achieved by reporting both sides of an issue, leads to the views of a few maverick scientists often getting just as much attention in American news outlets as the accumulated voice of the multitudes of mainstream climate scientists.<sup>42</sup> The result is a news product that conveys the misperception that there is a lot of disagreement among scientists over whether global warming is happening. This exploitation of the journalistic norm of balance is a common rhetorical maneuver used by those who manufacture scientific controversy in public forums.<sup>43</sup>

A similar commitment to balance in the format of pro/con debate that organizes our political institutions can likewise create the misperception of ongoing scientific controversy despite an existing scientific consensus. Environmental sociologist Aaron McCright points out that in the congressional hearings that took place over global warming between 1994 and 1997, “five

contrarians testified approximately as often as did thousands of mainstream climate scientists publishing in the scientific literature.”<sup>44</sup> The description Oreskes offers of a 2006 Senate hearing on global warming in which she participated illustrates the conditions under which a few challengers might hold the ground against the rest of the scientific community. The hearing had “the quality of a sports event,” she said, with each side represented by two or three experts opposed to each other in a contest-like atmosphere.<sup>45</sup> Members of the public who encounter such balanced events can hardly be blamed for assuming that the community of experts is evenly divided on the scientific question being debated.

Those who manufacture scientific controversy for the general public take advantage of these institutional balancing norms whenever possible. For example, consider another “smoking gun” memo, this one written in April 1998 by a group of oil company representatives and conservative think tank researchers who met at the offices of the American Petroleum Institute.<sup>46</sup> The document begins with the result of a survey that suggests the public is more likely to oppose restrictions on carbon emissions if told that some scientists contest claims about anthropogenic climate change.<sup>47</sup> It then proposes an action plan for a “National Media Relations Program” to “identify, recruit, and train” a team of five new “independent” scientists who will participate in media outreach, to “organize, promote and conduct through grassroots organizations a series of campus/community workshops/debates on climate science,” and to hit news organizations with a “steady stream” of material to “undercut the ‘conventional wisdom’ on climate science,” with the goal of ensuring that “media coverage reflects a balance on climate science.” The document sets a goal of publicly “undercutting the ‘prevailing scientific wisdom,’” and it proposes “public/government official opinion surveys” and studies to track “the percent of media articles that raise questions about climate science” as ways to measure whether this goal has been met.<sup>48</sup> Recognizing the opportunity to exploit the pro/con balancing norms of journalism and organized public debates, these public relations experts devised a plan to recruit and train a handful of maverick scientists who could be placed in balanced opposition to the accumulated force of the rest of the scientific community.

The balancing norm is so powerful in America because it evokes a concept of fairness that resonates with “the mythic basis of the ‘American way,’ freedom of belief and expression and protection of those rights for minority views.”<sup>49</sup> It is perhaps unsurprising that countries with a history of righteous dissent like South Africa and the United States are places where manufactured

scientific controversies have taken hold.<sup>50</sup> The values of fairness and freedom are exploited by those who manufacture a scientific controversy for public consumption in order to force scientists to enter a balanced public debate on a scientific claim that has already been decided in the technical sphere. For example, consider the following, taken from a 2008 newspaper opinion editorial that contests the claim that the science of global warming is settled.

So why hasn't the entire scientific community fallen into step? Can a reputable scientist be a "denier?" If the evidence of man-caused global warming is as overwhelming as the left claims it is, why the lack of rational, intelligent public debate between qualified people of opposing views? Doesn't this make more sense than believers simply brushing off deniers? Given the chance, wouldn't believers want to publicly articulate their overwhelming scientific evidence and silence the naysayers or "deniers" once and for all? The reason this hasn't happened is because the science is not settled. Man-caused global warming isn't scientific fact; it's an article of faith for the left—the stuff of belief. . . . Both sides claim to love truth, so in an ecumenical spirit, why not hold a grand examination for discovery and come up with an agreement on beliefs that both sides can hold in common? On the contested beliefs, why not hold a debate where reputable scientists contend against reputable scientists like a 21st-century monkey trial?<sup>51</sup>

The analogy to the Scopes trial in this editorial is telling. The author's misperception that scientists debated each other in that trial hints at a popular belief that jury trials are the obvious mechanism for laypeople to adjudicate the testimony of clashing experts. A trial takes the form of a public contest that pits two sides in a balanced debate. Insofar as this guest columnist invokes democratic institutions before an American audience, he calls upon values that are difficult to dismiss. He goads mainstream scientists to enter public debates with dissidents, and if they refuse because their very participation in such debates would give the public the false impression that the scientific community was evenly divided on the subject, he accuses them of being a closed-minded orthodoxy participating in a conspiracy of silence that opposes both American and scientific values. His analogy between science and religion helps to make this case. If a truth claim accepted by the scientific community can be portrayed as "an article of faith," the stuff of dogmatic "belief" that requires an "ecumenical spirit" to temper it, then the skeptics who have not "fallen into step" and challenge the claim in public debate are

being more true to the scientific spirit (and the American Protestant tradition) than those who speak for mainstream science.<sup>52</sup>

How do the defenders of mainstream science respond to this? Out of the 19 critical letters to the editor replying to this essay that were printed or appeared on the online newspaper site, seven of them argue that the guest editorial should have never been printed. The shortest of these reads: “Can we please have a moratorium on letters about global warming unless they are from bona fide scientists with expertise in a relevant area? This isn’t politics, where every opinion has some validity; this is science, where only the opinions of scientists are meaningful.”<sup>53</sup> Given the efforts of global warming skeptics to turn a closed technical debate over the existence of global climate change into an open debate in the public sphere, the impulse behind this response is understandable, but in the context of the argument being countered, the call for censorship is an unwise rhetorical move. It seems to corroborate the essayist’s claim of a dogmatic orthodoxy by indicating that supporters of the dominant paradigm would prefer to silence dissent. Also, by suggesting that the opinion of a mere citizen is irrelevant on a matter that citizens ultimately must decide, and by claiming that only scientists should be heard in newspaper editorials about an issue that has tremendous public policy implications, the response seems elitist and antidemocratic. The exploitation of a balancing norm and the implication of a dogmatic orthodoxy form the arms of a trap that the defenders of science fall into and then find difficult to escape.

### *INTELLIGENT DESIGN*

The “teach the controversy” campaign of the Intelligent Design movement is yet another example of how the fairness appeal can work with the balancing norms of various democratic institutions to construct an open debate on a technical matter that the scientific community has already closed. A “smoking gun” memo that reveals the nature of this campaign against the theory of evolution is an internal planning document produced by the Discovery Institute titled “The Wedge.”<sup>54</sup> In it, advocates of intelligent design theory admit that their governing goals are to “defeat scientific materialism” and “replace materialistic explanations with the theistic understanding that nature and human beings are created by God.” They describe their strategy to achieve these theistic goals with the help of an analogy. “If we view the predominant materialistic science as a giant tree, our strategy is intended to function as

a ‘wedge’ that, while relatively small, can split the trunk when applied at its weakest points.” To replace “the stifling dominance” of modern science with a view that is more “consonant with Christian and theistic convictions,” they stage a scientific revolution. “A lesson we have learned from the history of science is that it is unnecessary to outnumber the opposing establishment.” With the careful application of a scientific controversy at the right pressure point, a small group of scientists “who are not blinded by the prevailing prejudices” can help to “crack the materialist edifice.”<sup>55</sup> By exploiting a popular conception that science advances only when heroic dissidents push at the frontiers of normal science to initiate a paradigm change, they can make intelligent design appear to be on the cutting edge of a contemporary scientific controversy, rather than the latest incarnation of a religiously inspired creationist agenda.

They have made little headway with the scientific community. The American Association for the Advancement of Science and many other scientific organizations have published several statements confirming the scientific consensus about evolution and rejecting intelligent design theory as unscientific.<sup>56</sup> Nor has intelligent design theory succeeded in the judicial domain; U.S. District Court Judge John E. Jones III, after listening to a range of expert testimony in 2005, concluded that intelligent design “is not science”; its “negative attacks on evolution have been refuted by the scientific community. . . . [It] has failed to gain acceptance in the scientific community, it has not generated peer-reviewed publications, nor has it been the subject of testing and research.”<sup>57</sup> However, an indication that the window of opportunity is open for the manufacture of this scientific controversy in the public sphere is signaled by the fact that the American public is only dimly aware of the scientific consensus on evolution; a 2007 opinion poll indicates that fewer than half of all Americans believe that “the scientific theory of evolution is well-supported by evidence and widely accepted within the scientific community.”<sup>58</sup>

The wedge campaign known as “teach the controversy” is designed to exploit and sustain this public uncertainty over the scientific consensus on evolution. It uses a fairness appeal to demand new legislation that requires the inclusion of antievolution arguments in the public schools. Discovery Institute senior fellow Stephen C. Meyer and John Angus Campbell demonstrate this appeal in a 2004 newspaper opinion editorial in which they talk about “the growing controversy over biological origins” created by “the new theory of intelligent design”<sup>59</sup>:

Rather than ignoring the controversy or teaching ideas based in religion, teachers should teach about the scientific debate over Darwinian evolution. A good education presents students with competing perspectives held by credible experts, and offers them the skills to judge these views themselves. In such cases, teachers should not teach only one view as true. Instead, teachers should describe differing views to students and explain the arguments for and against these views as made by their chief proponents. We call this “teaching the controversy.” . . . [T]eaching scientific controversies engages student interest and encourages them to do what scientists must do—deliberate about how best to interpret evidence. As Charles Darwin wrote in the “On the Origin of Species,” “A fair result can be obtained only by fully stating and balancing the facts and arguments on both sides of each question.”<sup>60</sup>

The reasonableness of this appeal is hard to deny. A number of polls taken from 1998 to 2006 suggest that the fairness appeal is perfectly suited to an American audience, where a majority are generally in favor of teaching creation along with evolution in public schools.<sup>61</sup> As Rachel Whidden explains, intelligent design advocates address themselves to an American understanding of what makes good citizens, namely, people who “are exposed to all sides of an issue and are encouraged to weigh facts and determine their own beliefs.”<sup>62</sup> To oppose the “teach the controversy” argument would mark one as an opponent of free speech and open deliberation, a defender of dogmatic science that is closed to criticism. Ben Stein, in the 2008 documentary *Expelled: No Intelligence Allowed*, makes this point somewhat less subtly than Meyer and Campbell, arguing that legitimate scientific debate is being suppressed by a scientific orthodoxy that bans intelligent design theory from the classroom, and in its zealotry, chastises, fires, or denies tenure to faculty who dare to question the reigning scientific position on evolution.<sup>63</sup>

The response of scientists to this wedge strategy has been characteristically clumsy. Another documentary, *Flock of Dodos*, created by biologist-turned-filmmaker Randy Olson, points out that for the most part, the supporters of intelligent design are friendly and skilled at getting their point across to the public; in contrast, scientists are like a flock of dodos in danger of extinction because they fail to respond in clear and friendly terms before a public audience to the intelligent design challenge.<sup>64</sup> An example of this clumsiness can be seen in the same newspaper where Meyer and Campbell make their case for teaching “the controversy”: a counterpoint opinion editorial written by Stanford neurology professor Robert M. Sapolsky appears opposite

their argument. In his response to the intelligent design challenge, Sapolsky completely fails to address the fairness issue, and with a tone of intellectual elitism, stamps intelligent design supporters with what he calls a “Jed-Clampett profile,” postulating that they live in “the poorest” regions “out in the sticks,” and are the “unhealthiest” of people “with the shortest life expectancies.” He then engages in sociological speculation about why the “downtrodden” might engage in such “bizarre, twitchy forms of ire” as to “dislike evolution” and goes on to express pity for the “unhappy campers” who believe an acceptance of evolution will mean they have to give up “one of the more common sources of solace in that corner of the country, namely fundamentalist religion.”<sup>65</sup> He might as well have said that in their bitterness, they cling to guns or religion. In tone, the piece confirms the public’s perception of scientists as elitist snobs locked away in their ivory tower and unwilling to engage the central issues that are being leveled against them.

This sort of response just reinforces the manufactured scientific controversy. The fairness wedge is built on public misperception that a scientific controversy exists, and on a balancing norm that exists in our educational institutions to ensure that students are not force-fed dogma but encouraged to think critically. The arrogant dismissive response of scientists to the “teach the controversy” appeal only works to reaffirm the populist argument that resistance to the hegemony of a closed-minded orthodoxy is necessary.<sup>66</sup> Such resistance can take the form of policy changes to protect the minority view, like the Louisiana Science Education Act, passed by that state’s legislature and signed into law by Governor Bobby Jindal in 2008. It requires the Louisiana Board of Education, in certain circumstances, to “create and foster an environment within public elementary and secondary schools that promotes critical thinking skills, logical analysis, and open and objective discussion of scientific theories being studied including, but not limited to, evolution, the origins of life, global warming, and human cloning.”<sup>67</sup> It is no coincidence that the list of scientific theories considered controversial enough to require critical discussion includes evolution *and* global warming. Both are contemporary scientific controversies that have been successfully manufactured for American audiences. The inclusion of human cloning on this list, the scientific theories about which are not considered a matter of controversy either in the public or technical spheres, is the clue that reminds us that this legislation is part of a larger political strategy, a fairness wedge that in reality is less about fairness than about turning a public values debate into a debate over science for the purpose of achieving a particular political end.

## INTENTIONAL POSSIBILITIES FOR THOSE RESPONDING TO MANUFACTURED SCIENTIFIC CONTROVERSIES

Those who manufacture scientific controversy for a public that is uncertain about the state of scientific knowledge do so by exploiting balancing norms and making appeals to values such as open-mindedness, freedom of inquiry, and fairness. When frustrated defenders of the scientific mainstream dismiss these arguments, protesting that there *is* no scientific controversy to debate, they are hurting themselves in two ways.

First, when they assume that they can safely ignore claims about science that remain unpublished in scientific journals, they fail to recognize the jurisdiction and burden of proof in these cases. Rhetors who manufacture scientific controversy are making arguments before a public audience to influence public policy decisions over things like carbon emissions, medicine distribution, and education standards. When a good portion of the public believes the skeptics (as with antievolution arguments in America), or when the empowered decision maker embraces the dissenters (as was the case with Mbeki and AIDS dissent), then ignoring the arguments of the critics means conceding the debate. A more promising strategy would be to engage the debate, but after refuting the most damning charges, shift the focus of discussion away from the conjectural stasis, recognizing that manufactured scientific controversy is really “a political controversy over values masquerading as a scientific dispute.”<sup>68</sup> Addressing the real issue of which values should be prioritized in society, or what standards of proof should be applied by a public body weighing the stakes of action and inaction, or what specific policies would be best in the given circumstances, forces the debate to turn on matters that are more appropriately managed in the public forum, rather than merely replaying a long and complicated technical debate before a nontechnical audience.<sup>69</sup>

As Lynda Walsh explains, there tends to be an “upward pull of the stases” that encourages public audiences to hear scientists making implicit value and policy claims (answers to epideictic and deliberative “ought” questions) even when scientists are being careful only to address conjectural, definitional, or causal stases (answers to forensic “is” questions).<sup>70</sup> Given this implicit conflation of stasis points, an explicit shift between stases might help to derail the misleading rhetorical implication. Since the ultimate question in the public sphere regarding science-based matters like AIDS, global warming,

and science education turns on what we “ought” to do, a deliberate and unambiguous change in the subject of discussion to matters of value and policy might allow controversialists to find points of contact that they would otherwise miss. For example, arguers who disagree about whether global warming is happening might find a point of contact in support of a policy to promote the development of alternative energies, regardless of where they stand on the technical issues surrounding climate science. At the very least, such a shift between stases would encourage disputants to engage each other as fellow citizens debating public policy rather than as competitors for the status of most expert possessor and interpreter of scientific data before an audience of nonexperts.

The second way in which mainstream scientists who follow their impulse to dismiss the manufactured scientific controversy are hurting themselves is by unwittingly confirming the very charge leveled against them: that they are a closed-minded orthodoxy conspiring to silence the opposition. Supporters of the scientific consensus can take measures to avoid being entrapped in this unwinnable argumentative sequence. For example, they can acknowledge that debate is important to science, while pointing out that debate on this particular subject has already taken place in scientific forums and been decided against the dissenters. Dissenters can be characterized as a small group who are given a hearing, but who have not yet offered a persuasive case. One of the online letters to the editor in response to the “Global Warming’ is Alarmism” essay offers a model of this kind of response. Atmospheric scientist R. A. Brown begins by explaining that he has been a part of the debate for 20 years. He recalls “a heavily attended evening debate . . . circa 1985,” then claims to “have heard hundreds of debates around the world since then.” He goes on to note that “there are hundreds of peer-reviewed scientific papers on the subject. They support anthropomorphic induced global warming by about 99 to 1. Among global warming scientists,” he says, “man-caused global warming has been established and proven by the scientific method.”<sup>71</sup> Notice how Brown describes the scientific method not as a process of data collection by a few heroic individuals that leads immediately and inexorably to the full consensus of all reasonable experts.<sup>72</sup> Instead, science is described as an open debate—a debate that on this matter at least, has been settled through a lengthy deliberative process among experts, not to the complete agreement of all involved, but to the assent of a vast majority. This allows him to avoid the charge that debate has been unfairly stifled, and places the force of intersubjective agreement (99 to 1) behind the conclusion reached. In this

response, the scientific orthodoxy becomes the defender of democratic values, rather than the voice of censorship, and global warming skeptics become sore losers who unfairly dispute the outcome of a deliberative contest.

A similar argument can be made in the case of AIDS dissent. In 2006, an AIDS scientist objecting to an AIDS dissent article published in *Harper's Magazine* wrote a letter to the editor that countered the romantic notion in that article that a nascent scientific revolution was being led by heroic rebels. The AIDS scientist points out that the author of the article favors "a few scientists, and a larger number of laymen, who have chosen not to believe that HIV causes AIDS. By doing so, she makes a classic error: scientific truth is not established by one or two people, it is created by consensus within a research community. It is always possible to find dissidents and denialists for any argument put forward by humans, be it scientific, political or the best shade to use for the bathroom wallpaper. But the mere existence of dissidents and denialists does not mean that they are right." He points out that the judgment of a supermajority of experts is generally more reliable than the claims of a handful of mavericks. Rather than make the futile and ultimately counterproductive argument that the article should have been censored, this supporter of the scientific consensus says "fairness" demands that the magazine "grant equivalent space to bona fide scientists to publish a detailed rebuttal" of the article in the same public forum.<sup>73</sup>

This fairness appeal also can be turned against those who advocate the teaching of intelligent design (or global warming skepticism) in public schools. By definition, a scientific *revolution* happens despite the status quo consensus of the scientific community; a scientific community practicing under one paradigm is transformed over time, through argument and counterargument, into a scientific community practicing under another.<sup>74</sup> Those seeking special treatment in the schools for a claim currently rejected by the scientific community in order to jumpstart what they believe to be a potential scientific revolution are asking for an unfair advantage in the marketplace of ideas.<sup>75</sup> If their claims are persuasive, intelligent design advocates should have no trouble finding new recruits for their future research programs by writing popular books or giving speeches to the majority of Americans who believe in young earth creationism or directed evolution.<sup>76</sup> It is only fair that intelligent design theorists toil along with every other dissenting view in science for acceptance, entering the classroom as textbook science not because they have powerful political connections, but only when they have won the debate in the technical sphere.

One might object that the image of science I am encouraging defenders of the scientific mainstream to adopt is not sensitive to audience insofar as it does not embrace the crude positivist or objectivist philosophy of science that most public audiences hold. When characterizing science, the first impulse of defenders of mainstream science, like the authors of the Durban Declaration, is to accept this simplistic vision of science as data-gathering that results in absolute knowledge, where careful observation leads to a theory that demands the immediate and complete consensus of the scientific community. But repeating this story of science is counterproductive on two counts. First, those who tell this story can be charged with “venue relativism” as they shift between positivism for the masses when countering manufactured scientific controversies in public settings and more constructivist images of science when communicating with fellow experts.<sup>77</sup> This inconsistency, when revealed, is damning. Second, the positivist image of science adopted for public audiences is especially vulnerable to the attack of those who manufacture scientific controversy since any little chink of controversy offers an opening to a well-placed wedge. Under the shelter of this narrative, the dissent of one person who is a bona fide scientist in a relevant area can be seen as evidence that complete consensus has not been obtained, and thus members of the public can jump to the conclusion that the correct scientific theory must not have been discovered yet.

A more promising response retells the Kuhnian story: scientific theories become accepted through a process of dissent, lengthy debate, and eventual acceptance by a community of experts. To counter the arguments of those who deceive the public about the existence of a technical sphere controversy in furtherance of their own political aims, defenders of the orthodoxy can dispute the identity of a revolutionary community in the specific case, pointing out that the mere existence of dissent does not mean that a scientific revolution is underway. Dissent is normal in science, they can explain, always existing in small pockets outside the mainstream consensus, and although it sometimes marks the start of a revolution, it more commonly marks those who are unwilling to relinquish their grip on an old paradigm, or those who are unable to persuade their colleagues because of the poor quality of their theories and evidence. In some rare cases, dissent is the route of those who find it profitable to take up arms against the consensus position because political interests pay them to do so. Once a defender draws on the history of science to establish the extensive debate that preceded the current scientific consensus, the burden of proof shifts to the dissenter to

explain why he or she is not acting unfairly as a poor loser or a politically motivated obstructionist.

Historians of science have done an excellent job of chronicling the record of disciplinary argumentation preceding the current scientific consensus in these cases, explaining how scientific knowledge comes to be established through the developing assent of expert opinion.<sup>78</sup> Including such a focus on the history and philosophy of science in our efforts at science education, both in academic settings and in the form of popularizations that reach a broader public, can assist scientists in defending their work against distortion by those who exploit common misunderstandings to bolster their attacks on contemporary science.

Those who manufacture scientific controversy will continue to push at any window of opportunity to challenge the science in public. So defenders of the scientific mainstream should not hesitate to offer rebuttals that reveal a manufactured scientific controversy for what it is, pointing to the “smoking gun” memos that expose the political machinations behind organized campaigns to defeat inconvenient scientific knowledge in the public forum. As one sociologist reminds us, “Claiming the disenfranchised underdog role has gained contrarians access to an arsenal of provocative imagery within American culture. However, this is not a very accurate description of reality.”<sup>79</sup> Identifying the unambiguous linkages between conservative think tanks, the petroleum industry, and global warming skeptics, or between an organized creationist lobby and intelligent design theory, can go far toward disputing the dissenters’ self-portrayal as clear-eyed scientists heroically following the evidence wherever it leads them.<sup>80</sup> The juxtaposition of industry claims with proof of their deliberate attempts to manipulate the public can help reverse the dynamics of uncertainty and highlight the moral dimension of such cases.<sup>81</sup> But defenders of mainstream science should not be surprised when their opponents use the same credibility-damaging arguments against them, as with the circulation of the “Climategate” emails that revealed certain climate scientists as also falling outside the idealized role of the disinterested observer.<sup>82</sup> As Sally Jackson warns, “when political partisans exaggerate scientific uncertainty to justify inaction, rebuttal choices open to scientists are all dangerous in different ways, but most dangerous when framed by accusations of deliberate distortion” because it opens a disagreement space “that the opponent can exploit to devastating effect.”<sup>83</sup>

Nevertheless, it is a perfectly appropriate rhetorical move for scientists and their allies battling a scientific controversy that has been manufactured

in the public sphere to highlight those moments when the dissenter's charge of a restrictive orthodoxy morphs into an unbelievable conspiracy theory, or to point out the places where dissenters' misrepresentations and fallacious reasoning call their credibility into question.<sup>84</sup> Appeals to authority tend to dominate over technical argument whenever scientists enter the public policy context, so arguments that turn on character probably cannot be avoided.<sup>85</sup> But recognizing that the empowered audience in these debates is a public that does not always trust science, care must be taken not to let ethos attacks on opponents devolve into elitist rants against anyone foolish enough to doubt the reigning orthodoxy, or to allow the debate to turn on dueling ad hominem attacks and counterattacks that leave the public with nothing but a muddy view of the science involved.

These means of persuasion are some of the resources available to those who would defend the scientific orthodoxy against a manufactured scientific controversy, whether it be an epistemological filibuster to delay policy change or a fairplay wedge to initiate policy change. Teased out of the recommendations of other scholars and an analysis of the few responses by defenders of the orthodoxy that avoid the argumentative traps that have been set for them, these appeals show promise for confuting the claims of opponents and producing a more healthy debate on these matters. In short, students of rhetoric and science who face what they believe to be a manufactured scientific controversy can be encouraged to: (1) engage the opponent's claims but then explicitly shift the stasis from questions of fact, definition, and cause to the questions of value and policy that are the driving force behind the public debate; (2) counter the charge that dissent is being silenced by characterizing science as a process of open debate among experts, a process that is ongoing but that has been fairly settled on this issue; and (3) point to the "smoking gun" memos and other indicators that scientific controversy is being manufactured to manipulate a public audience in these cases, while taking care not to adopt a dismissive tone toward everyone who takes a skeptical view toward mainstream science.

## CONCLUSION

The cases of AIDS dissent, global warming skepticism, and intelligent design have been separately identified by scholars as manufactured scientific controversies, but this has been the first rhetorical study of the common

argumentative tactics used in building all three of them. By offering a rhetorical perspective to these cases, focusing on the way scientific controversy is persuasively manufactured in the public sphere through the exploitation of balancing norms and the topoi of freedom of speech and freedom of inquiry, this study has revealed the deployment of argumentative traps that constrain the response of mainstream scientists and their allies. These are techniques that have not been as thoroughly explored by other science studies scholars, who have approached this phenomenon from the perspective of uncertainty production and thus have focused primarily on how scientific data and methods are manipulated in such cases for political or economic gain. After exposing the argumentative traps that are deployed in these cases, and the stumbling responses of those attempting to support the current scientific consensus, this study revealed some alternative inventional resources. The use of these resources would potentially result in more productive civic debate about public policy decisions that citizen ultimately must make.

In the past, rhetoricians have been satisfied to critique scientific orthodoxy from a position that shows sympathy for the heretic; we have revealed the mechanisms of forum control and ritual scapegoating that are used to exclude those who contest the authoritarian dogma of an exceedingly powerful modern scientific institution, and in so doing, we helped call the claims of that institution into question.<sup>86</sup> My study has taken a different position, suggesting the situationally appropriate adoption of more prudent mechanisms of public persuasion as defenses against the tactics of the politically powerful and rhetorically savvy forces that manufacture scientific controversies before public audiences to delay or promote specific public policies. Surely there is room for scholars of rhetorical inquiry to take both of these positions toward science in the pages of our journals. After all, our commitment to freedom of inquiry and a fair balance of positions in the academy demands it.

## NOTES

1. For more on the history of this case, see Marcus Paroske, "Deliberating International Science Policy Controversies: Uncertainty and AIDS in South Africa," *Quarterly Journal of Speech* 95 (2009): 156–57, 162.
2. Pride Chigwedere, George R. Seage III, Sofia Gruskin, Tun-Hou Lee, and M. Essex, "Estimating the Lost Benefits of Antiretroviral Drug Use in South Africa," *Journal of*

- Acquired Immune Deficiency Syndromes* 49 (2008): 410–15.
3. Paroske, “Deliberating International Science Policy Controversies,” 155.
  4. Paroske, “Deliberating International Science Policy Controversies,” 162, 152.
  5. Although the terms “public sphere” and “technical sphere” appear in this definition, I recognize that the distinction between them is not a simple one. The boundaries between the two are permeable, with social and scientific orders dynamically coproducing each other; see, for example, Sheila Jasanoff, ed., *States of Knowledge: The Co-Production of Science and Social Order* (New York: Routledge, 2004). One example of this permeability is that technical sphere disputes that fail to be adjudicated by formal mechanisms within that sphere can be taken to the public sphere for resolution. See G. Thomas Goodnight, “The Personal, Technical, and Public Spheres of Argument: A Speculative Inquiry into the Art of Public Deliberation,” *Journal of the American Forensic Association* 18 (1982): 219. It is when this practice for publically adjudicating technical disputes between experts is exploited by political interests who create a public controversy over scientific claims in order to achieve a particular policy objective that one might say scientific controversy is being “manufactured” in the public sphere.
  6. Nathan Crick and Joseph Gabriel, “The Conduit Between Lifeworld and System: Habermas and the Rhetoric of Public Scientific Controversies,” *Rhetoric Society Quarterly* 40 (2010): 219–20.
  7. Paroske, “Deliberating International Science Policy Controversies,” 162, 152; Marlia Elisabeth Banning, “When Poststructural Theory and Contemporary Politics Collide—The Vexed Case of Global Warming,” *Communication and Critical/Cultural Studies* 6 (2009): 286–87, 291, 298; Rachel Avon Whidden, “The Manufacturing of Controversy: Debating Intelligent Design in Public,” in *Critical Problems in Argumentation: Selected Papers from the Thirteenth NCA/AFA Conference on Argumentation*, ed. Charles Arthur Willard (Washington, DC: National Communication Association, 2005), 707–8. “Civic epistemology” is a term that denotes a public’s “culturally specific, historically and politically grounded” encounter with science and technology; see Sheila Jasanoff, *Designs on Nature: Science and Democracy in Europe and the United States* (Princeton, NJ: Princeton University Press, 2005), 249.
  8. Paroske, “Deliberating International Science Policy Controversies,” 151; Whidden, “The Manufacturing of Controversy,” 705.
  9. The term “epistemological filibuster” was coined in Paroske, “Deliberating International Science Policy Controversies”; the term “fairplay wedge” is my own.
  10. David Michaels, *Doubt Is Their Product: How Industry’s Assault on Science Threatens Your Health* (Oxford: Oxford University Press, 2008), x, 60, 264. See also David Michaels, “Manufactured Uncertainty: Contested Science and the Protection of the Public’s Health and Environment,” in *Agnotology: The Making and Unmaking of Ignorance*, ed.

- Robert N. Proctor and Londa Schiebinger (Stanford, CA: Stanford University Press, 2008), 90–107; David Michaels, “Knowing Uncertainty for What It Is,” *Nieman Reports* 59, no. 4 (2005): 75–77.
11. Robert N. Proctor, “Agnotology: A Missing Term to Describe the Cultural Production of Ignorance (and Its Study),” in *Agnotology*, 3, 8. See also the more recent popular nonfiction book cowritten by two historians of science that examines the production of doubt in these cases and others: Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (New York: Bloomsbury Press, 2010).
  12. William R. Freudenburg, Robert Gramling, and Debra J. Davidson, “Scientific Certainty Argumentation Methods (SCAMs): Science and the Politics of Doubt,” *Sociological Inquiry* 78 (2008): 2, 5.
  13. The archetypal “smoking gun” document of a manufactured scientific controversy is a tobacco industry internal memo that, when faced with evidence that tobacco causes cancer, candidly admits, “Doubt is our product since it is the best means of competing with the ‘body of fact’ that exists in the mind of the general public. It is also the means of establishing a controversy.” See Brown and Williamson, “Smoking and Health Proposal,” 1969, *Brown and Williamson Collection*, Bates number 680561778/1786, p. 4, <http://legacy.library.ucsf.edu/tid/nvs40f00/pdf> (accessed January 2011). Similar documents will be identified later in this article in the cases of global warming skepticism and intelligent design advocacy. I have found no such document in the Mbeki case; instead, I interpret his inconsistent positions about the need for medicine distribution in the face of scientific uncertainty as evidence that his promotion of AIDS dissent after he became president was a matter of expediency, a political tactic to promote a specific policy objective.
  14. Stephen Olbrys Gencarella, “The Myth of Rhetoric: Korax and the Art of Pollution,” *Rhetoric Society Quarterly* 37 (2007): 268–69.
  15. Celeste Condit, “How Bad Science Stays that Way: Brain Sex, Demarcation, and the Status of Truth in the Rhetoric of Science,” *Rhetoric Society Quarterly* 26 (1996): 83–109; Carolyn R. Miller, “Novelty and Heresy in the Debate on Nonthermal Effects of Electromagnetic Fields,” in *Rhetoric and Incommensurability*, ed. Randy Allen Harris (West Lafayette, IN: Parlor Press, 2005), 464–505.
  16. For example, see my critiques of E. O. Wilson in Leah Ceccarelli, *Shaping Science with Rhetoric: The Cases of Dobzhansky, Schrödinger, and Wilson* (Chicago: University of Chicago Press, 2001), and Leah Ceccarelli, “Science and Civil Debate: The Case of E. O. Wilson’s Sociobiology,” in *Rhetoric and Incommensurability*, 271–93. See also my response to G. Thomas Goodnight’s rationale for inquiry into science and technology controversy, in which I argue that there are times when rhetoricians of science should

- support public rhetors who are capable of “creating a controversy where one did not previously exist.” Leah M. Ceccarelli, “Let Us (Not) Theorize the Spaces of Contention,” *Argumentation and Advocacy* 42 (2005): 32.
17. Whether to critique mainstream science or align with mainstream science by critiquing those who oppose it is a judgment that should be made anew in each study. Neither a scholar nor the field as a whole can afford to take a singular stance in all situations. Starting with the proposition that some cases of public controversy over science involve deception for political gain is not the same as claiming that *all* cases of public controversy over science are illegitimate, or that any particular scientific consensus should be assumed to be permanent. The particular case and available evidence at the time should determine the critical or supportive stance taken by the rhetorician who studies that case.
  18. Zuoyue Wang and Naomi Oreskes, “History of Science and American Science Policy,” *Isis* 99 (2008): 365.
  19. Bruno Latour, “Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern,” *Critical Inquiry* 30 (2004): 227, 231. His groundbreaking earlier work on the social construction of scientific knowledge is Bruno Latour and Steve Woolgar, *Laboratory Life: The Construction of Scientific Facts* (Beverly Hills, CA: Sage, 1979).
  20. In 1998, the Association for the Rhetoric of Science and Technology (ARST) gave climate contrarian Patrick Michaels equal footing with consensus scientist James Hansen at the National Communication Association convention. Organizers Gordon R. Mitchell and Timothy M. O'Donnell described the event, printed a transcript of the debate, and published scholarly commentary on it in a special double issue of *Social Epistemology* that they coedited. See *Social Epistemology* 14 (2000): 79–233. The scholarly organization's decision to affirm “conflict and uncertainty” with a sponsored debate despite “a reasonably firm consensus among scientists” was questioned in Philip C. Wander and Dennis Jaehne, “Prospects for ‘a Rhetoric of Science,’” *Social Epistemology* 14 (2000): 220. At another ARST meeting, intelligent design supporters were placed on the program and their arguments were extended in a special issue of *Rhetoric & Public Affairs* 1 (1998) that later became a book: John Angus Campbell and Stephen C. Meyer, eds., *Darwinism, Design, and Public Education* (East Lansing, MI: Michigan State University Press, 2003). This book in the respected Rhetoric and Public Affairs Series is now used by intelligent design supporters as evidence that they publish their research in “appropriate scientific literature.” See Discovery Institute, “Peer-Reviewed and Peer-Edited Scientific Publications Supporting the Theory of Intelligent Design,” the Discovery Institute, Center for Science and Culture, August 26, 2010, <http://www.discovery.org/a/2640> (accessed January 2011).
  21. That Steve Fuller, one of the founding members of ARST, sees himself as channeling

the emancipatory voice of Protagoras in making the weaker case stronger, is evident in his testimony in *Kitzmiller v. Dover*, where he justifies support of intelligent design “as an affirmative action strategy with regard to disadvantaged theories.” See “Kitzmiller v. Dover Area School District Trial Transcript: Day 15 (October 24, 2005), AM Session, Part 2,” *The TalkOrigins Archive: Exploring the Creation/Evolution Controversy*, <http://www.talkorigins.org/faqs/dover/day15am2.html> (accessed January 2011). As I will demonstrate later in this essay, John Angus Campbell, another rhetorician of science I greatly admire and a former president of ARST, grounds his support for intelligent design’s “teach the controversy” approach in a desire to introduce students to the importance of argument in science. I share the values and goals of Fuller and Campbell (improving public discourse about science and promoting rhetorical education); I hope these scholars who have taught me so much over the years can forgive me for disagreeing with the means they have adopted to achieve these goals, such as collaboration with the Discovery Institute in support of intelligent design.

22. Aristotle, *Rhetoric*, trans. W. Rhys Roberts (Whitefish, MT: Kessinger Publishing, 2004), 3, 4.
23. Michael Leff, “Isocrates, Tradition, and the Rhetorical Version of Civic Education,” in *Isocrates and Civic Education*, ed. Takis Poulakos and David Depew (Austin: University of Texas Press, 2004), 236–37.
24. Bruce A. Kimball, *Orators and Philosophers: A History of the Idea of Liberal Education* (New York: Teachers College Press, 1986), 238.
25. Consider, for example, the recent independent review by the University of East Anglia of the conduct of the scientists involved in the “Climategate” emails scandal. This comprehensive review concluded that, although the rigor and honesty of the scientists was never in doubt, there was “a consistent pattern of failing to display the proper degree of openness” by scientists who took an “unhelpful and defensive” posture toward potential critics in the public sphere. Muir Russell, Geoffrey Boulton, Peter Clarke, and James Norton, *The Independent Climate Change E-mails Review*, July 2010, 11–12, <http://www.cce-review.org/pdf/FINAL%20REPORT.pdf> (accessed January 2011).
26. Barry Brummett, “Rhetorical Theory as Heuristic and Moral: A Pedagogical Justification,” *Communication Education* 33 (1984): 103, 97.
27. Sheila Jasanoff notes the opposite limitation for her multiple-case, cross-national study of biotechnology and politics, which can be faulted for exaggerating differences since it is focused on revealing cultural heterogeneity. See Jasanoff, *Designs on Nature*, 11.
28. In addition to the studies already mentioned by Paroske, Banning, and Whidden, see Kiran van Rijn, “The Politics of Uncertainty: The AIDS Debate, Thabo Mbeki and the South African Government Response,” *Social History of Medicine* 19 (2006): 521–38; Clark A. Miller, “Climate Science and the Making of a Global Political Order,” in *States of*

- Knowledge*, 46–66; and David J. Depew, “Darwinian Controversies: An Historiographical Recounting,” *Science and Education* 19 (2010): 323–66.
29. Thabo Mbeki, “Thabo Mbeki’s Letter,” April 3, 2000, <http://www.pbs.org/wgbh/pages/frontline/aids/docs/mbeki.html> (accessed January 2011).
  30. Susan Rice, quoted in Barton Gellman, “S. African President Escalates AIDS Feud,” *Washington Post*, April 19, 2000, A1.
  31. James Darsey, “A Conspiracy of Science,” *Western Journal of Communication* 66 (2002): 488.
  32. Van Rijn, “The Politics of Uncertainty,” 525.
  33. “The Durban Declaration,” *Nature* 406, no. 6791 (July 6, 2000): 15. To avoid the charge that signatories were influenced by the pharmaceutical industry, the petition explicitly excludes “scientists working for commercial companies.” An entire paper could be written on the use of petitions and lists to demonstrate the consensus position, or alternatively, to establish the existence of significant dissent by those who manufacture scientific controversy. Some notable examples of dissent lists include: “The AIDS Industry and Media Want You to Think There Are Only a Handful of Scientists Who Doubt the HIV-AIDS Theory. Here’s The Reality,” Rethinking AIDS, <http://www.rethinkingaids.com/quotes/rethinkers.htm>; “U.S. Senate Minority Report: More Than 700 International Scientists Dissent Over Man-Made Global Warming Claims,” U.S. Senate Environment and Public Works Committee, [http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore\\_id=83947f5d-d84a-4a84-ad5d-6e2d71db52d9](http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=83947f5d-d84a-4a84-ad5d-6e2d71db52d9); “A Scientific Dissent from Darwinism,” the Discovery Institute, <http://www.dissentfromdarwin.org/>. These lists are often deconstructed with arguments that the people named are motivated by extrascientific factors or are not real experts. For example, see Stuart Jordan and Thomas O’Brien, “The Credibility Project: An Assessment of the ‘U.S. Senate Minority Report: More than 650 International Scientists Dissent Over Man Made Global Warming,’” Center for Inquiry Office of Public Policy, July 2009, [http://www.centerforinquiry.net/uploads/attachments/credibility\\_\\_brochure.pdf](http://www.centerforinquiry.net/uploads/attachments/credibility__brochure.pdf); and Whitney Gray, “List of Scientists Rejecting Evolution—Do They Really?” April 14, 2008, <http://www.youtube.com/watch?v=Ty1Bo6GmPqM>. Another critical response to dissent lists relies on irony, like the tragic catalog of HIV-AIDS dissenters who have died of AIDS, or the humorously lengthy petition of just those scientists named Steve who believe in evolution. See “AIDS Denialists Who Have Died,” AIDSTruth.org, [http://www.aidstruth.org/denialism/dead\\_denialists](http://www.aidstruth.org/denialism/dead_denialists); and “The List of Steves,” National Center for Science Education, <http://ncseweb.org/taking-action/list-steves> (all accessed January 2011).
  34. “The Durban Declaration,” 16.
  35. “The Durban Declaration,” 15.
  36. Gordon T. Stewart, “The Durban Declaration is not accepted by all,” *Nature* 407, no.

- 6802 (September 21, 2000): 286.
37. Frank Luntz, "The Environment: A Cleaner, Safer, Healthier America," The Luntz Research Companies—Straight Talk, n.d., [http://www.ewg.org/files/LuntzResearch\\_environment.pdf](http://www.ewg.org/files/LuntzResearch_environment.pdf) (accessed January 2011). Luntz calls himself a "language guy" in his interview with Hot Politics, November 13, 2006, Frontline, <http://www.pbs.org/wgbh/pages/frontline/hotpolitics/interviews/luntz.html> (accessed January 2011). The existence of the memo and its use by Republicans was first reported by Jennifer Lee, "A Call for Softer, Greener Language: G.O.P. Adviser Offers Linguistic Tactics for Environmental Edge," *New York Times*, March 2, 2003, N24. Although there is no date on the memo, it includes a past-tense reference to an event that took place in November 2001, so it was not produced "back [in] '97, '98" as Luntz suggests in the Frontline interview. Lee indicates that the memo was written before the November 2002 midterm elections, so it was likely produced sometime between November 2001 and November 2002.
  38. J. T. Houghton, Y. Ding, D. J. Griggs, M. Noquer, P. J. van der Linden, X. Dai, K. Maskell, and C. A. Johnson, eds., *Climate Change 2001: The Scientific Basis* (Cambridge: Cambridge University Press, 2001), 25, 61. This report was released in January 2001 (thus before the Luntz memo was written), as confirmed in Andrew C. Revkin, "Warming's Likely Victims," *New York Times*, February 19, 2001, A4.
  39. Naomi Oreskes, "The Scientific Consensus on Climate Change," *Science* 306, no. 5702 (December 3, 2004), 1686, erratum post dated January 21, 2005.
  40. Matthew C. Nisbet and Teresa Myers, "The Polls—Trends: Twenty Years of Public Opinion About Global Warming," *Public Opinion Quarterly* 71 (2007): 453.
  41. Luntz, "The Environment," 137–38.
  42. Maxwell T. Boykoff and Jules M. Boykoff, "Balance as Bias: Global Warming and the US Prestige Press," *Global Environmental Change* 14 (2004): 125–36; Maxwell T. Boykoff, "Lost in Translation? United States Television News Coverage of Anthropogenic Climate Change, 1995–2004," *Climatic Change* 86 (2008): 1–11; Lisa Antilla, "Climate of Scepticism: US Newspaper Coverage of the Science of Climate Change," *Global Environmental Change* 15 (2005): 338–52.
  43. On the balancing norm leading to a misperception of an ongoing scientific debate over "the extent of human contributions to global warming" and "the cause of AIDS," see Sharon Dunwoody, "Scientists, Journalists, and the Meaning of Uncertainty," in *Communicating Uncertainty: Media Coverage of New and Controversial Science*, ed. Sharon M. Friedman, Sharon Dunwoody, and Carol L. Rogers (Mahwah, NJ: Lawrence Erlbaum Associates, 1999), 73. On the balancing norm leading to a misrepresentation of scientific debate over evolution, see Charles Alan Taylor and Celeste Michelle Condit, "Objectivity and Elites: A Creation Science Trial," *Critical Studies in Media Communication* 5 (1988): 300.

44. Aaron M. McCright, "Dealing with Climate Change Contrarians," in *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, ed. Susanne C. Moser and Lisa Dilling (Cambridge: Cambridge University Press, 2007), 203.
45. Wang and Oreskes, "History of Science and American Science Policy," 370.
46. John H. Cushman Jr., "Industrial Group Plans to Battle Climate Treaty," *New York Times*, April 26, 1998, 1, 24.
47. Global Climate Science Team, "Global Climate Science Communications," American Petroleum Institute, April 3, 1998, 2, [http://www.edf.org/documents/3860\\_GlobalClimateSciencePlanMemo.pdf](http://www.edf.org/documents/3860_GlobalClimateSciencePlanMemo.pdf) (accessed January 2011).
48. Global Climate Science Team, "Global Climate Science Communications," 3–5, 7. Although it is tempting to assume a link, I suspect that it is a coincidence that the ARST-sponsored debate on global warming at NCA seven months later was the sort of campus/community debate that this public relations team was promoting.
49. Taylor and Condit, "Objectivity and Elites," 297.
50. Jasanoff's comparative study of culturally differentiated encounters with science and technology offers an explanation of why the United States is more susceptible to persistent regulatory controversies involving science than countries like Germany or England; in brief, the United States has a "contentious," as opposed to a "consensus-seeking" or "communitarian," civic epistemology. Jasanoff, *Designs on Nature*, 259–70. I suspect that political histories that valorize dissent and the protection of minority views, shared by South Africa and the United States, contribute to the civic epistemology that allows the argumentative dynamics of manufactured scientific controversy to take hold in those locations. The rise of the Internet with its ease of access to expert materials and leveling of institutional markers of credibility also undoubtedly plays a role in the contemporary manufacture of scientific controversy.
51. Jim Pedersen, "'Global Warming' Is Alarmism," *Seattle Post-Intelligencer*, January 28, 2008, B5.
52. The language of the editorial echoes a speech given by Senator James Inhofe on the floor of the Senate, in which he said "man-induced global warming is an article of religious faith to the radical far left alarmists"; *Congressional Record* 151, no. 1 (January 4, 2005), S18. It also echoes an opinion editorial by climate skeptic S. Fred Singer, in which he claims, "Global warming has become an article of faith for many, with its own theology and orthodoxy. . . . Its believers are quite fearful of any scientific dissent that threatens their deeply held beliefs. They therefore lash out at anything that even suggests lack of a scientific consensus about a cataclysmic climate change. 'The end is near,' they tell us, brought on by human folly, like driving cars and other such sinful behavior. Non-believers of global-warming catastrophes are severely chastised. Academic scientists have had their research funds cut off for expressing skepticism. Government scientists have been

- ostracized or forced to resign; some have even been fired. Others have been harassed, demonized and libeled." S. Fred Singer, "Warming Orthodoxy Ambush," *Washington Times*, October 4, 1999, A15.
53. Ed Burns, "Please, Limit Opinions to Experts in the Field," *Seattle Post-Intelligencer*, January 29, 2008, B7.
  54. "The Wedge," Center for the Renewal of Science and Culture, Discovery Institute, n.d., [http://ncseweb.org/webfm\\_send/747](http://ncseweb.org/webfm_send/747) (accessed January 2011). Although there is no date on the document, it makes reference to events that place its composition in the summer of 1998. The Discovery Institute acknowledges the authenticity of the document and the accuracy of its reproduction in "The 'Wedge Document': 'So What?'" the Discovery Institute, <http://www.discovery.org/scripts/viewDB/filesDB-download.php?id=349> (accessed January 2011).
  55. "The Wedge," 2, 4.
  56. Carrie Sager, ed., *Voices for Evolution* (Berkeley, CA: National Center for Science Education, 2008).
  57. *Kitzmiller v. Dover*, Case 4:04-cv-02688-JEJ, Document 342, filed December 20, 2005, 64, [http://www.pamd.uscourts.gov/kitzmiller/kitzmiller\\_342.pdf](http://www.pamd.uscourts.gov/kitzmiller/kitzmiller_342.pdf) (accessed January 2011).
  58. This statistic is from a *Newsweek* poll conducted by Princeton Survey Research Associates International, March 28–29, 2007, and reported in "Science and Nature," *PollingReport.com*, <http://www.pollingreport.com/science.htm> (accessed January 2011).
  59. Stephen C. Meyer and John Angus Campbell, "Controversy Over Life's Origins: Students Should Learn to Assess Competing Theories," *San Francisco Chronicle*, December 10, 2004, B9. Although Campbell was identified as a Discovery Institute senior fellow in the editorial, he is no longer listed as such on their website. In a more recent publication that may reflect his break with the Discovery Institute, he says that one "should not teach as controversial ideas that are not controversial and which, to the contrary, enjoy consensus among the widest range of professional scientists." He now argues that instead of teaching the "controversy" over intelligent design, which he encouraged in his coauthored 2004 opinion editorial, we should teach the controversy over subjects that really are matters of contemporary scientific debate, like "questions about the units of selection." John A. Campbell and Taz Daughtrey, "Teaching the Contexts: Why Evolution Should Be Taught as an Argument and How It Might Be Done," *Religion and Education* 33 (2006): 16, 34.
  60. Meyer and Campbell, "Controversy Over Life's Origins," B9.
  61. Eric Plutzer and Michael Berkman, "The Polls—Trends: Evolution, Creationism, and the Teaching of Human Origins in Schools," *Public Opinion Quarterly* 72 (2008): 551.
  62. Whidden, "The Manufacturing of Controversy," 707.
  63. *Expelled: No Intelligence Allowed*, DVD, directed by Nathan Frankowski (Premise Media

- Corporation, 2008).
64. *Flock of Dodos: The Evolution-Intelligent Design Circus*, DVD, directed by Randy Olson (Prairie Starfish Productions, 2006).
  65. Robert M. Sapolsky, "Controversy Over Life's Origins: Regardless of How It Works, Evolution Is for Real," *San Francisco Chronicle*, December 10, 2004, B9.
  66. For a similar analysis of an earlier creationist appeal, see Taylor and Condit, "Objectivity and Elites."
  67. Louisiana Senate Bill No. 733, SLS 08RS-1629, Regular Session, 2008, <http://www.legis.state.la.us/billdata/streamdocument.asp?did=482728> (accessed January 2011). Similar legislation has been introduced more recently in other states too; see Leslie Kaufman, "Darwin Foes Add Warming to Target List," *New York Times*, March 4, 2010, A1, A4.
  68. Roger A. Pielke, Jr. and Steve Rayner, "Editor's Introduction," *Environmental Science and Policy* 7 (2004): 356. See also Daniel Sarewitz, "How Science Makes Environmental Controversies Worse," *Environmental Science and Policy* 7 (2004): 385–403; and McCright, "Dealing with Climate Change Contrarians," 207.
  69. Lawrence J. Prelli likewise suggests that scientists who rightly focus on conjectural issues when debating in scientific or legal forums might do better to consider other issues when debating *about* science in the public forum. See *A Rhetoric of Science: Inventing Scientific Discourse* (Columbia: University of South Carolina Press, 1989), 261.
  70. Lynda Walsh, "Visual Strategies to Integrate Ethos across the 'Is/Ought' Divide in the IPCC's Climate Change 2007: Summary for Policy Makers," *Poro* 6, no. 2 (2009): 42.
  71. R. A. Brown, "More Letters to the Editor: Global Warming," *Seattle Post-Intelligencer* Opinion, January 31, 2008, [http://www.seattlepi.com/opinion/349560\\_webltrs1.html](http://www.seattlepi.com/opinion/349560_webltrs1.html) (accessed January 2011).
  72. Thomas M. Lessl has argued that it is this simplistic view of science, often employed by scientists in demarcation battles with creationists, that hobbles them when they seek to instruct the public about global warming. "Scientific Demarcation and Metascience: The National Academy of Sciences on Greenhouse Warming and Evolution," in *Controversy and Confrontation: Relating Controversy Analysis with Argumentation Theory*, ed. Frans H. van Eemeren and Bart Garssen (Amsterdam: John Benjamins Publishing Company, 2008), 77–91.
  73. Letter by John Moore, cited in "Out of Control, AIDS, and the Corruption of Medical Science," February 22, 2006, <http://www.aidstruth.org/denialism/harpers-farber> (accessed January 2011).
  74. Thomas S. Kuhn, *The Structure of Scientific Revolutions*, 2nd ed. (Chicago: University of Chicago Press, 1970), 152.
  75. Kieran Healy, "The Revolution Will Not Be Synthesized," in *Looking for a Fight: Is There a Republican War on Science?*, ed. John Holbo (West Lafayette, IN: Parlor Press, 2006),

- 76–77; Eugenie C. Scott and Glenn Branch, “Evolution: What’s Wrong with ‘Teaching the Controversy,’” *Trends in Ecology and Evolution* 18 (2003): 501.
76. On the beliefs of Americans about evolution, see Plutzer and Berkman, “The Polls—Trends,” 545.
77. John Angus Campbell, “Intelligent Design, Darwinism, and the Philosophy of Public Education,” *Rhetoric & Public Affairs* 1 (1998): 492.
78. For example, see Oreskes and Conway, *Merchants of Doubt*.
79. McCright, “Dealing with Climate Change Contrarians,” 207.
80. Peter J. Jacques, Riley E. Dunlap, and Mark Freeman, “The Organisation of Denial: Conservative Think Tanks and Environmental Scepticism,” *Environmental Politics* 17 (2008): 349–85; Barbara Forrest, “Still Creationism After All These Years: Understanding and Counteracting Intelligent Design,” *Integrative and Comparative Biology* 48 (2008): 189–201.
81. Steve Schwarze, “Juxtaposition in Environmental Health Rhetoric: Exposing Asbestos Contamination in Libby, Montana,” *Rhetoric & Public Affairs* 6 (2003): 319.
82. John M. Broder, “Scientists Taking Steps to Defend Climate Work,” *New York Times*, March 3, 2010, A1, A11.
83. Sally Jackson, “Predicaments of Politicization in the Debate over Abstinence-Only Sex Education,” in *Controversy and Confrontation*, 219.
84. Nicoli Nattrass, “AIDS Denialism vs. Science,” *Skeptical Inquirer* 31, no. 5 (2007): 31–37.
85. Jean Goodwin and Lee Honeycutt, “When Science Goes Public: From Technical Arguments to Appeals to Authority,” *Studies in Communication Sciences* 9, no. 2 (2009): 27–28.
86. Dale L. Sullivan, “Keeping the Rhetoric Orthodox: Forum Control in Science,” *Technical Communication Quarterly* 9 (2000): 125–46; Thomas M. Lessl, “Heresy, Orthodoxy, and the Politics of Science,” *Quarterly Journal of Speech* 74 (1988): 18–34.