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Climate Change, Political Truth, and the Marketplace of Ideas

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INTRODUCTION

In an interview last year in *Time* magazine, Environmental Protection Agency (EPA) Administrator Lisa Jackson commented on congressional efforts to undo her greenhouse gas (GHG) endangerment finding under Clean Air Act section 202: "I don't think that history will forget the first time that politicians made a law to overrule scientists."[1] Proponents of aggressive action to control GHGs are frustrated that international scientific consensus that disruptive climate change is highly probable and caused by anthropogenic emissions has not prevailed in the political marketplace of ideas in the United States. This truth-seeking, open marketplace of ideas is not just a recognized foundational principle in First Amendment protection for freedom of expression, but is also a paradigm for our system of self-governance. This marketplace of ideas has historically had mixed success in its truth-seeking function—indeed, there have been many instances where political truth in the United States was demonstrably at odds with objective historical or scientific truth. Nevertheless, few would argue that these market failures in the marketplace of ideas justify restrictions on speech or limitations on the principle of self-governance, substituting some means of establishing political truth other than democratic self-governance.

The public, political marketplace of ideas as a means of determining truths worthy of social response is comparable to other social systems for determining such truths. The climate science consensus has itself emerged from the system of academic truth-seeking based on reproducible experiments, calculations, and

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[1] *10 Questions for Lisa Jackson*, TIME (Apr. 3, 2011), http://www.time.com/time/magazine/article/0,9171,2062448-1,00.html. In its endangerment finding pursuant to Section 202(a) of the Clean Air Act, 42 U.S.C. § 7521(a) (2006), EPA determined that the current and projected concentrations of the six greenhouse gases in the atmosphere threaten the public health and welfare of current and future generations. Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66496 (Dec. 15, 2009). This finding was the statutory predicate to EPA regulation of greenhouse gas emissions from mobile sources such as cars and trucks, as well as for regulation of greenhouse gas emissions from new stationary sources such as power plants.

observations—all subject to peer review. The system of expert administrative agencies making regulatory determinations, including the Clean Air Act endangerment finding, is also a system of truth-seeking that operates somewhat independently of the political marketplace for truth. The economic marketplace also incorporates a truth-seeking function, as business entities make long-term plans based on future forecasts, with economic success dependent on accuracy. Each of these alternative truth-seeking systems operates in a subordinate position to the political marketplace of ideas in the United States system.

There are explanations for the competitive disadvantage of the scientific climate consensus in this marketplace of ideas. Economic actors with a vested interest in the status quo carbon economy have enjoyed greater access to the media compared to the scientific community, an access preference that has been endorsed by recent Supreme Court First Amendment decisions.[2] Even without this preferred access by proponents of the status quo, climate science must confront cognitive bias and framing issues in the polity. The public at large will ordinarily resist scientific theories that hold socially accepted patterns of individual consumption responsible for devastating negative impacts on the global ecosystem, especially where there is a lack of direct personal experience with these negative impacts.[3]

In light of this nation's fundamental commitment to an open marketplace of ideas and self-governance based on the results of this marketplace, efforts to force internalization of the future environmental costs of climate change into current marketplace decision-making are likely to continue to be unsuccessful. These efforts, such as regulatory limits on GHG emissions implemented through cap-and-trade market systems or regulatory regimes, seem unlikely to prevail as long as the political marketplace of ideas fails to accept the scientific consensus. This suggests that until some event occurs that results in a paradigm shift in the political marketplace, efforts to internalize the future costs of climate change in the United States will need to embrace the current political uncertainty associated with climate science—though contrary to the scientific consensus—if they hope to succeed.

Such methods might include measures that impose contingent future liability on significant industrial contributors of GHG emissions for climate change impacts, where the contingency perhaps consists of a specified threshold increase in global temperatures or sea level. Litigation efforts to establish such liability are already underway, but these efforts have had limited success so far.[4] Legislation

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[2] *See* discussion *infra* Part III.B.1.

[3] *See* JANET SWIM ET AL., PSYCHOLOGY & GLOBAL CLIMATE CHANGE: ADDRESSING A MULTIFACETED PHENOMENON AND SET OF CHALLENGES 64–68 (2010), *available at* http://www.apa.org/science/about/publications/climate-change.aspx/; S. Stoll-Kleemann et al., *The Psychology of Denial Concerning Climate Mitigation Measures: Evidence from Swiss Focus Groups*, 11 GLOBAL ENVTL. CHANGE 107, 110–15 (2000), *available at* http://www.gis.uni-greifswald.de/agnw/shared-data/Files/Publications/Stoll-ORiordan-JaegerGEC.pdf.

[4] *See* David Markell & J.B. Ruhl, *An Empirical Assessment of Climate Change in the Courts: A New Jurisprudence or Business as Usual?*, 64 FLA. L. REV. 15, 18 n.4 (2012).

based on the "polluter pays" principle, similar to that found in the Comprehensive Environmental Response Cleanup and Liability Act (CERCLA),[5] could eliminate the uncertainties associated with common law liability, leaving only whatever legitimate scientific uncertainty exists. Like CERCLA, such liability could be made strict, joint, and several. Legislation establishing such future liability might meet less political resistance than regulatory measures because its justification would not depend on the near certainty that climate change is occurring—a fact not yet politically accepted. Rather, its justification would depend on the substantial risk of catastrophic climate change together with the principle that should such climate impacts occur, those actors primarily responsible should bear the economic risk. Clawback provisions might prevent responsible enterprises from avoiding future liability by distributing pre-contingency profits to shareholders and management. Such contingent future liability principles could have immediate GHG reduction impacts, as emitting industries would have to plan for future liability based not on political considerations, but on a rational business analysis of the scientific consensus. Additionally, such industries would have an economic incentive not just to avoid liability, but also to prevent the occurrence of the climate change trigger for liability.

This Article first examines the role of the marketplace of ideas in First Amendment freedom of expression doctrine as well as its role in our constitutional system of self-government. In Part II, the Article examines challenges facing the conclusions of climate science in the American political marketplace of ideas, including individual cognitive factors, the role of cultural cognition, and the problems of enhanced market access for opponents to the scientific climate consensus. Part III of this Article then considers possible corrections for these market failures in the context of climate science, including administrative agency bypasses of the political marketplace, regulation of the climate debate, and direct market participation by science agencies. Part III concludes that none of these market corrections can overcome the obstacles to climate science consistent with current law. Part IV of this Article examines the epistemology of climate change and the fundamental conflict between the competing epistemological systems of scientific truth and political truth. Part V then considers whether this conflict between political truth in an open system of government and the scientific truth of climate change calls into question the preference of self-governance over more autocratic systems of government that might be more accepting of climate science as a driver of policy and concludes that it does not. Finally, Part VI of this Article suggests that legislation establishing prospective retroactive liability if certain climate change thresholds are crossed may succeed at both internalizing the costs of climate change and accommodating the political uncertainty of the conclusions of climate science.

[5] 42 U.S.C. §§ 9601–9675 (2006).

I. MARKETPLACE OF IDEAS AND AMERICAN SELF-GOVERNMENT

The metaphor of a marketplace of ideas, in which unfettered expression of ideas will lead inexorably to the discovery of truth, has deep roots in Anglo-American political philosophy. John Milton, writing in opposition to press licensing laws in *Areopagitica*, urged poetically that truth would of necessity prevail in an open debate:

> [T]hough all the winds of doctrine were let loose to play upon the [E]arth, so Truth be in the field, we do injuriously by licensing and prohibiting to misdoubt her strength. Let her and Falsehood grapple; who ever knew Truth put to the worse, in a free and open encounter?[6]

Similarly, John Stuart Mill's *On Liberty* argued for the utility of open debate to advance truth, based on Enlightenment ideas of the fallibility of received truths and the ability of rational thought to determine the elements of truth and falsity in competing ideas. Mill, along with other writers, qualified this thought with the idea that truth will prevail "in the long run"—not necessarily immediately.[7]

The idea that a free, unregulated marketplace of ideas advances the societal search for truth and thus presents a foundational principle for supporting freedom of speech first and most famously entered American jurisprudence in Justice Holmes's dissent in *Abrams v. United States*.[8] Holmes echoed Mill's fallibility premise and used it to posit an unregulated marketplace of ideas as a social and political good: "time has upset many fighting faiths . . . the best test of truth is the power of the thought to get itself accepted in the competition of the market."[9] This iteration of the marketplace of ideas metaphor reflects a libertarian, laissez-faire approach to speech, which embraces the idea that the same "invisible hand" that guides unregulated economic markets to maximum efficiency will guide unregulated markets in ideas to maximum discovery of truth. Writing later in another dissent, Holmes emphasized the strength of his commitment to the end product of the marketplace of ideas, even should it result in an economic system at odds with his own fundamental beliefs. Holmes stated, "If in the long run the beliefs expressed in proletarian dictatorship are destined to be accepted by the dominant forces of the community, the only meaning of free speech is that they should be given their chance and have their way."[10]

The Supreme Court ultimately adopted this marketplace of ideas metaphor as a foundational value underlying freedom of speech, and the Court continues to apply it, sometimes literally, in First Amendment cases. For example, First

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[6] JOHN MILTON, AREOPAGITICA 35 (John W. Hales ed., Oxford Clarendon Press new ed. 1904) (1644).

[7] JOHN STUART MILL, ON LIBERTY 33–106, 223 (Ticknor & Fields 2d ed. 1863) (1859).

[8] 250 U.S. 616, 624–31 (1919) (Holmes, J., dissenting).

[9] *Id.* at 630.

[10] Gitlow v. New York, 268 U.S. 652, 673 (1925) (Holmes, J., dissenting).

Amendment libel law principles have developed explicitly on the basis of the relative ease of access to the media market of public figures as opposed to private figures. The higher threshold of actual malice for liability in libel actions by public figures as compared to the threshold of negligence for private individuals reflects the Court's analysis of the relative market access of these two categories of plaintiffs.[11] Public figures are presumed to have access to the media market to rebut defamatory falsehoods, while private individuals are not.[12] The Court has also stated that "the purpose of the First Amendment" is "to preserve an uninhibited marketplace of ideas in which truth will ultimately prevail."[13] The Supreme Court continues to rely on the marketplace of ideas rationale as a foundational principle of freedom of expression—most recently in the *Citizens United v. FEC*[14] decision striking down restrictions on corporate electioneering expenditures.[15]

The marketplace of ideas metaphor has had its share of critics over the years, and this criticism continues. These critics include prominent First Amendment theorists such as Frederic Schauer, who questioned both whether "truth," even when redefined as propositions with a high likelihood of objective validity, is in fact a first-order societal good that should preemptively displace other societal interests. Schauer also questioned whether the marketplace of ideas actually advanced the cause of objective truth over any useful timeframe[16] and whether Enlightenment ideas of rational debate could be assumed for the public at large.[17] Other critics, such as Professor Stanley Ingber, question the existence of objective truth—the post-modernist view—and posit that the marketplace of ideas serves mainly to reinforce the beliefs of the economically powerful that have preferred media access.[18] More recent critics include Professor Derek Bambauer, among others, who question the rationalist basis for the belief that truth will prevail in open debate as refuted by findings in cognitive social psychology demonstrating that people have cognitive biases that prevent rational determination of truth.[19]

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[11] *See* Gertz v. Robert Welch, Inc., 418 U.S. 323, 342–48 (1974).

[12] *Id.* at 344; N.Y. Times Co. v. Sullivan, 376 U.S. 254, 304–05 (1964) (Goldberg, J., concurring); Derek E. Bambauer, *Shopping Badly: Cognitive Biases, Communications, and the Fallacy of the Marketplace of Ideas*, 77 U. COLO. L. REV. 649, 661 (2006).

[13] Red Lion Broad. Co. v. FCC, 395 U.S. 367, 390 (1969).

[14] 130 S. Ct. 876 (2010).

[15] *Id.* at 896, 913; *see, e.g.*, Virginia v. Hicks, 539 U.S. 113, 119 (2003); McIntyre v. Ohio Elections Comm'n, 514 U.S. 334, 341 (1995); Simon & Schuster, Inc. v. Members of N.Y. State Crime Victims Bd., 502 U.S. 105, 116 (1991); Leathers v. Medlock, 499 U.S. 439, 448 (1991); Pac. Gas & Elec., Co., v. Pub. Utils. Comm'n of Cal., 475 U.S. 1, 8 (1986); Anderson v. Celebrezze, 460 U.S. 780, 794 (1983); *see also* McCreary Cnty. v. ACLU, 545 U.S. 844, 883 (2005) (O'Connor, J., concurring) (discussing undesirability of government influence over religious expression in the marketplace of ideas).

[16] FREDERICK SCHAUER, FREE SPEECH: A PHILOSOPHICAL ENQUIRY 15–34 (1982).

[17] *See id.*

[18] Stanley Ingber, *The Marketplace of Ideas: A Legitimizing Myth*, 1984 DUKE L.J. 1, 6–49.

[19] *See* Bambauer, *supra* note 12, at 673–703.

Although this marketplace of ideas metaphor as a foundational principle is premised on the independent social value of truth, it is closely related to the interaction between freedom of expression and self-governance. Professor Alexander Meiklejohn famously argued in the mid-twentieth century that the First Amendment guarantee of freedom of expression is an essential element of a system of self-governance.[20] The Supreme Court has since adopted Professor Meiklejohn's principle, declaring in *Garrison v. Louisiana*[21] that "speech concerning public affairs is more than self-expression; it is the essence of self-government."[22] Although Professor Meiklejohn's self-governance principle is distinct from the marketplace of ideas' pursuit of truth, the two are closely related. Meiklejohn argued that an informed electorate is one of the requisites of effective self-governance. The marketplace of ideas supplies the truth to inform a self-governing electorate.[23] Indeed, Frederic Schauer (otherwise a critic of the search for truth justification for the marketplace of ideas) recognized that the value of free expression as advancing social discovery of truth does draw support from the value of dissemination of truth for self-government.[24]

Justice Brandeis, concurring in *California v. Whitney*,[25] likewise drew the connection between the marketplace of ideas search for truth and self-government:

> [The founders] believed that the freedom to think as you will and to speak as you think are means indispensable to the discovery and spread of political truth; that without free speech and assembly discussion would be futile . . . ; that the greatest menace to freedom is an inert people; that public discussion is a political duty . . . .[26]

In *Thornhill v. Alabama*,[27] the Court similarly drew on the relationship between the search-for-truth function and self-government and stated that "[a]bridgment of freedom of speech and of the press . . . impairs those opportunities for public education that are essential to effective exercise of the power of correcting error through the processes of popular government."[28]

These two foundational First Amendment ideas—free speech as truth discovery and free speech as self-government—coalesce into the notion that in a representative democracy like the United States, the only truths worthy of government action are those that have prevailed in the political marketplace—

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[20] ALEXANDER MEIKLEJOHN, FREE SPEECH AND ITS RELATION TO SELF-GOVERNMENT (1948).

[21] 379 U.S. 64 (1964).

[22] *Id.* at 74–75.

[23] MEIKLEJOHN, *supra* note 20, at 24–25.

[24] SCHAUER, *supra* note 16, at 35–46.

[25] 274 U.S. 357 (1927).

[26] *Id.* at 375 (Brandeis, J., concurring).

[27] 310 U.S. 88 (1940).

[28] *Id.* at 95.

"political truths."[29] There is no government orthodoxy, and decisions dependent on competing theories about the best social, economic, environmental, or foreign policies are to be decided according to the power of these competing ideas to prevail in the political marketplace.

When it comes to global climate change, however, the scientific consensus—that catastrophic global warming is likely as long as current patterns of energy production and consumption continue—has not achieved popular acceptance.[30] Scientific consensus holds that immediate global action to reduce fossil fuel consumption is necessary to avert this catastrophe.[31] Assuming that the scientific consensus represents "truth," or at least a sufficiently close approximation to truth, the planet does not have time for this truth to overcome the incorrect political consensus in the long run. If First Amendment marketplace-of-ideas principles and self-governance principles demand that the United States forgo painful measures to reduce fossil fuel consumption until it is too late, does this indicate that our system of self-government is not up to the task of responding to a slow-motion global catastrophe like climate change?

The polity's refusal thus far to accept the scientific consensus about the threat of global climate change is certainly not the first time that the marketplace of ideas has failed to reach "truth" in a timely fashion. Other examples come readily to mind. Most recently, the United States' invasion of Iraq was based on demonstrably false popular ideas that (1) Saddam Hussein was implicated in the September 11 attacks on the United States, and (2) Iraq either possessed or was close to developing weapons of mass destruction.[32] Indeed, the idea that Saddam Hussein possessed weapons of mass destruction persisted in popular mythology long after the United States' invasion and a comprehensive search for such weapons concluded they did not exist.[33] The *Scopes* trial and the continuing historical refusal of many states to accept the scientifically established theory of evolution provide another vivid example of the polity rejecting scientific truth.[34] Other examples of majoritarian policy at odds with scientific consensus include the 1984 amendments to the Resource Conservation and Recovery Act, which

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[29] *Cf.* SCHAUER, *supra* note 16, at 39–40.

[30] Forty percent of respondents to a 2011 poll conducted by the Yale Project on Climate Change Communication indicated that they believed there was "a lot of disagreement among scientists about whether or not global warming is happening," while only 39% believed that "[m]ost scientists think global warming is happening." *See* ANTHONY LEISEROWITZ ET AL., YALE PROJECT ON CLIMATE CHANGE COMMUNICATION, CLIMATE CHANGE IN THE AMERICAN MIND: AMERICANS' GLOBAL WARMING BELIEFS AND ATTITUDES IN MAY 2011, at 3 (2011), *available at* http://environment.yale.edu/climate/files/ClimateBeliefsMay2011.pdf.

[31] *See* MINN. POLLUTION CONTROL AGENCY, *Climate Change: Scientific Consensus*, http://www.pca.state.mn.us/index.php/topics/climate-change/about-climate-change/climate-change-scientific-consensus.html (last visited July 10, 2012).

[32] *See* S. REP. NO. 108-301, at 14–16, 345–48 (2004).

[33] Bambauer, *supra* note 12, at 649–51.

[34] *See* Scopes v. State, 289 S.W. 363 (Tenn. 1927).

imposed a ban on land disposal of specified hazardous wastes[35] despite the scientific consensus that such disposal generally poses relatively small public health risks.[36] Popular opposition to free trade policies, which occasionally makes its way into legislation,[37] is similarly contrary to consensus among economists that free trade policies increase GDP and employment rather than decreasing it.[38]

The United States' national commitment to the marketplace of ideas as the ideal model for determining those political and policy truths worth acting upon persists despite these demonstrable failures of the political marketplace to reach and act upon objective truth. This commitment to the marketplace of ideas as the ultimate arbiter of policy truths faces a new challenge when it comes to addressing the threats posed by anthropogenic climate change. The international scientific consensus demands an immediate policy response to these threats, but our system of self-government and our commitment to the political marketplace of ideas demands that policy responses be deferred until and unless the scientific consensus becomes a political consensus as well.

II. CHALLENGES FOR CLIMATE SCIENCE IN THE MARKETPLACE OF IDEAS

The scientific consensus that anthropogenic climate change threatens cataclysmic disruption of human settlement and agriculture, requiring immediate

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[35] Hazardous and Solid Waste Amendments of 1984, Pub. L. No. 98-616, 98 Stat. 3221 (1984) (codified as amended in scattered sections of 42 U.S.C.).

[36] *See* Michael B. Gerrard, *Fear and Loathing in the Siting of Hazardous and Radioactive Waste Facilities: A Comprehensive Approach to a Misperceived Crisis*, 68 TUL. L. REV. 1047, 1115 (1994) ("Much of the [hazardous waste disposal] literature assumes that . . . disposal facilities can be built and operated with a high degree of health and environmental safety.").

[37] *See, e.g.*, American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 1605, 123 Stat. 115, 303 (2009) (requiring "all of the iron, steel, and manufactured goods used . . . [to be] produced in the United States" for projects funded by this federal economic stimulus bill); Omnibus Foreign Trade and Competitiveness Act of 1988, Pub. L. No. 100-418, 102 Stat. 1107 (1988) (establishing import tariffs on certain countries that held trade surpluses with the United States and enforced import tariffs of their own on American goods); Buy America Act of 1983, 49 U.S.C. § 5323(j) (2006) (requiring the purchase of American-made iron, steel, and certain manufactured products for use in transit-related projects utilizing substantial federal grants); Agricultural Adjustment Act, Pub. L. No. 73-10, 48 Stat. 31 (1933) (subsidizing domestic agricultural production); Buy American Act of 1933, 41 U.S.C. §§ 10(a)–(d) (2006) (requiring federal offices and agencies to purchase American-made products where feasible).

[38] *See, e.g.*, Dan Fuller & Doris Geide-Stevenson, *Consensus Among Economists: Revisited*, 34 J. ECON. EDUC. 369, 369 (2006) ("Consensus [among professional economists] is particularly strong for propositions of free international trade and capital flows."); Robert Whaples, *Do Economists Agree on Anything? Yes!*, 3 ECONOMISTS' VOICE, Nov. 2006, at 1, 1 (surveying members of the American Economic Association and finding that 87.5% think "the U.S. should eliminate remaining tariffs and other barriers to trade").

and drastic action, faces severe challenges in achieving acceptance as a political truth in the United States' marketplace of ideas. These challenges include cognitive biases that tend to prejudice members of the American public against acceptance of the scientific consensus,[39] cultural identity factors that likewise bias a substantial portion of the American public against climate science, and a possibly disadvantageous position in the media marketplace as compared to powerful economic players with a strong interest in the status quo.

A. Cognitive Factors

Social scientists have identified a number of cognitive factors that interfere with pure logical and rational thought in the process of belief formation. These factors include the avoidance of cognitive dissonance, the availability heuristic, loss aversion, status quo preferences, optimism, confirmation bias, inability to process low-probability events, and framing. Some of these factors, such as framing, are subject to changes in the presentation of information, while others are not.

1. Avoidance of Cognitive Dissonance

People will generally reject new information that conflicts with their overall beliefs about how the world works and their place in the world.[40] People generally believe that they are good—that is, that their lifestyle and choices are not malignant and do not cause harm to others.[41] Climate science tells Americans that their basic lifestyle choices—automobile and energy dependency and consumption-oriented social values—are causing catastrophic harm to humans and the environment. People cannot accept climate science and at the same time believe that their basic lifestyle choices are good, or at least morally neutral or not evil, without suffering extreme cognitive dissonance. Similarly, people with strong

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[39] For a general discussion of the cognitive biases affecting public acceptance of climate science, see CTR. FOR RESEARCH ON ENVTL. DECISIONS, THE PSYCHOLOGY OF CLIMATE CHANGE COMMUNICATION 4, 21–23 (2009), *available at* http://guide.cred.columbia.edu/pdfs/CREDguide_full-res.pdf. *See also* Sarah Krakoff, *Planetarian Identity Formation and the Relocalization of Environmental Law*, 64 FLA. L. REV. 87, 101–04 (2012) (arguing the state must change the behavior of individuals to adjust to dangers of climate change).

[40] *See* Bernd Rohrmann & Ortwin Renn, *Risk Perception Research—An Introduction*, *in* CROSS-CULTURAL RISK PERCEPTION: A SURVEY OF EMPIRICAL STUDIES 11, 25 tbl.5 (Ortwin Renn & Bernd Rohrmann eds., 2000).

[41] *See* ROBERT ALTEMEYER, THE AUTHORITARIANS 57 (2006) (noting most people believe they are more moral than the average human being), *available at* http://members.shaw.ca/jeanaltemeyer/drbob/TheAuthoritarians.pdf; *see also* Mitch Hall, *Cognitive Dissonance and the Movement to Ban Physical Punishment*, PSYCHOLOGISTS FOR SOC. RESP. BLOG (June 18, 2009), http://psysr.wordpress.com/2009/06/18/cognitive-dissonance/ ("One of the primary cognitions that people hold onto assiduously is the self-justifying image of themselves as good, moral, capable, and smart.").

religious beliefs, or even strong beliefs in the power and resilience of natural ecosystems, cannot accept that an all-powerful god created the world and controls its function and at the same time believe that human beings, even collectively, are a sufficiently powerful force to disrupt a god-created climate.[42] This factor, together with loss aversion and status quo preferences, works against acceptance of climate science.

2. Availability Heuristic

People are more likely to accept information that is consistent with recent examples that they have observed.[43] Thus, people are more likely to respond to the risks of air travel after a recent, well-publicized, aircraft accident than they are to the equivalent (or greater) risks of driving where there have not been recent well-publicized examples.[44] Much of the popular legislative successes of the environmental movement in the 1970s can be attributed to available, recent examples of environmental disasters such as the Cuyahoga River catching on fire leading to the Clean Water Act;[45] visible smog problems in major United States cities leading to the enactment of the Clean Air Act;[46] and hazardous waste calamities such as the contaminated residential development at Love Canal in

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[42] Consider the statement of Representative John Shimkus that government had no reason to respond to climate change because, "I do believe in the Bible as the final word of God, and I do believe that God said the Earth would not be destroyed by a flood." Darren Samuelsohn, *John Shimkus Cites Genesis on Climate Change*, POLITICO (Nov. 10, 2010, 6:11 PM), http://www.politico.com/news/stories/1110/44958.html. Senator James Inhofe has similarly cited biblical passages and his belief in an all-powerful god as grounds to reject climate science:

> Well actually the Genesis 8:22 that I use in there is that "as long as the [E]arth remains there will be springtime and harvest, cold and heat, winter and summer, day and night." My point is, God's still up there. The arrogance of people to think that we, human beings, would be able to change what He is doing in the climate is to me outrageous.

Vic Eliason, *The Greatest Hoax*, VCY AM. (Mar. 7, 2012), http://www.vcyamerica.org/blog/2012/03/07/the-greatest-hoax/.

[43] *See* Amos Tversky & Daniel Kahneman, *Availability: A Heuristic for Judging Frequency and Probability*, 4 COGNITIVE PSYCHOL. 207, 207 (1973).

[44] *See* Timur Kuran & Cass R. Sunstein, *Availability Cascades and Risk Regulation*, 51 STAN. L. REV. 683, 707 (1999).

[45] *See* Solid Waste Agency of N. Cook Cnty. v. U.S. Army Corps of Eng'rs, 531 U.S. 159, 174–75 (2001) (Stevens, J., dissenting) ("In 1969, the Cuyahoga River in Cleveland, Ohio . . . caught fire. Congress responded . . . by enacting the Federal Water Pollution Control Act (FWPCA) Amendments of 1972 . . . .").

[46] *See All Things Considered: Smog Deaths in 1948 Led to Clean Air Laws*, (NPR radio broadcast Apr. 22, 2009), *available at* http://www.npr.org/templates/story/story.php?storyId=103359330/.

Niagara Falls, New York, and the evacuation of the town of Times Beach, Missouri, due to dioxin contamination leading to the enactment of the Resource Conservation and Recovery Act (RCRA) and CERCLA.[47]

Although weather-related disasters like Hurricane Katrina and the spate of tornadoes in the spring of 2011[48] increase receptivity to the belief that climate change is happening, there is no readily available example of mankind's alteration of the planetary ecosystem to enlist the availability heuristic in favor of climate scientists' conclusion that climate change is anthropogenic in nature. In addition, reliance on the availability heuristic to link hurricanes and tornadoes to climate change runs smack into the scientific community's refusal to attribute specific weather events to climate change.[49] The public also lacks an available example of the impacts of human activities on the global ecosystem. Although local pollution effects are often easily observable even without scientific instruments, there are global changes that are not easily observable, and individual laypeople lack the ability to observe global changes.[50]

3. Loss Aversion and Status Quo Preferences

This cognitive bias causes people to prefer to avoid losing something they currently have and enjoy to an equivalent future gain of something they do not currently have.[51] Thus, in social science experiments, people randomly given objects in a group setting will demand a higher price to part with those objects than other participants would pay to gain the exact same objects.[52] When it comes to climate science and the changes necessary to respond to climate change, current American lifestyle choices represent a benefit in-hand that the loss-aversion factor

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[47] *See* MARK E. RUSHEFSKY, PUBLIC POLICY IN THE UNITED STATES 225–26 (2008).

[48] *See 2011 Spring Tornado Outbreaks*, NOAA NAT'L SEVERE STORMS LAB., http://www.nssl.noaa.gov/news/2011/ (last visited Jul. 10, 2012).

[49] *See* Frank Lowenstein, *Action Can't Wait for More Scientific Results on Climate Change*, PLANET CHANGE (May 21, 2011), http://change.nature.org/2011/05/21/action-can%E2%80%99t-wait-for-more-scientific-results-on-climate-change/ ("[T]here is lots of natural variability to weather, and the underlying trends, while clear, are slow enough to make specific attribution difficult. So typically climate scientists respond that they can't definitively attribute a given weather event to climate change . . . .").

[50] The availability heuristic may also explain why people in snow-covered regions of the United States are more likely to accept climate science than those outside the snow-covered regions, as the visible decrease in the winter season has become apparent. *See* LAWRENCE C. HAMILTON, CARSEY INST., ISSUE BRIEF NO. 26, CLIMATE CHANGE: PARTISANSHIP, UNDERSTANDING, AND PUBLIC OPINION 3 (2011), *available at* http://www.carseyinstitute.unh.edu/publications/IB-Hamilton-Climate-Change-2011.pdf.

[51] *See* Richard Thaler et al., *The Endowment Effect, Loss Aversion, and Status Quo Bias*, *in* THE WINNER'S CURSE: PARADOXES AND ANOMALIES OF ECONOMIC LIFE 63 (1992).

[52] Daniel Kahneman et al., *Experimental Tests of the Endowment Effect and the Coase Theorem*, 98 J. POL. ECON. 1325, 1326–29 (1990).

will make the public loath to sacrifice in exchange for an improved future environment.

4. Optimism/Misapplication of Probability

People tend to discount the risk of bad things happening to them personally and overestimate the likelihood that good things will happen.[53] This factor explains why lottery tickets, which have an infinitesimally small expected value, have a market. The optimism bias will cause people to reject the conclusions of climate science that catastrophic climate change will in fact occur, as long as there is some uncertainty about these impacts. And even among climate scientists, there is uncertainty—the Intergovernmental Panel on Climate Change (IPCC) gives a one-in-ten probability that climate change either will not happen or is not anthropogenic in nature.[54]

5. Confirmation Bias

Similar to the avoidance of dissonance, people reject new information that is inconsistent with their preexisting beliefs and prefer information that reinforces those beliefs.[55] Climate science runs counter to preexisting beliefs that humankind is not powerful enough to change the nature of the global ecosystem and runs counter to preexisting beliefs that the American lifestyle does not cause undue harm.

6. Self-Serving Bias

Social science researchers have identified a clear "self-serving" cognitive bias.[56] Not surprisingly, when people are asked to come up with a fair solution to a problem, their sense of what is fair is influenced by whether they (or the interest

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[53] Neil D. Weinstein, *Why It Won't Happen to Me: Perceptions of Risk Factors and Susceptibility*, 3 HEALTH PSYCHOL. 431, 431–32 (1984).

[54] Gabriele C. Hegerl et al., Intergovernmental Panel on Climate Change, Understanding and Attributing Climate Change, *in* CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS 665, 727–28 (S. Solomon et al. eds., 2007), *available at* http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch9.html. This IPCC report describes global climate change as "very likely" to be anthropogenic; the term "very likely" is defined as a probability of at least 90%. *Id.* at 120, *available at* http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch1s1-6.html. This leaves, according the IPCC's analysis, a 10% probability that climate change is not anthropogenic.

[55] *See* Maggie Gale & Linden J. Ball, *Does Positivity Bias Explain Patterns of Performance on Wason's 2-4-6 Task?*, *in* PROCEEDINGS OF THE TWENTY-FOURTH ANNUAL CONFERENCE OF THE COGNITIVE SCIENCE 340 (Wayne D. Gray & Christian Schunn eds., 2002).

[56] *See* Bradley G. Weary, *Self-Serving Biases in the Attribution Process: A Reexamination of the Fact or Fiction Question*, 36 J. PERSONALITY SOC. PSYCHOL. 56, 56–57 (1978).

they identify with) are likely to benefit.[57] Thus, participants in studies on resolving tort claims come to different results depending on whether they are asked to identify with the plaintiffs or defendants, despite being given an incentive to come up with the same result as an unbiased participant.[58] Studies of both fisheries allocations[59] and teachers' union salary negotiations[60] likewise show that a person's sense of what is fair or comparable is strongly influenced by self-interest.

This self-interest factor also works strongly against acceptance of climate change science. Not only would acceptance of climate science, along with its necessary response, require significant changes in the American lifestyle, but the most catastrophic burdens of global climate change will fall upon cultural others—the large coastal populations of Southeast Asia, the Nile Delta at greatest risk of flooding, and sub-Saharan Africans at greatest risk of climate change–induced drought.[61] Compounding the cognitive remoteness of these impacts is the fact that the most severe negative impacts are not forecast to occur for many decades, making the suffering temporally as well as culturally remote.[62] These "others" are

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[57] *See* Tom Tyler & Robyn M. Dawes, *Fairness in Groups: Comparing the Self Interest and Social Identity Perspectives*, *in* PSYCHOLOGICAL PERSPECTIVES ON JUSTICE 87, 102 (Barbara A. Mellers & Jonathan Baron eds., 1993).

[58] Linda Babcock & George Loewenstein, *Explaining Bargaining Impasse: The Role of Self-Serving Biases*, 11 J. ECON. PERSP. 109, 111–16 (1997).

[59] Kimberly A. Wade-Benzoni et al., *Egocentric Interpretations of Fairness in Asymmetric, Environmental Social Dilemmas: Explaining Harvesting Behavior and the Role of Communications*, 67 ORGANIZATIONAL BEHAV. & HUM. DECISION PROCESSES 111, 123–25 (1996).

[60] Babcock & Loewenstein, *supra* note 58, at 116–17. In a survey in which teachers and school board members were asked to select communities whose average salaries were comparable to average teacher salaries, teachers selected communities whose average salary was higher than those communities selected by school board members. This outcome reflected the teachers' self-serving bias. *Id.*; *cf.* Joakim Sandberg, *"My Emissions Make No Difference": Climate Change and the Argument from Inconsequentialism*, 33 ENVTL. ETHICS 229 (2011) (addressing self-interested arguments that specific GHG emissions are too small to count).

[61] *See* KURT M. CAMPBELL ET AL., CTR. FOR STRATEGIC & INT'L STUDIES, THE AGE OF CONSEQUENCES: THE FOREIGN POLICY AND NATIONAL SECURITY IMPLICATIONS OF GLOBAL CLIMATE CHANGE 42, 53 (2007).

[62] Indeed, evidence of this self-serving bias can be seen in arguments against climate response based on the idea that current generations owe no moral duty to persons not yet in existence. *See* ROBERT L. HEILBRONER, AN INQUIRY INTO THE HUMAN PROSPECT 169–76 (1975); Wilfred Beckerman, *Sustainable Development and Our Obligations to Future Generations*, *in* FAIRNESS AND FUTURITY: ESSAYS ON ENVIRONMENTAL SUSTAINABILITY AND SOCIAL JUSTICE 71, 85–92 (Andrew Dobson ed., 1999); Richard T. De George, *The Environment, Rights, and Future Generations*, *in* RESPONSIBILITIES TO FUTURE GENERATIONS: ENVIRONMENTAL ETHICS 157, 159 (Ernest Partridge ed., 1980); Thomas H. Thompson, *Are We Obligated to Future Others?*, 1 ALTERNATIVE FUTURES 29, 29 (1978). These arguments fly in the face of the internationally accepted environmental norms of intergenerational equity (such as the Stockholm Convention, or the Rio Declaration), as well as the shared ethical principle of the golden rule.

not part of the American polity. The participants in our marketplace of ideas suffer a cognitive bias against giving their interests equal weight with our own.

7. Framing

The way people react to new information depends on how it is framed in reference to their preexisting beliefs.[63] Thus, conservatives are more likely to be receptive to arguments to address climate change when they are presented as an argument for increased reliance on nuclear power.[64] Similarly, conservatives are more likely to respond favorably to climate science when it is described as "climate change" than when it is described as "global warming."[65] This factor suggests that climate science might improve its acceptance as political truth by improving the framing of the issue. But there are limits to how far the conclusion that human economic activity is causing irreversible global warming can be reframed to have broad appeal.

Climate science thus faces strong cognitive bias headwinds in the marketplace of ideas. As long as there is a colorable debate (no matter how one-sided) about the existence of climate change and its human origins, cognitive factors seem likely to prevent widespread acceptance of climate science by the American polity.

B. Cultural Cognition—Beliefs as Cultural Identity

In addition to these distinct cognitive biases identified by social scientists, Professor Dan Kahan has been researching the links between political philosophy and cognitive beliefs. Kahan has identified two broad axes of political philosophy—hierarchical versus egalitarian and individualist versus communitarian.[66] Conservatives tend to be hierarchical/individualistic and liberals tend to be communitarian/egalitarian. Kahan posits, and his surveys support, the idea that hierarchical/individualist oriented people reject climate science because it calls for government intervention (communitarian) and threatens to disturb existing economic distributions (egalitarian), while communitarian/egalitarian individuals are more receptive to climate science for the same reasons.[67] He contrasts this with

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[63] *See* James N. Druckman, *Evaluating Framing Effects*, 22 J. ECON. PSYCHOL. 91, 96 (2001) ("Evaluating the effect of a frame of unadulterated preferences thus requires the measurement of prior risk preferences.").

[64] DAN M. KAHAN ET AL., THE SECOND NATIONAL RISK AND CULTURE STUDY: MAKING SENSE OF—AND MAKING PROGRESS IN—THE AMERICAN CULTURE WAR OF FACT 2–6 (The Cultural Cognition Project at Yale Law Sch., Working Paper No. 154, 2007), *available at* papers.ssrn.com/sol3/papers.cfm?abstract_id=1017189/.

[65] Jonathon P. Schuldt et al., *"Global Warming" or "Climate Change"? Whether the Planet is Warming Depends on Question Wording*, 75 PUB. OPINION Q. 115, 117–20 (2011).

[66] Dan Kahan & Donald Braman, *Cultural Cognition and Public Policy*, 24 YALE L. & POL'Y REV. 147, 149–55 (2006).

[67] *See id.* at 155–57.

communitarian/egalitarian rejection of scientific consensus that nuclear waste storage is safe.[68] He also relies on research showing that when presented with (fictional) experts with identical credentials, survey participants are much more likely to accept the qualifications of the experts when they expressed opinions consistent with the participants' cultural biases.[69]

Kahan and others have suggested that these cognitive biases are reinforced within distinct cultural and social groupings—that people will not dissent from the collective beliefs of their social cohort even where they might, upon reflection, have rejected some of these beliefs individually. Professor Kahan notes,

> When faced with conflicting claims and data, individuals usually aren't in a position to determine for themselves how large particular risks—leukemia from contaminated groundwater, domestic attacks by terrorists, transmission of AIDS from casual contact with infected gay men—really are. Instead, they must rely on those whom they trust to tell them which risk claims are serious and which specious.[70]

Kahan goes on to note that these cultural cognitive factors are self-reinforcing. Once even a slight majority within a cultural group embraces a point of view on a controversial issue, other members of the group—even those initially opposed to that point of view—will adopt the group point of view in order to maintain social acceptance within the group.[71]

This factor (which may be a greater challenge to acceptance of climate science than Kahan posits[72]) suggests another enormous challenge for acceptance of climate science as a political truth: the rejection of climate science has become a cultural marker for political conservatism, regional identity, and political party membership in this country. Polls show that public belief in climate science's conclusion (that climate change is anthropogenic) is strongest in northern states and much weaker in the Gulf Coast states and Appalachia.[73] The climate belief gap is even more striking by political party identification, with a fifty-point-plus gap in acceptance of anthropogenic climate change between Democrats and Republicans

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[68] *Id.* at 156.

[69] *Id.* at 164–65.

[70] *Id.* at 153 (emphasis omitted).

[71] *Id.*; *see also* HAMILTON, *supra* note 50, at 5.

[72] Professor Kahan suggested in another article that by reframing the climate debate to include market-oriented solutions such as a cap-and-trade system, conservative opponents to climate science could be converted. *See* Dan M. Kahan et al., *Cultural Cognition of Scientific Consensus*, 14 J. RISK RES. 2, 20–22 (2011). The spectacular failure of cap-and-trade legislation indicates that cultural identity is a stronger factor than cognitive framing for conservatives.

[73] See HAMILTON, *supra* note 50, at 2–4. The results for the Gulf Coast are particularly striking, coming on the heels of the BP Deepwater Horizon oil spill—an example of humankind's global-scale impacts on the natural environment.

in some states.[74] As a matter of political culture in the United States, it is becoming almost impossible to identify oneself as a Republican and at the same time accept the scientific consensus about anthropogenic climate change.[75]

As long as belief in climate science remains a matter of cultural and political identity, it does not matter how strong the case for anthropogenic global warming (AGW) is or how complete the scientific consensus is, the portion of the population that self-identifies as culturally conservative will reject climate science.

C. Market Access and Market Failure: Mass Media and Economic Power

Accepting (and acting upon) the conclusions of the scientific consensus on climate change would disrupt existing economic relationships and distributions within American society. Thus, it is no surprise that climate science has powerful enemies in the fossil fuel, electrical generation, and automobile industries.[76] These powerful economic interests have preferred access to mass media markets and public policy, both through control of media corporations, influence through advertising purchases, and through their lobbying power in Congress. The fossil fuel interests have nearly limitless resources to buy media access and to push their message out to the public.[77] The Supreme Court's *Citizens United* decision holding that the First Amendment protects a right of corporations to make unlimited independent expenditures for speech on political issues[78] will only increase the influence of established fossil-fuel-based economic interests on the political marketplace of ideas. The scientific community, on the other hand, is relatively impoverished, and must rely on news outlets and to some extent on government agencies and not-for-profits to get their message out.[79] In addition, the scientific

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[74] *Id.*; *see also* Jeffrey M. Jones, *In U.S., Concerns About Global Warming Stable at Lower Levels*, GALLUP (Mar. 14, 2011), http://www.gallup.com/poll/146606/concerns-global-warming-stable-lower-levels.aspx/ (reporting sizable gap in attitudes about global warming between Republicans and Democrats).

[75] *See* MATTHEW C. NISBET, CLIMATE SHIFT: CLEAR VISION FOR THE NEXT DECADE OF PUBLIC DEBATE 66 (2011), *available at* http://climateshiftproject.org/wp-content/uploads/2011/08/ClimateShift_report_June2011.pdf; Aaron M. McCright, *Political Orientation Moderates Americans' Beliefs and Concern about Climate Change*, 104 CLIMATIC CHANGE 243 (2011); Aaron M. McCright & Riley E. Dunlap, *The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001–2010*, 52 SOC. Q. 155, 180 (2010).

[76] *See* Marianne Lavelle, *The Climate Lobby's Nonstop Growth*, CENTER FOR PUBLIC INTEGRITY (May 20, 2009, 5:01 AM), http://www.publicintegrity.org/2009/05/20/2863/climate-lobbys-nonstop-growth/.

[77] *See* Ctr. for Responsive Politics, *Lobbying Spending Database Energy & Natural Resources, 2010*, OPENSECRETS.ORG (Oct. 31, 2011), http://www.opensecrets.org/lobby/indus.php?id=E&year=2010/ (detailing hundreds of millions of dollars in annual lobbying expenditures from various industries within the energy sector).

[78] Citizens United v. FEC, 130 S. Ct. 876, 891–92 (2010).

[79] For a discussion of the challenges the scientific community faces in appropriate media coverage, see generally Aaron M. McCright & Rachael L. Shwom, *Newspaper and*

community does not view itself as a participant in the political debate.[80] This preferential media access would seem inexorably to distort the marketplace of ideas against the acceptance of climate science.

There may be, however, some limits to the magnitude of the effect this differential access has. Some studies have concluded that paid advertising and media access have only a limited effect on public opinion—that they will reinforce existing beliefs but will not cause people to believe a proposition they would otherwise reject, which is a reflection of the confirmation and dissonance avoidance biases discussed above.[81] Combined with the cognitive biases discussed above, however, this media access is a potent factor limiting the success of climate science in the marketplace of ideas. Another recent and controversial study asserts that climate science proponents made significant strides in closing the spending gap on lobbying and media access efforts as compared to their opponents during the recent legislative battles over the cap-and-trade bill.[82] This same study concludes that media news presentation of the climate science debate in five major news outlets has been uniformly consistent with the climate science consensus, and has not presented the climate science skeptics' position as equally meritorious.[83]

Television Coverage, *in* CLIMATE CHANGE SCIENCE AND POLICY 405, 405–13 (Stephen H. Schneider et al. eds., 2010) (analyzing frequency and content of media coverage on climate change and discussing influences on media of coverage).

[80] *See generally* Peter Weingart, *Science in a Political Environment: The Dynamics of Research, Risk Perception and Policy Making*, 5 EMBO REP. 52 (2004), *available at* http://www.nature.com/embor/journal/v5/n1s/full/7400230.html (discussing political mobilization of scientists and the public's resulting distrust of scientific experts).

[81] *See* STEVEN D. LEVITT & STEPHEN J. DUBNER, FREAKONOMICS: A ROGUE ECONOMIST EXPLORES THE HIDDEN SIDE OF EVERYTHING 9–10 (2005); Edwin Baker, *Scope of the First Amendment Freedom of Speech*, 25 UCLA L. REV. 964, 979 (1978); William C. Canby, Jr., *The First Amendment Right to Persuade: Access to Radio and Television*, 19 UCLA L. REV. 723, 739–41 (1972); Stanley Ingber, *The Marketplace of Ideas: A Legitimizing Myth*, 1984 DUKE L.J. 1, 40 (1984); Joseph T. Klapper, *Communication, Mass: Effects*, *in* 3 INT'L ENCY. SOC. SCI. 81, 82–85 (David L. Sills ed., 1968); Steven D. Levitt & James M. Snyder, Jr., *The Impact of Federal Spending on House Election Outcomes*, 105 J. POL. ECON. 30, 30–34 (1997); Nicholas A. Valentino et al., *The Impact of Political Advertising on Knowledge, Internet Information Seeking, and Candidate Preference*, 54 J. COMMUNICATION 337, 337 (2004), *available at* http://dmitriwilliams.com/jocinfseeking.pdf; Alan Gerber et al., The Influence of Television and Radio Advertising on Candidate Evaluations (Apr. 5, 2007) (unpublished manuscript), *available at* http://convention2.allacademic.com/one/mpsa/mpsa07/ (search for "Influence of Television and Radio" in the quick search field).

[82] NISBET, *supra* note 75, at 64. For a summary of controversy greeting the report, see Andrew C. Revkin, *Beyond the Climate Blame Game*, N.Y. TIMES BLOG (Apr. 25, 2011, 2:18 PM), http://dotearth.blogs.nytimes.com/2011/04/25/beyond-the-climate-blame-game/.

[83] NISBET, *supra* note 75, at 48–57.

III. CORRECTIONS TO MARKET FAILURES IN THE MARKETPLACE OF IDEAS

Applying the admittedly imperfect economics metaphor of a marketplace of ideas working toward a state of truth efficiency, courts and commentators sometimes identify these market failures—mainly barriers to access—as justification for government intervention in the marketplace of ideas. This section considers some of the potential structural and regulatory interventions that might allow the climate science consensus to prevail, either by bypassing the political marketplace of ideas, or by intervention in that market. These structural interventions include the role of administrative agencies in displacing the political process, "market" regulation, and "market" participation.

A. Administrative State

In some senses, the modern administrative state is itself a structural response to perceived failures of the political marketplace of ideas to achieve workable conclusions for regulatory policymaking. The principle justification for administrative agency rulemaking is that Congress and, by extension, the polity at large lack the capacity and expertise to make appropriate policy in areas requiring expert knowledge of complex scientific, economic, and technical issues.[84] Thus, administrative agencies, staffed by experts in their regulatory field, are charged with determining technical facts and adopting specific rules to implement broad congressional policies. Comprehending these facts is considered beyond the competence of a deliberative body like Congress, but there is also an element of political insulation involved because Congress delegates many hard regulatory choices to agencies specifically to avoid political responsibility for these choices.[85] Executive agencies (like the EPA) are politically accountable only indirectly through the President's prerogative to fire agency heads that ignore his policy preferences and through congressional oversight devices such as committee hearings and budgetary restrictions.[86]

Thus, executive agencies have some freedom to make factual findings and implement policies at odds with the political factual consensus. In fact, broad

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[84] *See* James O. Freedman, *Expertise and the Administrative Process*, 28 ADMIN. L. REV. 363, 364–67 (1976).

[85] *See* DAVID SCHOENBROD, POWER WITHOUT RESPONSIBILITY: HOW CONGRESS ABUSES THE PEOPLE THROUGH DELEGATION 135–52 (1993); Peter H. Aranson et al., *A Theory of Legislative Delegation*, 68 CORNELL L. REV. 1, 63–67 (1982).

[86] Professor Cass Sunstein, among others, is a leading proponent of the use of technocratic, expert agencies to implement sound policies that may be at odds with the political truths of an irrational political constituency. Sunstein advocates for use of a form of cost-benefit analysis to determine which societal risks are worthy of regulatory response even in the face of different prioritizations by the general public. Ironically, Sunstein opines that the risk of global climate change is not one that merits aggressive immediate regulatory action under such an approach. *See* CASS R. SUNSTEIN, LAWS OF FEAR: BEYOND THE PRECAUTIONARY PRINCIPLE 50 (2005).

administrative authority to implement the recommendations of the climate-science consensus already exists. Under the existing authority of Clean Air Act section 211(c), the Administrator of the EPA may control or prohibit the manufacture or sale of any motor-vehicle fuel whose emissions products "may reasonably be anticipated to endanger the public health and welfare."[87] Administrator Jackson has already made the finding that GHG emissions, including carbon dioxide and nitrogen oxides from gasoline and diesel, may reasonably be anticipated to endanger the public health and welfare.[88] The EPA could, under this existing authority, immediately ban or limit the availability of fossil fuels for motor vehicles, despite the lack of political consensus that global warming is a scientific reality that requires an immediate regulatory response. The fact that such an option has not even been discussed is an indication that executive agencies like the EPA are not well insulated from the political marketplace of ideas. Not only would any President whose EPA bans the sale of gasoline likely be a one-term (or less) President, but even a proposal to implement such a policy without a political consensus in its favor would also certainly provoke an immediate statutory amendment—like the one that has already passed the House of Representatives[89]—to strip the EPA of its regulatory authority over GHG emissions. Indeed, an EPA proposal to limit sales of gasoline would, in the current political climate, more likely lead to the President summarily dismissing the EPA Administrator than to actual implementation of policy in response to climate science.[90]

Independent agencies are one step further removed from accountability to the political marketplace of ideas. Such agencies, like the Nuclear Regulatory Commission and the Securities and Exchange Commission, have members appointed by the President for staggered terms that exceed the term of the sitting President and are removable only for malfeasance and not for policy disagreements. Although adherents of the unitary executive theory insist that the President must be allowed to discharge such commissioners with or without cause, even for policy disagreements, the Supreme Court held in the 1930s in *Humphrey's Executor* that Congress may create such agencies whose members are immune from political firing.[91] These independent agencies thus enjoy a large

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[87] 42 U.S.C. § 7545(c)(1) (2006).

[88] Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 66496 (Dec. 15, 2009) (to be codified at 40 C.F.R. ch. 1).

[89] Energy Tax Prevention Act of 2011, H.R. 910, 112th Cong. (2011), *available at* http://www.gpo.gov/fdsys/pkg/BILLS-112hr910rh/pdf/BILLS-112hr910rh.pdf.

[90] Indeed, in the early days of President George W. Bush's administration, the President overruled his EPA Administrator Christine Todd Whitman, who had made public statements in support of regulating GHG emissions under existing authorities. *See* Douglas Jehl & Andrew C. Revkin, *Bush, in Reversal, Won't Seek Cut in Emissions of Carbon Dioxide*, N.Y. TIMES (Mar. 14, 2001), http://www.nytimes.com/2001/03/14/us/bush-in-reversal-won-t-seek-cut-in-emissions-of-carbon-dioxide.html.

[91] Humphrey's Executor v. United States, 295 U.S. 602 (1935).

degree of immunity from political accountability and, within limits, may implement policies at odds with the "political truths" of the marketplace.

Independent agencies might thus be established to find facts and carry out policies that may be at odds with the political consensus; however, the experience with independent agencies has been mixed. The Nuclear Regulatory Commission was constituted as an independent agency both to separate the regulators of nuclear energy from the promoters of nuclear energy (the Department of Energy), and also to insulate nuclear power plant siting decisions from politics.[92] The result has been an agency that is certainly insulated from popular politics when it comes to siting and regulatory decisions, but at the same time has been criticized as being captured by the nuclear industry and insufficiently protective of the environment.[93] Another somewhat unique example of an independent agency that is effectively insulated from the political consensus is the Federal Reserve Bank, which is given broad power to set interest rates and affect the economy through its control of the money supply.[94] Federal Reserve policies are often deeply unpopular, such as when the Federal Reserve raises interest rates, limiting economic expansion.[95] Equally unpopular is the Federal Reserve's quantitative easing policy, designed to avoid deepening the current economic slowdown, which is popularly perceived as an inflationary giveaway of money to banking interests.[96] That the Federal Reserve

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[92] *See The Nuclear Regulatory Commission Fact Sheet: NRC Mission — To Protect Public Health and Safety*, U.S. NUCLEAR REG. COMMISSION (Mar. 29, 2012), http://www.nrc.gov/reading-rm/doc-collections/nuregs/brochures/br0099/r10/#mission/.

[93] *See, e.g.*, UNION OF CONCERNED SCIENTISTS, POSITION PAPER: NUCLEAR POWER AND GLOBAL WARMING 6 (2007) ("[T]he NRC has tended to act more like a protector of the nuclear power industry than a guardian of the public welfare."), *available at* http://www.ucsusa.org/assets/documents/nuclear_power/npp.pdf; STAFF OF CONGRESSMAN EDWARD J. MARKEY, REGULATORY MELTDOWN: HOW FOUR NUCLEAR REGULATORY COMMISSIONERS CONSPIRED TO DELAY AND WEAKEN NUCLEAR REACTOR SAFETY IN THE WAKE OF FUKUSHIMA (2011), *available at* http://www.hsdl.org/?view&did=694392/ (detailing efforts of some commissioners to impede the NRC's review of nuclear power plant safety guidelines in the wake of the Fukushima nuclear power plant meltdown in Japan); Daniel Kaufmann & Veronika Penciakova, *Preventing Nuclear Meltdown: Assessing Regulatory Failure in Japan and the United States*, BROOKINGS INST. (Apr. 1, 2011), http://www.brookings.edu/research/opinions/2011/04/01-nuclear-meltdown-kaufmann/ (noting, "the NRC is not effectively enforcing regulations" due in large part to "a degree of regulatory capture").

[94] PAULINE SMALE, CONG. RESEARCH SERV., RS20826, STRUCTURE AND FUNCTIONS OF THE FEDERAL RESERVE SYSTEM (2010), *available at* http://www.fas.org/sgp/crs/misc/RS20826.pdf.

[95] *See* Lisa Schultz Bressman & Robert B. Thompson, *The Future of Agency Independence*, 63 VAND. L. REV. 599, 648–49 (2010) (explaining the need to remove popular and political pressure from the calculus of the Federal Reserve's decisions regarding interest rate adjustments).

[96] *See* Lydia Saad, *CDC Tops Agency Ratings; Federal Reserve Board Lowest*, GALLUP (July 27, 2009), http://www.gallup.com/poll/121886/cdc-tops-agency-ratings-federal-reserve-board-lowest.aspx/; Joshua Zumbrun, *Majority of Americans Say Fed Should Be Reined In or Abolished, Poll Shows*, BLOOMBERG (Dec. 9, 2010, 18:40 GMT),

has been able to effect policies that have been deeply unpopular without congressional interference, especially in the current financial crisis, indicates that a government actor independent of the political marketplace of ideas is at least theoretically possible in our system.

It may well be that what the United States needs is a Federal Reserve system for climate policy. However, it took a series of financial crises, including the Great Depression, to convince the United States polity to turn monetary policy over to a politically unaccountable body. The Federal Reserve was created following several financial panics of the early twentieth century and was given substantially greater powers during the Depression.[97] Confronting climate change cannot wait until after the manifest impacts of the climate crisis have occurred.

Even independent agencies like the Federal Reserve are not completely unaccountable politically, for Congress always retains legislative authority to reverse an agency's decisions through legislation, or even to disband the agency entirely. President Reagan floated the idea of limiting the Federal Reserve's independence when it refused to lower interest rates to increase employment during his tenure.[98] Similarly, presidential candidate Ron Paul has called for the abolition of the Federal Reserve.[99] Like congressional efforts to overturn EPA Administrator Jackson's GHG endangerment finding, these congressional moves limit the freedom of action of even the most independent agencies, such as the Federal Reserve. Thus, even an independent agency that seeks to implement policy at odds with the political truth of the marketplace of ideas can be overruled.

B. Market Regulation

Turning policymaking over to politically insulated technocrats is a way to bypass the political marketplace of ideas and implement policies that may be unpopular and even contrary to socially accepted truths. These mechanisms, however, simply avoid the marketplace of ideas rather than attempt to correct the underlying market failure. In economic markets, market failures are considered justifications for government restrictions on free markets.[100] When it comes to the marketplace of ideas, however, government regulation is strictly circumscribed by First Amendment doctrine itself. Market regulation in the marketplace of ideas

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http://www.bloomberg.com/news/2010-12-09/more-than-half-of-americans-want-fed-reined-in-or-abolished.html.

[97] *See* Bressman & Thompson, *supra* note 95, at 625–26.

[98] *See* Jonathan Fuerbringer, *Regan Reviewing Plans to Restrict Federal Reserve*, N.Y. TIMES, June 20, 1982, § 1, at 1 (Late City Final ed.), *available at* http://www.nytimes.com/1982/06/20/us/regan-reviewing-plans-to-restrict-federal-reserve.html.

[99] Federal Reserve Board Abolition Act, H.R. 833, 111th Cong. (2009).

[100] *See* Paul Stephen Dempsey, *Market Failure and Regulatory Failure as Catalysts for Political Change: The Choice Between Imperfect Regulation and Imperfect Competition*, 46 WASH. & LEE L. REV. 1, 14–26 (1989) (comparing different rationales for regulation).

might take one of two forms: access regulation and substantive limitations. The Court has allowed extremely limited interference with the First Amendment marketplace of ideas in the case of market access and has strictly circumscribed substantive regulation.

1. Market Access

Despite widespread academic calls for accommodation of First Amendment doctrine to media market-access measures,[101] the Supreme Court has allowed only relatively limited market-access corrective measures. As noted, the Supreme Court has itself accommodated market-access barriers in conforming common law defamation actions to the First Amendment protections for speech. In *Gertz v. Robert Welch, Inc.*,[102] the Court allowed limited content-based intervention in the form of a preferential-damages standard (negligence rather than actual malice) for defamatory liability in the case of private individuals.[103] This preferential-damages standard is meant to correct the market-access disparities between public figures, who are presumed to have media access to counteract defamatory falsehoods in the marketplace of ideas, and private figures, who are presumed to lack equivalent market access as their media-based defamers.[104]

The Supreme Court has also allowed limited correction of market-access barriers in the case of broadcast television, based on the scarcity of broadcast frequencies and the public interest in open access to publicly owned airwaves. In *Red Lion Broadcasting v. FCC*,[105] the Supreme Court upheld the Federal Communications Commission's (FCC's) fairness doctrine, which required broadcast television and radio licensees to provide access for opposing viewpoints whenever they broadcast opinions on controversial issues.[106] In *Miami Herald Publishing Co. v. Tornillo*[107] the Supreme Court subsequently refused to extend its First Amendment accommodation of the fairness doctrine to print media, striking down a Florida statute requiring newspapers to publish views contrary to those

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[101] *See, e.g.*, RODNEY A. SMOLLA & MELVILLE B. NIMMER, SMOLLA & NIMMER ON FREEDOM OF SPEECH § 2:14 (3d ed. 1996); Jerome A. Barron, *Access to the Press — A New First Amendment Right*, 80 HARV. L. REV. 1641, 1641–45 (1967); Ellen P. Goodman, *Media Policy and Free Speech: The First Amendment at War with Itself*, 35 HOFSTRA L. REV. 1211, 1217 (2007); Alberto Bernabe Riefkohl, *Freedom of the Press and the Business of Journalism: The Myth of Democratic Competition in the Marketplace of Ideas*, 67 REV. JUR. U.P.R. 447, 450–51 (1998); *see also* LAURENCE TRIBE, AMERICAN CONSTITUTIONAL LAW § 12-1, at 786 (2d ed. 1988) ("[W]hen the wealthy have more access to the most potent media of communication than the poor, how sure can we be that 'free trade in ideas' is likely to generate truth?").

[102] 418 U.S. 323 (1974).

[103] *Id.* at 351–52.

[104] *Id.* at 344.

[105] 395 U.S. 367 (1969).

[106] *Id.* at 385–94.

[107] 418 U.S. 241 (1974).

expressed in their pages. The Court refused to extend the rule to unlicensed print media that theoretically face unlimited competition.[108] The FCC abandoned the fairness doctrine in 1987,[109] and it seems unlikely that the Supreme Court would extend its accommodation of market access regulation from broadcast media to cable, given the unlimited number of cable channels available.

Even were resurrection and extension of the fairness doctrine possible, it would do little to advance public acceptance of climate science. When it comes to the debate over climate change, it is hard to argue that media access is the crux of the market failure. It is not that the public has lacked sufficient exposure to the climate scientists' consensus. Arguably, the scientific consensus receives at least as much media exposure as, and possibly more than, climate skeptics' position. The *Climate Shift* report issued by the American University School of Communication reported that the mainstream media accurately reported the climate science consensus far more often than it reported climate skeptics' position.[110] The only exception found was the editorial pages of the *Wall Street Journal*. The news pages of the *Wall Street Journal*, on the other hand, conformed to the practice of accurately reporting climate-science consensus.[111] The study did not account for Fox News Network's coverage, and described it as a partisan news source that would not be relied on by those members of the public who are open to considering climate science.[112] A "fairness doctrine" applied to climate science thus might actually result in more exposure to the skeptics' claims rather than less (except, perhaps, on the Fox News Network). It may be that the media is giving more exposure to nonscience-based climate skeptics' position than it deserves as objective fact, but that is not a market access problem; it is a market valuation problem (i.e., the media values climate skeptics' ideas more than their optimal worth). As discussed below, attempts to regulate the market value placed on particular ideas by the marketplace will run afoul of First Amendment's core prohibition against viewpoint regulation.

Climate beliefs are highly correlated with political identity in the United States. The fossil fuel industry's participation in the political process has had a direct influence on the climate science positions taken by the leaders of both political parties.[113] Limits placed on industry influence in the marketplace of ideas

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[108] *Id.* at 257–58. For a discussion critical of the Court's economic analysis in *Tornillo*, see Darren Bush, *The Marketplace of Ideas: Is Judge Posner Chasing Don Quixote's Windmills?*, 32 ARIZ. ST. L.J. 1107 (2000).

[109] *See* Syracuse Peace Council v. FCC, 867 F.2d 654, 660 (D.C. Cir. 1989).

[110] *See* NISBET, *supra* note 75, at 57.

[111] *See id.* at 54.

[112] *See id.* at 54, 67.

[113] *See, e.g.*, *NOW: Big Oil, Big Influence* (PBS television broadcast Aug. 1, 2008), *available at* http://www.pbs.org/now/shows/347/oil-politics.html (highlighting the extreme disparity between the lobbying expenditures and political contributions of the oil and coal industries as compared to those of public interest environmental advocates and the renewable energy industry); Jim Motavalli, *Clean Coal Carolers and the Fight for Obama's Energy Soul*, DAILY GREEN (Dec. 23, 2008), http://www.thedailygreen.com/

and in politics might be effective in changing the nature of the climate change debate. However, such limits have been precluded by the series of Supreme Court decisions protecting monetary political contributions from regulation as political expression[114] and granting business corporations equal speech rights as individuals.[115] Most recently, the Supreme Court, in the context of public campaign financing, has specifically and repeatedly rejected the notion that "leveling the playing" field in public debate is a sufficiently important government interest to overcome the presumption of government noninterference in the marketplace of ideas.[116]

Nor is it clear that elimination of fossil fuel industry influence in the political debate on climate change would overcome the remaining cognitive biases against acceptance of climate science. As long as one political party sees opposition to aggressive GHG regulation as an appealing message, opposition to climate science will persist in the political marketplace.

2. Regulation of the Climate Debate

Another potential response to market failure in the marketplace of ideas, as in economic markets, would be direct regulation. After all, economists accept that government may regulate goods offered in economic markets in the interests of health and safety, where information barriers would prevent markets from properly "pricing" product hazards.[117] Examples abound in government regulation of food, drugs, and consumer products. Likewise, the Supreme Court long ago rejected the proposition of absolute freedom from regulation of labor markets, allowing states and the federal government to set limits on wages, hours, and conditions of employment.[118] Can and should government likewise regulate the marketing of

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living-green/blogs/cars-transportation/clean-coal-obama-461208/ (highlighting the efforts of the coal industry to encourage then-candidate Barack Obama to run on a pro-coal energy platform); John Vidal, *Revealed: How Oil Giant Influenced Bush*, GUARDIAN (June 8, 2005, 3:38 EDT), http://www.guardian.co.uk/news/2005/jun/08/usnews.climatechange (detailing the influence of oil industry pressure on President George W. Bush's determination that the United States should not participate in the Kyoto protocol).

[114] *See* Buckley v. Valeo, 424 U.S. 1 (1976); Davis v. FEC, 554 U.S. 724 (2008); McConnell v. FEC, 540 U.S. 93 (2003).

[115] Citizens United v. FEC, 130 S. Ct. 876 (2010); First Nat'l Bank of Bos. v. Bellotti, 435 U.S. 765 (1978).

[116] Ariz. Free Enter. Club's Freedom Club PAC v. Bennett, 131 S. Ct. 2806, 2827 (2011).

[117] *See, e.g.*, PETER ASCH, CONSUMER SAFETY REGULATION: PUTTING A PRICE ON LIFE AND LIMB 5–7 (1988) (arguing consumer safety requires government intervention in the marketplace). *See generally* Richard J. Barber, *Government and the Consumer*, 64 MICH. L. REV. 1203 (1966) (arguing for government intervention to protect consumers in a modern, distributed economy).

[118] *See, e.g.*, United States v. Darby, 312 U.S. 100 (1941) (recognizing federal power to regulate wages and hours under the Commerce Clause); W. Coast Hotel v. Parrish, 300

climate skeptics' ideas on the grounds that, due to the cognitive biases identified above, the marketplace of ideas cannot appropriately value climate skeptics' ideas?

Simply to state such a proposition, of course, runs counter to the very foundation of the First Amendment theory. Any governmental attempt to regulate the exposure given to the climate skeptics' position would, of course, run afoul of the absolute prohibition against viewpoint discrimination. Indeed, the Supreme Court has held that the regulation of expressive activities may not discriminate based on viewpoint even where the underlying activity itself falls outside the protection of the First Amendment. Thus, in *R.A.V. v. City of St. Paul*,[119] the Court struck down a Minneapolis ordinance that criminalized the burning of a cross intended to promote racial hatred. The Court reasoned that, although cross burning could clearly be prohibited, the criminality of the act could not turn on the viewpoint expressed.[120]

One might argue that there is room for regulation of climate skeptics' speech on the grounds that the First Amendment provides only limited, indirect protection for false statements of fact. As the Court stated in *Gertz*,[121]

> We begin with the common ground. Under the First Amendment there is no such thing as a false idea. However pernicious an opinion may seem, we depend for its correction not on the conscience of judges and juries but on the competition of other ideas. But there is no constitutional value in false statements of fact. Neither the intentional lie nor the careless error materially advances society's interest in "uninhibited, robust, and wide-open" debate on public issues.[122]

In *Gertz*, the Court held that although false statements of fact have no intrinsic First Amendment value, protection of innocent falsehoods was required to avoid chilling valuable speech.[123] This "breathing space" for open debate is what led the Court to adopt the negligence standard for defamation actions brought by private figures and the actual malice standard for public figures.[124]

Might the climate debate be subject to regulation as a question of truth versus "false statements of fact"? After all, the metaphor of the marketplace of ideas as a search for truth has always been described in terms of a search for political and policy truths, not literally as a means of determining objective facts. However, the distinction between "objective fact" and "political truth" is a vexed one, and the

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U.S. 379 (1937) (upholding minimum wage laws as constitutional and overruling *Lochner v. New York*, 198 U.S. 45 (1905)).

[119] 505 U.S. 377 (1992).

[120] *Id.* at 391.

[121] 418 U.S. 323 (1974).

[122] *Id.* at 339–40.

[123] *Id.* at 340.

[124] *Id.* at 342.

Supreme Court's jurisprudence is singularly unhelpful in drawing the line.[125] At this stage in its development, though, climate science is closer to being an idea than an objective fact; as a prediction of future conditions, it presumably will ultimately be tested successfully against reality and prevail. As noted by First Amendment scholar Robert Post, the fact/opinion distinction might be boiled down to a question of convergence—whether objective observers, without community bias, can be expected ultimately to converge on a single view about an assertion.[126] Thus, an infinite number of views will converge on objective fact over time. As Professor Post points out, however, attempts to determine factual truth prior to this convergence are problematic, as they cut off the infinite number of viewpoints before they have a chance to converge.[127]

Any attempt to enshrine the climate consensus as an incontrovertible truth would be contrary to the foundational First Amendment principle that there is no orthodoxy in the United States polity[128] and would violate the "profound national commitment to the principle that debate on public issues should be uninhibited, robust, and wide-open."[129] And, of course, any governmental attempt to influence the substance of the debate on climate change in favor of the consensus scientific view would have to derive from a political consensus that this view is correct and worthy of protection—in which case such regulation would be unnecessary.

C. Market Participation

Although the First Amendment precludes government interference with the debate about climate science, the First Amendment does not preclude government participation in the debate. Indeed, the emerging "government speech" doctrine seems to be an exception to the rule that government must remain neutral in the marketplace of ideas. Viewpoint-based participation that would be unacceptable in the form of regulation has been held to be perfectly acceptable when presented as government speech.

Although the government speech doctrine originally appeared in cases addressing objections to compelled financial contributions in support of speech the taxpayer disagreed with,[130] the Court has expanded the doctrine to include

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[125] *See* ROBERT C. POST, CONSTITUTIONAL DOMAINS: DEMOCRACY, COMMUNITY, MANAGEMENT 153–63 (1995).

[126] *Id.* at 161–62.

[127] *Id.* at 161.

[128] *See* W. Va. State Bd. of Educ. v. Barnette, 319 U.S. 624, 642 (1943) ("If there is any fixed star in our constitutional constellation, it is that no official, high or petty, can prescribe what shall be orthodox in politics, nationalism, religion, or other matters of opinion.").

[129] N.Y. Times Co. v. Sullivan, 376 U.S. 254, 270 (1964).

[130] Abood v. Detroit Bd. of Educ., 431 U.S. 209, 234–35 (1977). *See generally* Barry P. McDonald, *The Emerging Oversimplifications of the Government Speech Doctrine: From Substantive Content to a "Jurisprudence of Labels"*, 2010 B.Y.U. L. REV. 2071 (2010) (tracing the development of the government speech doctrine).

government control over the speech of public employees[131] and government selection of public monuments.[132] Thus, the Supreme Court has upheld federal funding for an advertising campaign promoting beef consumption over the objections of industry members who were taxed to support the campaign.[133] The Supreme Court has also upheld content-based speech restrictions on recipients of government funds[134] and disciplinary actions against government employees speaking within the scope of their employment activities.[135] Most recently, in *Pleasant Grove City v. Summum*,[136] the Supreme Court rejected a claim by a religious group that it should be able to place its own religious monument in a public park adjacent to the Ten Commandments on public forum grounds.[137] The Supreme Court relied on the idea that when government engages in its own expression, as by choosing monuments for a public park, it need not act neutrally with respect to content or even viewpoint.[138]

Active government participation in the marketplace of ideas—at least in the marketplace of ideas about food preferences and public monuments—has thus received the First Amendment endorsement of the Supreme Court. As one commentator describes the government speech doctrine:

> In order to represent the People, democratic government—and the elected and appointed public officials through whom democratic government speaks—must be able to speak to the People, to inform, explain, justify, educate, defend, and persuade as to the wisdom and goodness of its policy initiatives and decisions.[139]

The Supreme Court has stated, "it would be ironic if those charged with making governmental decisions were not free to speak for themselves in the process."[140]

Government agencies thus may have a significant effect on public debate through their own participation in this marketplace of ideas. There is a significant

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[131] Garcetti v. Ceballos, 547 U.S. 410, 421 (2006). *See generally* McDonald, *supra* note 130, at 2090–92.

[132] Pleasant Grove City v. Summum, 555 U.S. 460 (2009) (rejecting religious group's First Amendment claim to have its monument displayed in public park on grounds that municipal choice of what monuments to display constituted government speech not subject to public forum analysis); Van Orden v. Perry, 545 U.S. 677 (2005) (rejecting Establishment Clause challenge to secular display of the Ten Commandments in public park).

[133] Johanns v. Livestock Mktg. Ass'n, 544 U.S. 550, 566–67 (2005).

[134] Rust v. Sullivan, 500 U.S. 173, 200 (1991).

[135] *Garcetti*, 547 U.S. at 421.

[136] 555 U.S. 460 (2009).

[137] *Id.* at 464–65.

[138] *Id.* at 464.

[139] Howard M. Wasserman, *Compelled Expression and the Public Forum Doctrine*, 77 TUL. L. REV. 163, 185 (2002) (citing THOMAS I. EMERSON, THE SYSTEM OF FREEDOM OF EXPRESSION 698 (1970)).

[140] Keller v. State Bar of Cal., 496 U.S. 1, 12 (1990).

tension in the Supreme Court's doctrine between the foundational principle that requires government neutrality in the marketplace of ideas, precluding government attempts to level the playing field of debate and the government speech doctrine which appears to permit government participation in public debate on public issues without limitation. Government speech, with its implicit authority, has the potential to exert a profound influence on the public debate.[141]

The government speech doctrine may thus permit substantial governmental influence on the climate science debate in the marketplace of ideas. The federal government already participates in the climate debate through educational programs designed to increase awareness and understanding of the scientific consensus on climate change.[142] A recent National Science Foundation grant solicitation sought proposals for innovative ways to educate and engage the public in climate change issues, specifically including the goal of encouraging members of the public to change their behavior and to take political action to address climate change.[143] Government agencies speak with authority to the public on scientific issues, and these educational measures may well be effective in the long run in changing public opinion—at least to the extent of counteracting industry opponents of climate science.

State and local governments can also participate in the marketplace of ideas by setting public school educational policies. The extent to which climate science is presented in public education, and the way it is presented, will have a profound effect on how the public responds to and understands the climate science consensus, particularly since information presented to children will become part of their background understanding of the world against which dueling theories must compete.[144] Public education thus may, in the long run, overcome the confirmation and dissonance avoidance biases that make public acceptance of climate science so difficult.

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[141] Indeed, some commentators have criticized an unlimited government speech doctrine for this reason. *See generally* David Cole, *Beyond Unconstitutional Conditions: Charting Spheres of Neutrality in Government-Funded Speech*, 67 N.Y.U. L. REV. 675, 702–04 (1992) (listing ways in which governmental expression can shift or guide the course of public dialogue); Abner S. Greene, *Government of the Good*, 53 VAND. L. REV. 1, 35–37 (2000) (arguing government advocacy should be limited only if it effectively monopolizes the debate); Robert D. Kamenshine, *The First Amendment's Implied Political Establishment Clause*, 67 CAL. L. REV. 1104, 1104 (1979) (arguing unparalleled access to media resources allows government to achieve political goals and marginalize critics).

[142] *See, e.g.*, *Global Climate Change*, U.S. DEP'T OF STATE, http://www.state.gov/e/oes/climate/index.htm (last visited July 8, 2012); *Climate Change*, EPA, http://www.epa.gov/climatechange/ (last visited July 8, 2012); *Climate Watch*, NOAA, http://www.climate.gov/#climateWatch/ (last visited July 8, 2012); U.S. GLOBAL CHANGE RES. PROGRAM, http://www.globalchange.gov/ (last visited July 8, 2012).

[143] Press Release, Nat'l Sci. Found., Climate Change Education Partnership Program Is Launched (Sept. 10, 2010), *available at* http://www.nsf.gov/news/news_summ.jsp?cntn_id=117685/.

[144] *See* Elizabeth S. Spelke, *Nativism, Empiricism, and the Origins of Knowledge*, 21 INFANT BEHAV. & DEV. 181, 195 (1998).

It is exactly because public education so profoundly influences public opinion that public education has become a battleground in the climate science debate. Several states have proposed legislation either preventing the teaching of the scientific consensus about anthropogenic climate change, or requiring that climate science be taught alongside the nonscientific views of the climate science skeptics.[145] Of forty-nine states with science standards for their school curriculums, only thirty include the anthropogenic causes of climate change in their curriculum.[146] Of these only seven states include fossil fuel use in their standards for science education on the causes of climate change.[147]

Like the policies of administrative agencies and direct market regulation, government speech is generally going to reflect the political consensus rather than fundamentally alter it. As one commentator puts it: "Speech 'by the government' really refers to the speech of whatever majority political constituency won control at the last election."[148] The EPA's and National Science Foundation's current climate education efforts may be the exception rather than the rule. Like agency regulatory efforts, they are always subject to political override by Congress and by the President. The history of public school curriculum-setting, including current legislative efforts to curtail teaching of the climate science consensus, has shown an anti-science bias rather than a pro-science bias.[149] Government speech can be expected to reflect the political consensus, not cure a market failure of that political consensus (due to cognitive bias) to determine truth.

IV. ALTERNATIVE MEANS FOR DETERMINING TRUTH

The conflict between the marketplace of ideas and climate science is, at its base, a conflict between epistemological systems. Scientific modes of truth-finding have reached a different conclusion than the political mode of truth-finding. Under our constitutional system of self-government, the results of the political system of truth-finding prevail. Proponents of aggressive action to address climate change essentially argue that the scientific mode of truth-finding should be given greater

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[145] *See, e.g.*, Louisiana Academic Freedom Act, S. 561, Reg. Sess. (La. 2008); Scientific Education and Academic Freedom Act, S. 320, 52nd Leg., 1st Sess. (Okla. 2009); H.R. Con. Res. No. 1009, 2010 Leg., 85th Sess. (S.D. 2010); *see also* H.R. 368, 2012 Leg. (Tenn. 2012) (to be codified at TENN. CODE ANN. § 49-6-10) (authorizing public school teachers to teach present climate science skeptics arguments).

[146] Kim Kastens & Margaret Turrin, *What Are Children Being Taught in School About Anthropogenic Climate Change?*, *in* BUD WARD, COMMUNICATING ON CLIMATE CHANGE 48, 48 (Sunshine Menezes ed., 2008).

[147] *Id.*

[148] Wasserman, *supra* note 139, at 186 (quoting Steven G. Gey, *Reopening the Public Forum—From Sidewalks to Cyberspace*, 58 OHIO ST. L.J. 1535, 1602 (1998)).

[149] *See generally* Debora MacKenzie, *Battle over Climate Science Spreads to US Schoolrooms*, NEW SCIENTIST (Mar. 11, 2010), http://www.newscientist.com/article/mg20527514.100-battle-over-climate-science-spreads-to-us-schoolrooms.html (detailing the fight over teaching climate science).

weight. This argument presupposes that the scientific mode of truth-finding is more reliable than the political mode of truth-finding, at least when it comes to identifying and responding to global environmental threats of civilization-killing proportions. It is impossible to evaluate this premise without considering, comparing, and contrasting systems of knowledge and placing them in their epistemological context. This requires a brief inquiry into the basic philosophical questions of what "truth" is and how it is to be determined. These questions, which have kept philosophers busy over the millennia, will not be resolved here, but it is useful to examine how competing knowledge-finding systems address climate science and how to place these systems in their philosophical context.

A. The Epistemology of the Climate Debate

The marketplace of ideas is described as the appropriate means to search for truth in a system of self-governance. Evaluating the concept of a marketplace of ideas requires some sense of what truth is and how to evaluate systems to gain knowledge. These concepts—both the definition of truth and the appropriate means to discover it—have been debated throughout recorded history. Knowledge has been defined since the Platonic dialogues as a justified true belief; that is, knowledge requires (1) a belief, (2) that is true, and (3) that is justified (i.e., a true belief that is not true by chance, but with justification).[150] While the "belief" part of this equation refers to the subjective state of mind of the individual (and is thus somewhat beyond debate), the "truth" and "justification" parts of this knowledge equation have engaged philosophers in a vigorous debate over the centuries, spawning schools and subschools of thought.[151] Philosophical discussion of the nature of truth tends to be separated from discussion of epistemology (the study of knowledge), but in reality there is substantial overlap between concepts of truth and the methodology by which that truth is determined.

1. The "Truth" of Climate Change

(a) Truth as Correspondence with Reality

The classical philosophical view of truth is the correspondence theory attributed to Plato and Aristotle. Simply put, the correspondence view of truth is

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[150] Matthias Steup, *The Analysis of Knowledge*, STANFORD ENCYCLOPEDIA PHILOSOPHY, http://plato.stanford.edu/archives/fall2008/entries/knowledge-analysis/ (last updated Jan. 16, 2006). Note that Edmund Gettier challenged this conception of knowledge in modern times. Gettier hypothesized a set of circumstances meeting the justification definition but failed the true test of knowledge. *See id.*

[151] *See generally* Stewart Cohen, *Justification and Truth*, 46 PHIL. STUD. 279 (1984) (discussing schools of thought relating to justification and truth).

that true statements are those that correspond to things in objective reality.[152] Although this theory has the virtue of simplicity and corresponds to common understanding of what truth is, it functions only to the extent that objective reality is indeed objective and real, and not subject to dispute. To the extent that reality is disputed, as the science of climate change is, the correspondence theory of truth does little more than substitute a concept of "reality" for "truth." As shall be seen, empiricist and rationalist schools of epistemology may advance the elusive goal of achieving a correspondence version of truth, without necessarily laying claim to having achieved it. Although it is problematic to define truth as simple correspondence with objective reality, it seems to be the best approach to the question of whether climate science accurately predicts the results of current patters of fossil fuel combustion because it is the objective reality of the Earth's future climate that is at stake. It is fair to say that a correspondence theory form of truth is the objective of the scientific method, which, as discussed below, seeks to compare statements to objective reality through experimentation and proof.

(b) Truth as Coherence

Some philosophers, notably Spinoza and Hegel, argued that the appropriate test for truth involves evaluating the internal consistency of a series of propositions.[153] Thus, a system of statements is considered true so long as the statements are mutually supportive and consistent—that is, they form a coherent system.[154] Individual propositions can be true or false only by reference to the system of statements of which they are a part. The coherence theory of truth does not posit that there is only one true system—rather, alternative and even mutually contradictory systems of statements can both be true as long as they are internally consistent.

A coherence approach is not a useful way to consider climate change, as multiple internally consistent systems of statements can explain the Earth's climate without reference to the systems' predictive power. Thus, the statement "the [E]arth's climate is regulated by an all-powerful supreme being and will never be allowed to become inhospitable to mankind" can be a "true" statement as part of a coherent system of religious "truths" which are mutually supportive and consistent. It would be a poor basis for environmental policy, however, as the coherence theory of truth makes no apparent claim to predictive accuracy.

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[152] *See* Marian David, *The Correspondence Theory of Truth*, STANFORD ENCYCLOPEDIA PHILOSOPHY, http://plato.stanford.edu/archives/fall2009/entries/truth-correspondence/ (last updated July 2, 2009).

[153] RALPH C.S. WALKER, THE COHERENCE THEORY OF TRUTH: REALISM, ANTI-REALISM, IDEALISM (1989); James O. Young, *The Coherence Theory of Truth*, STANFORD ENCYCLOPEDIA PHILOSOPHY, http://plato.stanford.edu/archives/fall2008/entries/truth-coherence/ (last updated Sept. 9, 2008).

[154] *See* Young, *supra* note 153.

(c) Truth as a Cultural Construct

Associated with Hegel and Marx, the constructivist theory of truth denies that accepted truths necessarily correspond to any objective reality.[155] Rather, accepted truth is a social construct that is influenced by politics and power relationships.[156] This form of truth seems consistent with the marketplace of ideas theory of self-governance—which seems to accept that truth is a relativistic concept subject to the social consensus of a given time. Again, as with the coherence theory of truth, correspondence with objective reality is not the test of such truths, so its predictive power is problematic, except as a prediction of what might be acceptable to the polity. At that level, "political truth" in the marketplace of ideas becomes a tautology—climate science is untrue because most people believe it to be untrue, regardless of whether that belief corresponds to objective reality or has any predictive power.

(d) Truth as Consensus

Related to the constructivist view of truth is a view of truth as social consensus reached under conditions of "ideal speech." This view of truth most closely corresponds to the marketplace of ideas concept underlying the American system of self-government. According to its main proponent, Habermas, the consensus view of truth depends on an optimized version of the marketplace of ideas, where all views are heard and considered.[157] Like the constructivist theory of truth, it does not claim predictive power.[158]

(e) Truth as Pragmatic Principles

Under the pragmatist approach to truth, espoused by Charles Sanders Pierce and John Dewey at the turn of the twentieth century, truth can be approximated by putting principles into action and observing the results, modifying principles when the results disagree with predictions, and endlessly repeating the progression so that the system always moves closer to truth.[159] This system of truth blends epistemological empiricism[160] with pursuit of a sort of Aristotelian correspondence with objective reality, while acknowledging that determination of a final truth is

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[155] *See* TODD MAY, BETWEEN GENEALOGY AND EPISTEMOLOGY: PSYCHOLOGY, POLITICS, AND KNOWLEDGE IN THE THOUGHT OF MICHEL FOUCAULT 1–3 (1993).

[156] *Id.*

[157] *See generally* Mary Hesse, *Habermas' Consensus Theory of Truth*, 1978 PHIL. SCI. ASS'N 375 (1978) (exploring theory of truth developed by social philosopher Jürgen Habermas).

[158] *Id.*

[159] *See* WILLIAM JAMES, PRAGMATISM: A NEW NAME FOR SOME OLD WAYS OF THINKING 58–61 (1907).

[160] *See infra* Section IV.A.2.a.

not possible.[161] Pragmatic truth seems to correspond best with the scientific method and makes predictive power a touchstone of the survival of statements of truth. A pragmatic form of truth seems best suited to making pragmatic policy decisions, and seems to correspond best with the truth of climate science, and not necessarily with the truth of the marketplace of ideas.

These different philosophical approaches to defining "truth" expose some of the weaknesses of the marketplace-of-ideas metaphor for determining "political truths." It is impossible to assess the effectiveness or appropriateness of the marketplace of ideas approach to truth finding without some arbiter of what the truth is. It is all well and good to define "truth," as Aristotle did, as correspondence with reality, but that definition begs the question of how to determine what the reality is that truth must correspond to. During the 2004 presidential election cycle, an adviser to President George W. Bush famously criticized the so-called "reality-based community," asserting the ability to create political realities.[162] While truth and reality may not ultimately be subject to objective determination, epistemology is the study of knowledge—the study of justification for belief in a particular version of reality. Familiarity with epistemology helps assess the efficacy of the marketplace of ideas as a means of setting policy in the face of the scientifically accepted reality of climate change.

2. The Epistemology of Climate Change

As with the concept of truth, the concept of epistemology has attracted philosophical debate over the centuries. Epistemology, or the study of knowledge, examines the question of how humans discover knowledge. The philosophy of epistemology, like that of truth itself, has fallen into several schools of thought. These schools—the empiricist, idealist, constructivist, and rationalist—correlate roughly with various theories of truth.[163]

(a) Empiricist

The empiricist school of epistemology posits that knowledge flows solely from direct observation by the senses. Tracing back to Aristotle, empiricists view the human mind as a tabula rasa, which gains knowledge only through observation and experience.[164] Later empiricists included John Locke and David Hume. Locke recognized that, based on empiricism, not all ideas were verifiable, and certainty was unachievable for knowledge that was not confirmable by direct observation.[165]

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[161] *Id.*

[162] Ron Suskind, *Without a Doubt*, N.Y. TIMES MAG., Oct. 17, 2004, at 44, 50–51.

[163] ALVIN I. GOLDMAN, EPISTEMOLOGY AND COGNITION 34–41, 190–91 (1986).

[164] *See generally* LOUIS E. LOEB, FROM DESCARTES TO HUME: CONTINENTAL METAPHYSICS AND THE DEVELOPMENT OF MODERN PHILOSOPHY (1981) (explaining empirical philosophy).

[165] *See* JOHN LOCKE, AN ESSAY CONCERNING HUMAN UNDERSTANDING 18 (Prometheus Books 1995) (1689).

Hume carried Locke's observations on empiricism further, and reasoned that predictions of future events were unknowable with certainty—it was merely probable that the sun would rise the next morning, based on the past experience of its rising every previous morning.[166] Hume identified the inductive element in empiricist reasoning—the conclusion that experience can be generalized into knowledge about patterns of events—but criticized inductive reasoning as essentially circular.[167] As inductive reasoning is often conceived to be an essential part of the scientific method, Hume's criticism of inductive logic is a significant criticism of classical understandings of the scientific method.

Nevertheless, empiricism is one of the building blocks of the scientific method, and is important for understanding the conflict between scientific conclusions and political conclusions about climate change.

(b) Idealist

The idealist school of epistemology views all human knowledge as innate.[168] Knowledge is thus derived from ideas. Idealism is associated with Immanuel Kant, who saw knowledge as a product of the human mind.[169] Platonic philosophy is also an idealist epistemology, although Platonic forms were seen to exist independently of the human mind.[170]

With its lack of emphasis on objective sense impressions and empirical observation, idealism aligns itself with the sort of knowledge that is purely the result of human thinking and debate. It thus aligns more closely with a version of the marketplace of ideas in which truth is determined by the power of the idea to win adherents. It is dissimilar from the scientific truth finding of climate science in that it does not purport to be based on observations of the physical world.

(c) Rationalist

The rationalist school of epistemology combines elements of the empiricist school and the idealist school. Knowledge, in this view, comes from a combination of human perception (empirical knowledge) and human reason or theorizing (like the idealist school).[171] Rationalism adds abstract thought as a third category of

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[166] *See* DAVID HUME, AN ENQUIRY CONCERNING HUMAN UNDERSTANDING 29 (Cambridge Univ. Press 2007) (1748).

[167] *Id.*

[168] *See generally* Daniel Sommer Robinson, *Idealism*, *in* ENCYCLOPÆDIA BRITANNICA (2011), *available at* http://www.britannica.com/EBchecked/topic/281802/idealism/ (summarizing the philosophy of idealism).

[169] *See id.*

[170] *See id.*

[171] *See* Peter Markie, *Rationalism vs. Empiricism*, STANFORD ENCYCLOPEDIA PHILOSOPHY, http://plato.stanford.edu/archives/fall2008/entries/rationalism-empiricism/ (last updated Aug. 6, 2008).

knowledge beyond the empirical and the idealist.[172] Knowledge derived from direct observation can be combined with human theorizing about relationships among such observations; abstract thought can address mathematics and geometry that may not correlate to empirical observation.

The scientific method corresponds to a rationalist approach to epistemology, as it seeks to combine experience and observation with idealistic theorizing, as well as abstract theorizing. Climate science thus has some attributes of rationalism, as it synthesizes empirical observations about physical properties of GHGs and solar radiation with abstract theoretical thinking about the future effects of changes in atmospheric composition.

(d) Constructivist

Similar to the consensus and cultural construct views of truth, the constructivist view of epistemology holds that knowledge is in fact a social construct based on social and political conventions.[173] This version of epistemology suffers from the criticism that it is relativistic—that is, different societies and cultures may arrive at different knowledge, depending on language, social attitudes, and political norms.[174]

Constructivism may be more descriptive than normative (i.e., it may describe what cultures accept as knowledge better than it sets a standard for what cultures should accept as knowledge). Obviously, constructivism is consistent with a political marketplace of ideas—"truth" and "knowledge" are what the cultural and political marketplace determines they are. Constructivism seems inconsistent with scientific truth-finding, which seeks to be objective rather than relativistic. But, as shall be seen, there may be elements of constructivism (or conventionalism), at least descriptively speaking, in the operation of the scientific method.

As can be seen, there is not a single universally accepted definition of the "truth" that a marketplace of ideas should be seeking; nor is there one accepted definition of what process adequately justifies belief to give it the characteristic of "knowledge." This Article certainly cannot resolve these issues. But for the purposes of addressing the conflicting conclusions of political truth and scientific truth when it comes to anthropogenic climate change, there are some reasons to prefer correspondence and pragmatism as philosophies of truth, and to prefer empiricism and rationalism as philosophies of epistemology. The fundamental question of climate policy is simple: will current patterns of human consumption of fossil fuels and similar GHG-producing agricultural and industrial activities cause future disruptions to the Earth's climate of a magnitude manifestly great enough to demand current action? Only correspondence and pragmatic schools of

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[172] *See id.*

[173] *See* Alvin Goldman, *Social Epistemology*, STANFORD ENCYCLOPEDIA PHILOSOPHY, http://plato.stanford.edu/archives/fall2008/entries/epistomology-social/ (last updated Aug. 18, 2006).

[174] *See id.*

truth purport to relate truth to physical reality; and the empirical, rationalist (and corresponding pragmatic) schools of epistemology relate to making valid predictions of future events.[175] The scientific method, the primary basis of climate science's conclusions, is more closely aligned with these latter theories. The exact nature of the scientific method, both in theory and as practiced, requires examination to determine the extent to which the conclusions of science should be preferred to the conclusions of the political marketplace when it comes to climate policy.

B. Scientific Truth Finding

In light of the fundamental conflict between scientific truth finding, which has determined to a high degree of probability (90%) that anthropogenic GHG emissions are causing extreme and rapid climate change,[176] and political truth-finding, which has so far determined that the existence of climate change is questionable and its causation by anthropogenic emissions is unlikely,[177] this section will examine the scientific truth-finding process, both in its classic understanding and in modern criticism. While the scientific method is most associated with empiricism, modern critics have demonstrated that the scientific method in practice has elements of conventionalism[178]—science is its own marketplace of ideas, albeit a restricted one, with high barriers to entry. Climate science and its predictions, together with the particular procedures used to achieve scientific consensus, must be placed in the appropriate context of the scientific method and scientific knowledge.

1. The Scientific Method

Classical scientific method is a form of empirical epistemology. The scientific method involves four steps to achieving accepted scientific truths: first, the observation of phenomena; second, the development of a hypothesis of scientific principles that would explain the observed phenomena; third, the development of predictions of observable phenomena deductively based on the principle of the hypothesis; and, fourth, experimentation designed to test the predictions of the hypothesis against observable phenomena.[179] A key element of the experimental method is to have a control procedure: to isolate the putative causative factor, an identical experiment must be performed under identical controlled conditions,

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[175] *See* ANTHONY A. AABY, A TAXONOMY OF THEORIES 12–17 (2004), *available at* http://cs.wallawalla.edu/~aabyan/TR/TheoryTaxonomy.pdf.

[176] Hegerl et al., *supra* note 54, at 665, 727–28.

[177] *See, e.g.*, Elizabeth Kolbert, *Uncomfortable Climate*, NEW YORKER (Nov. 22, 2010), http://www.newyorker.com/talk/comment/2010/11/22/101122taco_talk_kolbert/.

[178] *See* BARRY GOWER, SCIENTIFIC METHOD: AN HISTORICAL AND PHILOSOPHICAL INTRODUCTION 19, 130–51 (1997).

[179] Thomas S. Ulen, *A Nobel Prize in Legal Science: Theory, Empirical Work, and the Scientific*, 2002 U. ILL. L. REV. 875, 879–80 (2002).

except for the putative causative factor. Experimental results are shared with other members of the scientific community, and experiments must be reproducible by other scientists to be acceptable confirmation. The scientific community has developed conventions of peer review and publication to ensure the reproducibility and validity of scientific results and to share the advances in scientific knowledge.[180] If the predictions are verified by the experiments, a hypothesis becomes an accepted scientific theory.[181]

This classical description of the scientific method implies the use of inductive reasoning—the generalization from a series of observations to a hypothetical rule—although some theorists have invented the term "abductive reasoning" to describe the scientific hunch that leads to a hypothesis that seeks to explain observed phenomena.[182] This classical account of the scientific method is also premised on a form of empiricism, and specifically, a form of verification or justification of scientific principles through experimental proof. And the process by which a hypothesis leads to an accepted scientific theory depends on acceptance by a peer-review community of scientists, echoing conventionalist and constructivist theories of truth and epistemology.

The scientific method suffers from a significant potential for ambiguity—it has no means of choosing between two (or more) conflicting hypotheses, each of which is equally supported by experimental results. But it is the scientific method's empiricist thread that gives it a privileged status among epistemologies. The essence of the scientific method is to make predictions, test those predictions against reality, reject those propositions that fail the reality test, and enshrine those propositions that survive the reality test as scientific truth.

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[180] Effie J. Chan, Note, *The "Brave New World" of Daubert: True Peer Review, Editorial Peer Review, and Scientific Validity*, 70 N.Y.U. L. REV. 100, 113–14 (1995).

[181] According to the National Academy of Sciences, a scientific theory "refers to a comprehensive explanation of some aspect of nature that is supported by a vast body of evidence." *See* NATIONAL ACADEMY OF SCIENCES, SCIENCE, EVOLUTION, AND CREATIONISM 11 (2005). Contrary to the colloquial understanding of the term, a scientific theory is neither tentative nor uncertain. Rather, a scientific theory is an accepted, comprehensive explanation of natural phenomena. Theories seek to explain the behavior of natural phenomena rather than simply describe them. Theories are contrasted with scientific "laws," which are more descriptive, axiomatic statements of relationships between natural phenomena that are assumed as part of the basic understanding of the natural world. Thus, physics is premised on the "law of gravity"—a basic assumption supported by observation that gravitational attraction exists between objects, without any theoretical attempt to explain why such gravitational attraction exists. Like theories, scientific laws must be verified by scientific experimentation in order to be accepted as a law of science.

[182] Paul Thagard & Cameron Shelley, *Abductive Reasoning: Logic, Visual Thinking, and Coherence*, *in* LOGIC AND SCIENTIFIC METHODS 413–27 (Dalla Chiara et al. eds., 1995).

2. Critical Views of the Scientific Method

Not surprisingly, the classic statement of scientific truth-finding has had its critics and explicators over the years, particularly in modern times. Prominent critical writers about the history and philosophy of scientific discovery include Karl Popper, whose 1935 work, *The Logic of Scientific Discovery*, challenged the concepts of scientific truth and verifiability as the touchstone of the scientific method,[183] and Thomas Kuhn, whose 1962 book, *The Structure of Scientific Revolutions*, questioned the existence of "true" scientific paradigms and noted the role of conventionalism and cognitive framing among socially cohesive groups of scientists.[184] Later writers, including David Hess, have taken a more critical approach to scientific culture, pointing out the increasing role that scientific agenda-setting by politically and economically powerful interests plays in determining the scope and subject matter of scientific knowledge.[185]

(a) Karl Popper and Falsifiability

Popper's work questions the concept of a search for scientific truth. The problem with treating the scientific method as a search for truth, according to Popper, is that the idea of verification of a scientific theory is fundamentally flawed.[186] Popper rejects induction as a valid principle of scientific logic. Rather, he claims that scientific hypotheses spring from scientific intuition and that false hypotheses are eliminated through experimentation and "falsification."[187] According to Popper, science does not strive for a universal truth, but rather, through a process of endless iteration and rejection of false hypotheses, science continuously advances toward more accurate knowledge.[188] Thus, for Popper, it is the falsifiability of a hypothesis that is important, not its verifiability.

Popper distinguishes between existential statements and universal statements. Existential statements, such as "there is a white raven somewhere" are verifiable, because you might find a white raven somewhere, but are not falsifiable because it is a practical impossibility to collect all ravens in the world to establish that none of them are white.[189] On the other hand, universal statements, such as "all ravens are black" are not verifiable, because once again, you cannot collect all the ravens in the world, but are easily falsifiable because you can find one white raven and you have falsified the statement.[190] Popper notes the tendency of the scientific

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[183] KARL RAIMUND POPPER, THE LOGIC OF SCIENTIFIC DISCOVERY 3–7, 17–20 (1959).

[184] *See generally* THOMAS S. KUHN, THE STRUCTURE OF SCIENTIFIC REVOLUTIONS (2d ed. 1970) (explaining the phenomenon of paradigm shifts in scientific knowledge).

[185] *See* DAVID J. HESS, SCIENCE STUDIES: AN ADVANCED INTRODUCTION 52–80 (1997) (exploring the institutional sociology of science).

[186] POPPER, *supra* note 183, at 18.

[187] *Id.*

[188] *Id.* at 20.

[189] *Id.* at 47–48.

[190] *Id.*

method, when based on verification, to seek verification rather than falsification, and to develop auxiliary hypotheses rather than abandon hypotheses when predictions are not experimentally justified.[191] Popper proposes, instead, that the scientific method should focus on the falsifiability of hypotheses—that to be scientific, an hypothesis must be falsifiable rather than verifiable, and among competing hypotheses, the one that is more easily falsifiable should be preferred until it is disproved, and the one that makes more intuitively unexpected predictions should also be preferred (again, until it is disproved).[192] Auxiliary hypotheses should not be adopted to dismiss falsifying experimental results unless the auxiliary hypothesis itself satisfies the criteria of falsifiability and multiplicity of falsifiability.[193]

(b) Thomas Kuhn and Paradigm Shifts

Karl Popper's normative restatement of the scientific method is not an indictment of the scientific method, but rather a refinement of it and suggested improvement. Scientific historian Thomas Kuhn, in his influential book *The Structure of Scientific Revolutions*, echoes some of Popper's key insights into the scientific logic, but rejects the descriptive accuracy of both Popperian and classic descriptions of the scientific method. Like Popper, Kuhn rejects the idea that the scientific method is capable of determining objectively unique scientific truths, but sees value in the iterative scientific process of moving toward more predictively accurate explanations of natural phenomena independent of whether objective truth is ever achieved.[194]

Kuhn focuses on the sociology of science and the important role that scientific paradigms play in scientific culture. These paradigms are difficult to dislodge, as scientists within a given scientific culture tend to see the world and the natural phenomenon that are the subject of their experiments through the lens of their shared paradigm.[195] In Kuhn's view, paradigms are useful as an organizing force for scientific discovery.[196] Prior to the existence of a paradigm, scientific experimentation is chaotic and incoherent. However, once the scientific community adopts a shared paradigm, "normal" science can take place, advancing scientific understanding within the shared paradigm.[197] For Kuhn, "normal" science consists of relatively routine puzzle-solving within the framework of the shared paradigm, rather than any challenges to the paradigm itself.[198] No one who considers himself a scientist would question the paradigm. Anomalies—

[191] *Id.* at 59–60.
[192] *Id.* at 20.
[193] *Id.* at 62–63.
[194] *See generally* Kuhn, *supra* note 184 (arguing that science progresses via a series of iterative paradigm shifts, rather than through revolutionary changes).
[195] *Id.* at 18–20.
[196] *Id.*
[197] *Id.* at 23–24.
[198] *Id.* at 35.

experimental results that are not predicted by the paradigm—are not seen as refutation of the paradigm itself (contrary to Popper's normative rule of falsification), but rather are subject to refinements or exceptions to the paradigm, or they are simply rejected by questioning the experimental methods and reliability of the inconsistent results.[199]

For Kuhn, scientific paradigms are useful to the scientific culture but bear no necessary relationship to objective reality. Thus, Ptolemaic astronomy, which assumed that the Earth was at the center of the universe, was a useful and practical means of predicting the location of nearly all the celestial bodies, even if the assumed circular orbits of these bodies had to be fudged with assumed minor circles to account for the motion of the planets.[200] Ptolemaic astronomy as a paradigm was eventually displaced by Copernican astronomy, which placed the sun at the center of the universe and made more accurate predictions of the movement of celestial bodies.[201] Similarly, Newtonian physics was, and still is, a perfectly accurate paradigm for the prediction of the movement of objects great and small in nearly all cases, but it could not explain the observed perihelion of Mercury.[202] It took a paradigm shift—and scientific adoption of Einstein's utterly counterintuitive theory of relativity—to come up with a predictive paradigm for Mercury's orbit.[203] Similarly, wave theory replaced particle theory of light, to be supplanted by a combined wave-particle theory. But to Kuhn, neither waves nor particles are an objective description of light[204]—rather they are useful metaphors for making predictions about the behavior of light.[205]

According to Kuhn, these paradigm shifts occur when irreconcilable anomalies in observed phenomena become too large to be dismissed through ad hoc exceptions.[206] Such anomalies may arise because of the cumulative inability of the old paradigm to explain an increasing body of observations. Eventually, such anomalies lead to a scientific crisis, which is resolved when a new paradigm takes hold and better explains the observed anomalies. Kuhn notes the scientific community's extreme resistance to these shifts in paradigm: scientists working under the old paradigm continue to view the world and the observed data through the lens of the existing paradigm.[207] This resistance echoes some of the cognitive

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[199] *Id.* at 77–78.

[200] THOMAS S. KUHN, THE COPERNICAN REVOLUTION: PLANETARY ASTRONOMY IN THE DEVELOPMENT OF WESTERN THOUGHT 68–70 (1957). Ptolemaic astronomy used an auxiliary hypothesis of "minor circles" to explain the inconsistencies between the planets' predicted motion in the Ptolemaic model and their actual observed motion. *Id.*

[201] *Id.* at 134.

[202] *See generally* G.M. Clemence, *The Relativity Effect in Planetary Motions*, 19 REV. MOD. PHYS. 361 (1947) (explaining the difficulties associated with observational data and the perihelion of Mercury).

[203] *Id.* (applying Einstein's theory of relativity to explain the perihelion of Mercury).

[204] *See* KUHN, *supra* note 184, at 114.

[205] *Id.*

[206] *Id.* ch 2.

[207] *Id.* at 64–65, 150–52.

biases afflicting the rationality of human reasoning identified above: that scientists are perhaps less subject to cognitive bias because of a professional commitment to rationalism, but they are not immune to confirmation and framing biases and avoidance of cognitive dissonance. Kuhn likens paradigm shifts to Gestalt switches. In a classic Gestalt drawing, what once looked like a bird becomes a rabbit; what once looked like a Ptolemaic planet becomes a Copernican satellite.[208] Because the existing paradigm frames the entire framework for the existing scientific community, members of the community cannot change their view of the data, and paradigmatic changes take place only as the old generations of scientists die off[209] and new scientists are more open to adopting the paradigm that better fits the observed phenomenon.

But for Kuhn, this change in paradigm is not progress. Rather, adoption of a new metaphor for understanding the natural world inevitably leads to some loss of understanding—events that were better predicted by the old paradigm.[210] In a postmodernist, constructivist twist, Kuhn notes that the literature of science favors presentation of the scientific method as cumulative and inexorably progressing toward truth. But this is only because the winners of the paradigm revolutions believe they represent progress and get to write the textbooks.[211] Like the Ministry of Truth in George Orwell's *Nineteen Eighty-Four*,[212] scientists, according to Kuhn, are constantly rewriting history to put the current paradigm in the best light.[213] And Kuhn notes the fundamental tension between scientific paradigms and the general public's political marketplace of ideas: "One of the strongest, if still unwritten, rules of scientific life is the prohibition of appeals to heads of state or to the populace at large in matters scientific."[214] In a postscript to his book, however, Kuhn backs off from complete dismissal of the advance of scientific knowledge, acknowledging that science progresses toward more complete explanations of observations.[215]

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[208] *See id.* at 66–91 (discussing these concepts in depth).

[209] *Id.* at 150–51. Max Planck similarly observed that one side must retire or die before the scientific community can resolve scientific controversies. *Id.* at 151.

[210] *Id.* at 151–53, 166–71.

[211] *Id.*

[212] GEORGE ORWELL, NINETEEN EIGHTY-FOUR 84–123 (Houghton Mifflin Harcourt 1987) (1949).

[213] KUHN, *supra* note 184, at 151–54, 167.

[214] *Id.* at 168.

[215] *Id.* at 206. Kuhn explains that an astute observer presented with various theories representing different stages of the scientific understanding of a problem could reconstruct the chronology in which each theory was developed. *Id.* Kuhn declared that this thought experiment "displays the sense in which I am a convinced believer in scientific progress." *Id.*

(c) Contemporary Criticisms

Kuhn has profoundly influenced the current understanding of scientific epistemology, but his views are not regarded as definitive.[216] Scientists still learn the classical terms of the scientific method and they presumably strive to advance objective scientific knowledge.[217] According to Professor David Hess, a science sociologist, the current understanding (itself a form of convention) is that scientific knowledge results from a mixture of empiricism and conventionalism.[218] The scientific community is not as monolithic as Kuhn suggests. Rather, scientists work in networks of related fields, with peer reviews by scientists in related fields (but different networks) providing a check on the ability of conventional paradigms within one network to prevent competing paradigms from being considered and adopted.[219] While conventionalism plays a role, scientific argumentation must appeal to logic and observation to be accepted, thus providing an empirical anchor for scientific conclusions. Scientific knowledge is thus fallible, but its judgments and predictions are much more likely to be reliable than lay judgments about the same phenomena—just as the judgments of lawyers, doctors, and auto mechanics are more likely to be reliable predictions in their areas of expertise than those of lay people.

Professor Hess, however, writes critically of modern science, for he perceives that social factors external to pure scientific truth-finding influence the scientific agenda.[220] Hess does not see scientists as autonomous and independent truth seekers. Instead, Hess notes that in the social scientific marketplace, the value of scientific ideas for the scientist who creates them is a complex, self-reinforcing

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[216] *See* DAVID J. HESS, ALTERNATIVE PATHWAYS IN SCIENCE AND INDUSTRY: ACTIVISM, INNOVATION, AND THE ENVIRONMENT IN AN ERA OF GLOBALIZATION 21–42 (2007).

[217] Indeed, the discussion of scientific epistemology bears an uncanny resemblance to the debate between legal formalism and legal realism in legal academia. Just as scientists are taught the classic definition of the scientific method and expect to apply it to their professional work, lawyers are taught the tools and methods of legal formalism, and expect to apply it to their professional work. Sociologist critics of both the legal and scientific systems can point out with some validity that both systems are susceptible to cognitive biases, including the force of conventionalism. Scientific methodology differs from law in one important respect: it purports to test its theories against nonhuman-based observable phenomena, while law can merely attempt to predict how human judges will administer legal rules. This key distinction renders impossible an empirical testing of legal theories that is completely free from human cognitive biases. A scientist's perception of phenomena will be affected by her cognitive biases, but the phenomena themselves should not be; in law, the phenomenon to be observed (the legal process's action upon individuals and institutions) is itself bound up with human cognitive factors. *See* KUHN, *supra* note 184, at 108–12.

[218] HESS, *supra* note 216, at 21–42.

[219] *Id.* at 27–28.

[220] *Id.* at 43–47.

combination of peer recognition and citations by others.[221] It is this peer recognition that reinforces scientists' status and makes their research fundable in the future. Hess also notes the increasing influence of industry and politics on setting the scientific agenda; industry and government funding, which set the agenda for scientific inquiry, fund more and more university research.[222] Hess does not suggest that these influences change the results of scientific inquiry; rather, he suggests that scientific study is ignoring important scientific questions that lack a funding constituency.[223]

These critical examinations of the logic and sociology of scientific truth-finding suggest that, although in its idealized form the scientific method is an empirical determination of objective reality, in reality the scientific method suffers from some of the constructivist and conventionalist defects that diminish the political marketplace of ideas as a means of determining objective truth. These sociological critiques of the scientific method fuel climate skeptics' main arguments: that scientific convention is not infallible and that drastic measures should not be taken based solely on a scientific consensus that may be infected by a sociological scientific conventionalism. Nevertheless, these critical assessments of scientific epistemology ultimately support the relative reliability of the scientific method as a basis for predicting future consequences of current practices. While imperfect, as all human institutions are, scientific methodology incorporates a dedication to empiricism as well as procedures for deliberative decision-making and critical review that both reduce the likelihood of bias and improve the likelihood of correspondence to physical reality. Furthermore, climate science in particular does not suffer from the sort of industry agenda-setting that Professor Hess criticizes.

(d) The Status of Climate Science in Scientific Epistemology

Not surprisingly, climate science skeptics view consensus climate science as a form of conventionalism gone wrong. Such skeptics believe the science academy

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[221] *Id.* at 30.

[222] *Id.* at 43–47. Tellingly, Hess points to a de-emphasis of climate science under the George W. Bush Administration as an example of political influence on the scientific agenda. *Id.* at 46.

[223] *Id.* at 22–24. Other contemporary science sociologists have suggested that it is impossible to separate the progress of scientific truth-finding from the larger social structures that coevolve with changing scientific truth—so-called coproduction. *See generally* Sheila Jasanoff, *The Idiom of Co-Production*, *in* THE STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER 1 (Sheila Jasanoff ed., 2004). Under this approach, the existence of climate science knowledge is itself an artifact of coevolved international social norms that recognize the existence of global problems subject to resolution by international institutions, without which the notion of a global climate worthy of study as a distinct scientific problem cannot exist. *See* Clark A. Miller, *Climate Science and the Making of a Global Political Order*, *in* THE STATES OF KNOWLEDGE: THE CO-PRODUCTION OF SCIENCE AND SOCIAL ORDER, *supra*, at 46–65.

has reached an incorrect paradigm no more accurate than Ptolemy's geocentric vision of the universe but fight all dissenting attempts to shift the paradigm to reality. These skeptics see a Kuhnian paradigm shift in the works. Like the predictions of climate science themselves, that judgment is best reserved for hindsight a century from now. But while the skeptics may be wrong on the science, they may have a point on the scientific sociology of the climate debate. The authors of the so-called Climate Gate purloined e-mails have been exonerated of any scientific misconduct,[224] but these e-mails evidence a scientific culture of preserving and protecting a given understanding of climate science from attacks external to that scientific community. To evaluate the reliability of climate science as a prediction of future events and its relative merit compared to competing epistemologies such as the political marketplace of ideas, we must place that prediction in the structure of scientific epistemology. Is anthropogenic climate change a paradigm, an accepted theory, a law of science, or a mere hypothesis?

Surprisingly, this question has no easy answer. As noted, some climate skeptics view the climate science consensus as a false paradigm. Not surprisingly, skeptics deny that the climate science consensus has the status of a scientific theory or even a hypothesis, claiming that the consensus view of AGW fails even to explain past observed data.[225]

Climate scientists, on the other hand, are more likely to refer to AGW as a theory or a hypothesis,[226] but they may not even agree among themselves about

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[224] The Climate Gate scandal involved a series of e-mails among prominent climate scientists, primarily at East Anglia University in Britain. In these e-mails, the scientists discussed more effective ways to present data supporting the consensus view that anthropogenic GHG emissions are fundamentally altering the Earth's climate. The e-mails also discussed ways to prevent any scientific articles questioning the consensus view from being published in peer-reviewed literature. These e-mails were leaked to the public after a hacker invaded the scientists' e-mail accounts. Climate skeptics seized on the leak to argue that the scientific consensus on climate change was the result of manipulation and dishonesty rather than a true scientific consensus. For the complete report of the official parliamentary investigation into this scandal, see generally SEC'Y OF STATE FOR ENERGY AND CLIMATE CHANGE, GOVERNMENT RESPONSE TO THE HOUSE OF COMMONS SCIENCE AND TECHNOLOGY COMMITTEE 8TH REPORT OF SESSION 2009–10: THE DISCLOSURE OF CLIMATE DATA FROM THE CLIMATIC RESEARCH UNIT AT THE UNIVERSITY OF EAST ANGLIA, 2010, Cm. 7934 (U.K.) (discussing the reliability of the climate change data and making recommendations for greater openness in sharing this data), *available at* http://www.official-documents.gov.uk/document/cm79/7934/7934.asp/.

[225] *See* Jeff Glassman, *Conjecture, Hypothesis, Theory, Law: The Basis of Rational Argument*, CROSSFIT J. (Dec. 1, 2007), http://library.crossfit.com/free/pdf/64_07_Conjecture_to_Law.pdf.

[226] *See* John Cook, *Klaus-Martin Schulte and Scientific Consensus*, SKEPTICAL SCI. (Sept. 3, 2007), http://www.skepticalscience.com/Klaus-Martin-Schulte-and-scientific-consensus.html (referring to AGW "hypothesis"); Naomi Oreskes, *The Scientific Consensus on Climate Change*, 306 SCI. 1686, 1686 (2004) (citing an overwhelming consensus among climate scientists that AGW is occurring but acknowledging "scientific consensus might, of course, be wrong").

how to categorize predictions of global warming in terms of the epistemologies of science—whether it is a paradigm or an observation. In response to an e-mail inquiry, this author received various responses from different scientists working in fields of climate science. One respondent referred to AGW as a theory:

> This theory of climate is primarily applied physics, with some bits of chemistry and biology, customized for the planet (but, the theory is tested by application to climate of other planets, and used in understanding them, so really is more general than just Earth). This theory of climate includes energy and mass flows in their various forms. The oceans are now generally included within this, and parts of the solid Earth (but not most of the solid Earth, except as boundary conditions). . . . But, to look for a theory of anthropogenic climate change is a little like looking for a theory of anthropogenic earthquakes—blow up a bomb and you make an earthquake, hydrofrac and you make an earthquake, etc., but no one I know would say that there is a theory of anthropogenic earthquakes; instead, there is a theory, or study, or something of triggering of seismicity, and the anthropogenic part follows.[227]

Another characterized AGW as a testable hypothesis, much like individual weather forecasts are themselves testable hypotheses:

> Global warming itself is an observed fact, that it is largely caused by rising GHGs is based on testing hypotheses . . . . Future projections are also hypotheses based on theories of climate change validated on modeling of the past climate evolution. I do not know how to put this into your language (which is really not used by practicing scientists to my knowledge).[228]

Another referred to AGW predictions as applied science:

> I think of it as applied science, like other cases where predictions are made on the basis of scientific observations and theory. . . . It is arguably

[227] E-mail from Richard Alley, Evan Pugh Professor of Geosciences, Pa. State Univ., to Karl S. Coplan, Professor of Law, Pace Univ. Sch. of Law (July 9, 2011, 5:42 PM) (on file with author); *see also* E-mail from Robert Frodeman, Dir., Ctr. for the Study of Interdisciplinarity, Professor of Philosophy, Univ. N. Tex. to Kim Kastens, Doherty Senior Research Scientist, Adjunct Professor of Earth & Envt'l. Scis., Columbia Univ. (July 9, 2011, 9:05 AM) (on file with the author) ("Not a lot is at stake in the question; the days of philosophers of science trying to oh so carefully parse the meanings of such terms is long past. But I'd use 'theory.'").

[228] E-mail from Richard Seager, Lamont Research Professor, Lamont Doherty Earth Observatory, Columbia Univ. to Karl S. Coplan, Professor of Law, Pace Univ. Sch. of Law (July 8, 2011, 9:15 PM) (on file with author).

> the usual thing for need and technology to drive science, as for example, telegraphy led to Maxwell's equations, or the commercial need to navigate drove discoveries in astronomy and statistics.[229]

None of the classical epistemological categories seem to fit. As the last e-mail suggests, the AGW prediction actually seems to be closer to a form of applied science or technology than to part of the process of scientific discovery. Certainly there are hypotheses and theories within the global warming modes (i.e., whether clouds reflect heat or trap heat would be competing hypotheses). A large part of the climate science consensus is based on direct observation of temperature and GHG records and established scientific theories and laws. These records and theories include the heat-retention properties of carbon dioxide and other GHGs and the relationship between increased temperature and the water vapor content of gases in the atmosphere. Not even the most vehement climate change skeptics question the validity of these theories and laws (which may themselves be paradigmatic).

Yet, the combination of these paradigmatic laws of heat retention into a complex model incorporating atmospheric dynamics and positive and negative feedbacks from increased evaporation, clouds, aerosols, and the latent heat of the ocean hardly seems to fit the definition of a scientific hypothesis or theory.[230] Certainly, it is not the sort of experimental hypothesis that can lead to experimental verification in the classical sense of the scientific method. One cannot conduct a controlled experiment with two otherwise identical planets and modify only the concentration of carbon dioxide to see what happens.[231]

The prediction of AGW does not seem to fit properly within the Kuhnian scientific paradigm, either. While the current state of climate science may follow some of the conventionalist traits identified by Kuhn, the climate science consensus as a prediction of future climate does not constitute a basic frame for understanding and explaining observed natural phenomena as Ptolemaic astronomy or Newtonian physics did. To the extent that the current scientific consensus

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[229] E-mail from Mark Cane, G. Unger Vetiesen Professor of Earth & Climate Scis., Earth Inst., Columbia Univ. to Karl S. Coplan, Professor of Law, Pace Univ. Sch. of Law (July 9, 2011, 10:16 AM) (on file with author).

[230] For an attempt to place climate science into a framework of scientific epistemology, see Spencer Weart, *Reflections on the Scientific Process, as Seen in Global Warming Studies*, THE DISCOVERY OF GLOBAL WARMING (July 2004), http://www.aip.org/history/climate/reflect.htm (describing climate science in Darwinian evolutionary terms and acknowledging the constructivist elements of climate science).

[231] This is a gross oversimplification of the scientific method as applied to Earth sciences, of course, as many geologic theories (such as the theory of plate tectonics) are not testable by controlled experiment. In the field of geoscience, hypotheses must be proved or disproved by inquiries into the geological record; controlled experiments are impossible. Some aspects of AGW theory are supported by the geologic record—for example, the strong correlation between high carbon dioxide levels and global temperature over the paleo-climate record.

displays some of the conventionalist traits identified by Kuhn for scientific paradigms, scientific understanding of global temperature trends has already undergone something of a Kuhnian transformation. Many leading global climate scientists believed until the latter part of the twentieth century that the Earth was cooling as part of a 21,000 year cycling between ice ages and brief interglacial periods correlated to variations in Earth's orbit around the sun—the so-called Milankovitch cycle.[232] Indeed, Svante Arrhenius, the nineteenth-century Swedish scientist who first attempted to calculate the impact of anthropogenic GHGs on climate, believed that the increase in anthropogenic carbon dioxide might helpfully forestall a coming ice age.[233] More importantly, as detailed by Professor Spencer Weart, a scientific historian, the recognition of possible rapid climate change itself constituted a paradigm shift from the previous strong climate stability paradigm adhered to by climate scientists.[234]

The AGW prediction thus seems to be more like a form of applied science or technology than a component of the elemental processes of scientific discovery. It is a prediction of the practical consequences of a particular technology (primarily fossil fuel combustion), much like an engineering calculation about the maximum weight a bridge will support based on established scientific principles of tensile strength of building materials. The prediction of AGW itself does not seem to fit into the scientific method for discovery of scientific truth any more than the National Weather Service's prediction that tomorrow will be a sunny day can be considered a theory or a hypothesis, even though it may be testable.

This insight does not at all attack the reliability or verisimilitude (in Popperian terms) of AGW predictions. Indeed, as a specific prediction of future events (and one that is counterintuitive and unexpected), it is eminently falsifiable and thus

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[232] *See* Spencer Weart, *Past Climate Cycles: Ice Age Speculations*, THE DISCOVERY OF GLOBAL WARMING (May 2011), http://www.aip.org/history/climate/cycles.htm. Although many leading climatologists agreed in 1972 that the Earth was at the end of an interglacial period and headed for another ice age in a matter of centuries or a few millennia, this view had not reached the level of consensus that current predictions of AGW have reached. *See* William Connolley, *The Global Cooling Myth*, REALCLIMATE (Jan. 14, 2005), http://www.realclimate.org/index.php/archives/2005/01/the-global-cooling-myth/; William Michael Connolley, *Was an Imminent Ice Age Predicted in the '70's? No*, WMCONNOLLEY, http://www.wmconnolley.org.uk/sci/iceage/ (last modified Sept. 30, 2007); *What Were Climate Scientists Predicting in the 1970s?*, SKEPTICAL SCI., http://www.skepticalscience.com/ice-age-predictions-in-1970s-intermediate.htm (last updated Apr. 7, 2011). In fact, many of these predictions of a coming ice age were tempered by the acknowledgement that human burning of fossil fuels and contributing to GHGs might counteract and overwhelm the ice age cycle.

[233] Svante Arrhenius, *On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground*, 41 PHIL. MAG. & J. SCI. 237, 268–69, 274 (1896), *available at* http://www.rsc.org/images/Arrhenius1896_tcm18-173546.pdf.

[234] *See generally* Spencer Weart, *The Discovery of Rapid Climate Change*, PHYSICS TODAY, Aug. 2003, at 30 (detailing how climate scientists came to believe in the possibility of rapid climate change).

satisfies Popper's prerequisites for a valid scientific theory.[235] AGW has also been uniquely subject to enhanced and repeated peer review procedures within the scientific community; not only was the International Panel on Climate Change constituted to review, evaluate, and ultimately validate AGW predictions,[236] but the climate consensus has also been subject to an independent review by the United States' National Academy of Sciences at the request of a presidential administration that was openly hostile to the conclusions of AGW.[237]

Moreover, to the extent that the AGW consensus can be viewed as a form of constructivism within a social subgroup of climate scientists (as opposed to pure empiricism), there are reasons to believe that the conclusions of this restricted scientific marketplace of ideas may have a much more reliable predictive character than the conclusions of the political marketplace of ideas. As noted by Professor Hess for science generally[238] and by Professor Weart in the context of climate science specifically,[239] constructivist group biases are limited in the sciences by cross-disciplinary overlap and peer review by scientists outside of the cohesive social groups. Climate science and its AGW prediction are unique in that they are the product of multiple unrelated scientific disciplines—ranging from astrophysicists to climatologists to geologists to glaciologists to biologists—rather than being the result of one socially cohesive scientific subdiscipline. Professor Hess has noted that this cross-disciplinary review is what adds reliability to the constructivist elements of science.[240]

Although climate scientists undoubtedly suffer from confirmation biases and develop personal interests in supporting the conclusions they have already espoused, unlike the political marketplace of ideas, the scientific marketplace of ideas is specifically organized to treat correspondence with objective reality as a first-order value.[241] Professor Weart identifies this common interest in finding

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[235] KARL R. POPPER, CONJECTURES AND REFUTATIONS 37 (1962) ("[T]he criterion of the scientific status of a theory is its falsifiability . . . .").

[236] *See Organization*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, http://www.ipcc.ch/organization/organization.shtml (last visited July 6, 2012).

[237] COMM. ON THE SCI. OF CLIMATE CHANGE, NAT'L ACADS. OF SCI., CLIMATE CHANGE SCIENCE: AN ANALYSIS OF SOME KEY QUESTIONS 27 (2001), *available at* http://www.nap.edu/openbook.php?record_id=10139&page=27/.

[238] DAVID J. HESS, SCIENCE AND TECHNOLOGY IN A MULTICULTURAL WORLD: THE CULTURAL POLITICS OF FACTS AND ARTIFACTS 3 (1995) (explaining criteria for "distinguish[ing] between true and false knowledge . . . are historically situated in specific disciplines and scientific communities").

[239] SPENCER R. WEART, THE DISCOVERY OF GLOBAL WARMING 143–46 (2008) (stressing the interdisciplinary nature of various coalitions of climate scientists as an indication of the legitimacy of their conclusions).

[240] *See* HESS, *supra* note 216, at 27–29; *cf.* Sheila Jasanoff, *Testing Time for Climate Science*, 328 SCI. 695, 696 (2010) (noting cross-disciplinary nature of IPCC review process enhances the reliability of its conclusions).

[241] One political consultant in the 2004 election cycle referred to journalists disparagingly as members of the "reality-based community." Suskind, *supra* note 162, at 51.

reliable facts and predictions as providing the element of trust that allows scientists in one discipline to accept the climate science conclusions of scientists in other disciplines that form part of the AGW prediction.[242]

Professor Wonnell, a 1980s conservative defender of the marketplace of ideas concept as an effective means of discovering objective truth, also points to scientific communities as a marketplace of ideas in which truth itself is valued, and therefore one in which truth is more likely to be discovered through the free, unrestricted exchange of ideas.[243] Wonnell urges that, even accepting Kuhn's relativistic view of scientific truth, "[u]ncertainty about the ultimate cause of physical regularities must not be allowed to hide the fact that science has immensely increased our ability to predict observations, and accurate predictions are themselves important truths."[244] According to Wonnell, the truths discovered by these truth-valuing subgroups—his marketplace "elites"—will find their way into the political marketplace of ideas, much in the same way that economic markets in classical theory are presumed to discover the correct price for goods even when not all market participants are equally informed.[245]

The climate science consensus does not fit neatly into classical scientific method categories. But it is the product of an epistemological system that values correspondence with objective observation of phenomena as a first-order value and as a falsifiable prediction that also explains observed climate phenomena to date. Thus, it more than satisfies Karl Popper's criterion for a valid scientific theory. The rub is that, although falsifiable, it has not yet been subject to the test of falsification, for that can come only after sufficient time has passed to test the AGW predictions against observed changes in the Earth's climate. For the moment, AGW predictions are in the realm of an expert, consensus opinion based on universally accepted basic scientific principles (i.e., the heat retentive effects of GHGs and the effects of temperature on water vapor content of the atmosphere).

Professor Wonnell suggests that marketplaces of ideas are most effective at discovering truth when truth is in fact a first-order value of the marketplace in question, as in scientific inquiry.[246] This suggests an inquiry into the use of science by business and industry, another marketplace of ideas where accurate predictions have economic consequences.

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[242] Spencer R. Weart, *Climatology as a Profession*, THE DISCOVERY OF GLOBAL WARMING (Mar. 2011), http://www.aip.org/history/climate/climogy.htm#S6/ ("Scientists interested in climate change kept their identification with different disciplines but increasingly found ways to communicate across the boundaries . . . .").

[243] Christopher T. Wonnell, *Truth and the Marketplace of Ideas*, 19 U.C. DAVIS L. REV. 669, 695, 715–20 (1986).

[244] *Id.* at 714.

[245] *See id.* at 691–96, 721–22.

[246] *See id.* at 709–16.

C. Business Truth-Finding

Technology is defined as the application of science for practical purposes.[247] Many industrial and business enterprises rely on science and technology for economic success. Mining and oil companies rely on geology to decide where to drill and to predict the extent of natural resources. Agricultural enterprises may rely on long-term seasonal climate forecasts to make decisions about crops to plant and whether to purchase crop insurance.[248] Insurance companies must make predictions about the general frequency of natural disasters to set rates and establish reserves. Pharmaceutical companies are a special case; ideally, they must develop and test drugs that are in fact medically effective, but their economic success depends at least as much on their ability to convince regulators, doctors, and patients of their medical effectiveness as it depends on actual medical effectiveness. In other words, an ineffective medical treatment that receives the approval of regulators, doctors, and patients can be every bit as economically successful for a pharmaceutical company as one that is in fact effective.[249]

This history of industrial technology has been a history of ever increasing incorporation of scientists and the scientific method into business decision-making. Physicist Charles P. Snow, in his influential 1959 Rede Lecture, *The Two Cultures*, noted that during the industrial revolution in the nineteenth century, incorporation of the scientific method into technological innovation was random and haphazard, while during what he characterized as the scientific revolution of the twentieth century, science has become an integral part of industrial progress and development.[250] Other twentieth century authors similarly marked the incorporation of science into business.[251]

The difference between business truth finding and political truth-finding (and even scientific truth-finding) is that the validity or invalidity of the conclusions reached will have a profound effect on the bottom line. Business truth-finding thus

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[247] *Technology*, OXFORD DICTIONARIES ONLINE http://oxforddictionaries.com/definition/technology?q=technology/ (last visited Aug. 13, 2012).

[248] *See, e.g.*, Kristi G. Jochec et al., *Use of Seasonal Climate Forecasts in Rangeland-Based Livestock Operations in West Texas*, 40 J. APPLIED METEOROLOGY 1629, 1629–30 (2001); David Letson et al., *The Uncertain Value of Perfect ENSO Phase Forecasts: Stochastic Agricultural Prices and Intra-Phase Climatic Variations*, 69 CLIMATIC CHANGE 163, 163 (2005); James W. Mjelde et al., *Dynamic Aspects of the Impact of the Use of Perfect Climate Forecasts in the Corn Belt Region*, 39 J. APPLIED METEOROLOGY 67, 67 (2000).

[249] *See, e.g.*, Amanda J. Dohrman, Note, *Rethinking and Restructuring the FDA Drug Approval Process in Light of the Vioxx Recall*, 31 J. CORP. LAW 187, 212–15 (2005) (containing the critical account of Merck's testing and marketing of the pain medication Vioxx, where an illustration of the disconnect between the drug testing process and the drug approval and marketing process occurs).

[250] *See* C.P. SNOW, THE TWO CULTURES AND THE SCIENTIFIC REVOLUTION 1–2 (1963).

[251] *See, e.g.*, George Otis Smith, *Geology in Partnership with American Industry*, 192 J. FRANKLIN INST. 623, 623–35 (1921).

may have a greater stake in the validity of scientific conclusions than the political, or even scientific, marketplace. In this context, it is worth contrasting the conclusions about global warming reached by the fossil fuel industry, which fears regulation if climate science is accepted,[252] and the insurance industry, which stands to suffer enormous insured losses from sea level rise and increased storms if the climate science conclusions are valid.[253] The insurance industry has been supportive of the scientific consensus, while the fossil fuel industry (unsurprisingly) has taken a more skeptical, wait-and-see approach.[254]

Where the reliability of scientific predictions will have a profound effect on the bottom line, the accuracy of these predictions becomes a first-order value for business decision-makers. They thus place an intrinsic value on truth—at least truth defined in terms of reliability of predictions. In Professor Wonnell's schema, in the marketplace of ideas, science dependent business decision-making is an example of the truth-seeking elites who help guide the marketplace of ideas to more reliable conclusions. This premise supports the idea that business truth-finding where the business entity has an actual stake in the validity of its conclusions may be a more reliable determinant of valid "truths" than the political marketplace. It is telling that in contexts other than climate science, where business decision-making requires accurate prediction of natural conditions, business unhesitatingly incorporates scientists, the scientific method, and even constructivist scientific consensus into its decision-making. Indeed, for those businesses like insurance and agriculture whose bottom lines will depend to some extent on accurate prediction of future climate, this same business truth-seeking model has accepted the scientific consensus.

This conclusion that self-interested economic decision-making incorporates science where it will serve the bottom line bolsters the argument for the superior reliability of science over political consensus when it comes to responding to predictions of future events. Good policy, following the scientific consensus, thus seems to be in direct conflict with the fundamental premise of our system of self-

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[252] Sybille van den Hove et al., *The Oil Industry and Climate Change: Strategies and Ethical Dilemmas*, 2 CLIMATE POL'Y 3, 12–14 (2002) (stating businesses arguing against emmission constraints claim "climate action could lead to more stringent regulatory constraints, and additional command and control regulations are bad for business . . . .").

[253] A.F. Dlugolecki, *Climate Change and the Insurance Industry*, 25 GENEVA PAPERS ON RISK & INS. 582, 582 (2000) ("[T]here is a broader move within the industry to understand and cope with the insurance impact of extreme events, because of the growing exposure to catastrophic losses . . . .").

[254] Compare the position statements of the Geneva Group (an insurance industry group), 2 THE GENEVA ASS'N, THE GENEVA REPORTS: RISK AND INSURANCE RESEARCH (2009), *available at* http://www.genevaassociation.org/PDF/Geneva_Reports/Geneva_report%5B2%5D.pdf (discussing the need to monitor, work to alleviate, and prepare for global warming), with those of the American Petroleum Institute, *Climate Change*, AM. PETROL. INST., http://www.api.org/ehs/climate/index.cfm (last visited July 7, 2012) (discussing how oil and gas companies are working to reduce their emissions by reducing energy consumption and researching renewable energy sources).

government (following the political consensus of the marketplace of ideas). The next section of this Article considers, and rejects, the possibility that a response to the coming climate crisis is so urgent that it would argue for abandoning our commitment to self-government. The last section of this Article makes an alternative proposal to enlist self-interested business decision-making in responsible industries to internalize the future costs of climate change.

V. IS SELF-GOVERNMENT INCONSISTENT WITH AVOIDING GLOBAL CLIMATE CATASTROPHE?

This apparently irreconcilable conflict between the policy conclusions reached by the climate science consensus and the extreme resistance of the United States' marketplace of ideas to adopt these conclusions points to the fundamental question: Is the system of democratic self governance in the United States (and elsewhere) incapable of responding effectively to the catastrophic threats of climate change? If the political marketplace of ideas is structurally incapable of accepting climate science, and if "market failure correction" mechanisms within that structure are incapable of correcting this failure to accept the imperative climate "truths" reached by the (more reliable) methods of the scientific community, then our political system might indeed be incapable of responding effectively to catastrophic climate change.

This conflict poses the question of whether democratic self-governance is relatively more or less protective of environmental values and intergenerational interests threatened by climate change. Certainly, the experience with modern socialist, state capitalist, and communist autocracies does not suggest that nondemocratic forms of government are any more receptive to environmental values. Indeed, nondemocratic governments generally have a much worse environmental record. China's poor environmental record is a continuing example.[255] On the other hand, the 2010 Environmental Performance Index places Cuba, a communist dictatorship, among the top ten nations globally for environmental performance generally,[256] despite the general trend that environmental performance corresponds with national wealth.[257]

Geographer Jared Diamond's study of societal failures due to overexploitation of environmental resources[258] hints that hereditary monarchies may have the best record of preserving long-term environmental values. He points to the Japanese emperorship as a multicentury example of stewardship of forestry resources on a

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[255] China placed 121 out of 163 nations in the 2010 Environmental Performance Rankings Index. JAY EMERSON ET AL., YALE CTR. FOR ENVTL. LAW & POL'Y, 2010 ENVIRONMENTAL PERFORMANCE INDEX 8 (2010), *available at* http://www.ciesin.org/documents/EPI_2010_report.pdf.

[256] *Id.*

[257] *Id. at* 6.

[258] JARED DIAMOND, COLLAPSE: HOW SOCIETIES CHOOSE TO FAIL OR SUCCEED (2005).

resource-limited island nation.[259] Diamond also compares the poor environmental record of Haiti with the more preservation-oriented record of the Dominican Republic, which shares the same Caribbean island as Haiti, as another example of a hereditary autocracy better internalizing long-term environmental values.[260] These examples may suggest that a culture of viewing environmental resources as a family heritage as well as a current economic resource may lead to better long-term management.[261] Other recent commentators have similarly criticized the failures of democracies to confront climate change.[262] Decades ago, Charles P. Snow's 1959 Rede Lecture lamented that scientific illiteracy in western democracies would lead to a governance and technology gap compared to the Soviet sphere of influence.[263]

Climate change may be a special case that does not correspond to general governmental responsiveness to environmental issues. Severe air, water, and land contamination will lead to the sort of organized public response that democratic systems and public choice theory are sensitive to. But climate change—whose severe and unambiguous impacts are distant in the future and to some extent in geography—is less likely to result in the same sort of grassroots organized response. Thus general environmental performance of different forms of government may not correspond to effective response to climate change. The Environmental Performance Index has a separate ranking for climate change response; however, the rankings for climate performance seem generally to bear a strong inverse correlation to per capita GDP. Not surprisingly, wealthier nations have larger carbon footprints.[264] Jared Diamond's suggestion aside, there is no indication that even monarchies, as a very limited class, have performed better in mitigating GHG emissions than more democratically responsible forms of government.[265]

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[259] *Id.* at 294, 300–06.

[260] *Id.* at 329–57.

[261] *Cf.* DANIEL H. COLE, POLLUTION AND PROPERTY: COMPARING OWNERSHIP INSTITUTIONS FOR ENVIRONMENTAL PROTECTION 146 (2002) (arguing that private ownership of cultural resources such as Stonehenge leads to better long-term preservation of such resources).

[262] *See* DAVID W. ORR, DOWN TO THE WIRE: CONFRONTING CLIMATE COLLAPSE 52–53 (2009) (summarizing arguments by Robert Heilbroner, William Ophuls, and James Lovelock that "mounting ecological threats to human survival c[an] be managed only by authoritarian governments").

[263] SNOW, *supra* note 250, at 36–40.

[264] *See* Energy Info. Admin., U.S. Dep't of Energy, *International Energy Statistics*, EIA.GOV, http://www.eia.gov/cfapps/ipdbproject/IEDIndex3.cfm?tid=90&pid=44&aid=8 (last visited July 26, 2012).

[265] The CIA World Factbook lists only three pure monarchies (as opposed to constitutional monarchies) in the world: Oman, Saudi Arabia, and Swaziland. *See The World Factbook*, CENT. INTELLIGENCE AGENCY, https://www.cia.gov/library/publications/the-world-factbook/fields/2128.html?countryName=&countryCode=&regionCode=M/ (last visited July 26, 2012). Saudi Arabia and Oman rank 127 and 125, respectively (out of 132 countries), on the 2012 Environmental Performance Index's climate change factor. Yale

If an effective response to climate change is incompatible with democratic self-governance, and if global climate change is an existential threat to the nation or to civilization itself, then does this threat justify changing our system of government from an open democracy? Would this existential threat warrant irrevocably turning GHG regulation—which would of necessity include substantial economic and energy policymaking—over to a dictatorship of climate scientists? Would it even justify compromising our commitment to open debate, amending First Amendment doctrine in a way that would allow prohibitions against questioning climate science in public debate? Put another way, if given a choice between living in an open, democratic society that is on a near certain path to environmental self-destruction or a closed, autocratic society that might avoid the catastrophe, how many of us would choose the closed society?

Putting aside how this change could even be accomplished other than by force or international economic coercion, the answer to the question of whether the threats associated with climate change justify sacrificing our democratic form of government must be "no." There is no demonstrated superiority of closed governmental systems to respond any more effectively to environmental concerns generally or climate change specifically. Furthermore, it would prove difficult to reverse such a change in governments should the experiment fail (i.e., an autocratic government that evolves into a system that acts for self-perpetuation and the enrichment of insiders rather than for the actual elimination of the threat of climate change). Like Oliver Wendell Holmes, who was willing to accept the judgment of the political marketplace of ideas even if that political marketplace ultimately chose a socialist form of government he found anathema,[266] our collective commitment to self-government is and should be stronger than a commitment, based on scientific consensus, to respond aggressively to the coming climate catastrophe. This is not necessarily because democratic self-government based on a free and open marketplace of ideas can be counted on to respond effectively to climate change—as this Article demonstrates, it cannot. Rather, self-governing

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Ctr. for Envtl. L. & Pol'y et al., *Country Profile: Saudi Arabia*, 2012 ENVTL. PERFORMANCE INDEX, http://epi.yale.edu/dataexplorer/countryprofiles?iso=099SAU (last visited Sept. 23, 2012); Yale Ctr. for Envtl. L. & Pol'y et al., *Country Profile: Oman*, 2012 ENVTL. PERFORMANCE INDEX, http://epi.yale.edu/dataexplorer/countryprofiles?iso=088OMN (last visited Sept. 23, 2012). (Swaziland was not ranked in the 2012 rankings, and the United States ranked 121.) Yale Ctr. for Envtl. L. & Pol'y et al., *Country Profile: United States of America*, 2012 ENVTL. PERFORMANCE INDEX, http://epi.yale.edu/dataexplorer/countryprofiles?iso=099USA (last visited Sept. 23, 2012). The scores of these monarchies are strongly correlated with per capita GDP, as with climate response rankings generally. *See* Yale Ctr. for Envtl. L. & Pol'y et al., *Country Profile: Saudi Arabia*, 2012 ENVTL. PERFORMANCE INDEX, http://epi.yale.edu/dataexplorer/countryprofiles?iso=099SAU (last visited Sept. 23, 2012); Yale Ctr. for Envtl. L. & Pol'y et al., *Country Profile: Oman*, 2012 ENVTL. PERFORMANCE INDEX, http://epi.yale.edu/dataexplorer/countryprofiles?iso=088OMN (last visited Sept. 23, 2012).

[266] Gitlow v. United States, 268 U.S. 652, 672–73 (1925) (Holmes, J., dissenting).

democracies generally have a better track record of improving human welfare and environmental qualities than autocratic systems.[267]

VI. ACCOMMODATING CLIMATE RESPONSE TO THE REALITY OF THE MARKETPLACE OF IDEAS

The discussion so far establishes that popularly enacted legislation regulating GHG emissions of the severity necessary to avoid catastrophic climate change prospectively has about a 0% chance of happening as long as the United States remains an open, democratic society. Even if the current form of government were somehow replaced, the probability that the new government would successfully address GHG emissions is low.[268] The necessary actions will require substantial disruption of existing economic and energy structures and changes in the way that Americans live and work. The polity will not accept such changes without being convinced that a climate catastrophe is real, certain, human caused, and imminent. Such a conclusion by the polity is extremely unlikely given the strong cognitive biases against reaching such a conclusion—at least until undeniable external events force a paradigm shift in the way people think about their world.

Attempts to reframe climate response to be more attractive to conservatives and skeptics have likewise met with failure. The cap-and-trade approach to GHG reductions that formed the basis of the ultimately failed Waxman-Markey legislation—the American Clean Energy Security Act of 2009 (ACES)[269]—was the environmental community's attempt to appeal to conservative (individualistic/hierarchical) members of Congress. Those promoting the ACES hoped that by enlisting economic markets to perform an efficient allocation of GHG reductions, and at the same time reinforcing existing economic hierarchies by creating opportunities for trading profits in the financial industry, the legislation would gain conservative support.[270] Neither environmentalists nor economists were wholehearted supporters of cap-and-trade, with the environmental community preferring direct regulation and renewable energy subsidies[271] and economists

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[267] This is not to say that our political marketplace cannot be dramatically improved without abandoning the marketplace of ideas. Certainly effective campaign finance reform—perhaps through a constitutional amendment stripping business corporations of speech rights and removing First Amendment protections for monetary campaign contributions—would improve the neutrality of the debate, thereby removing the substantially self-interested voice of the fossil fuel industry.

[268] Legislation to respond to catastrophic climate change after it has happened may be likely; however, it will then be too late.

[269] H.R. 2454, 111th Cong. (2009).

[270] Dan Kahan, in his cultural cognition article, advocated cap-and-trade policies as a way to reframe climate policy to enlist conservative support. *See* Kahan & Braman, *supra* note 66, at 167.

[271] ROBERT D. ATKINSON & DARRENE HACKLER, THE INFO. TECH. & INNOVATION FOUND., ECONOMIC DOCTRINES AND APPROACHES TO CLIMATE CHANGE POLICY (2010) (stating some environmentalists tend to prefer "a more direct response such as setting a

preferring carbon taxes[272] to a cap-and-trade scheme. Rather, cap-and-trade was a compromise approach designed to appeal to market-oriented conservatives.

The failure of the deeply flawed ACES even to come to a vote in the Senate[273] and the successful rebranding of cap-and-trade regulation by Republicans as a "job-killing energy tax"[274] indicate the limits of reframing the climate debate. Reframing could not overcome cultural cognition. By the end of the day, cap-and-trade legislation was despised by progressives who disliked cap-and-trade for all the reasons it was supposed to appeal to conservatives, and conservatives were every bit as opposed to the legislation as their liberal counterparts.

Is there anything that can be done, then, within the United States' marketplace of ideas to address climate change and move our energy economy away from fossil fuels before it is too late? This author does not pretend to know the answer. But this Article will make a modest suggestion: legislation that is based on the uncertainty of climate change, which is the political truth of the marketplace of ideas, should fare better politically than legislation or regulation based on the near certainty of climate change, which is the scientific truth. As hard as it is for climate advocates to swallow, climate legislation should be based on the premise that climate change is fairly debatable—not because it *is*, but because the United States' polity thinks it is. In essence, we as a society are placing a big bet on whether climate scientists are correct.[275] It might be an appealing proposition to a public confused about what to believe about climate to demand that those industries that benefit most economically from the lack of response—for example, the fossil fuel–based industries—be required to pay up if the great global gamble loses.

What this Article proposes, then, is a sort of prospective retroactive liability legislation providing for compensatory damages for injuries caused by rising sea levels and climate change within the United States, to be triggered by a set amount of increase in the sea level and change in the global temperature by the year 2050. These triggers would be based on the scientific consensus projections for global

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limit on GHG emissions through emission caps . . . , and subsidizing current generators of renewable energy").

[272] *See Cap and Trade, with Handouts and Loopholes*, ECONOMIST (May 21, 2009), http://www.economist.com/node/13702826/ (describing a tax on carbon as "[t]he most straightforward and efficient approach to reducing carbon emissions," and referring to cap-and-trade schemes as "more cumbersome").

[273] *See H.R. 2454: American Clean Energy and Security Act of 2009*, GOVTRACK.US, http://www.govtrack.us/congress/bill.xpd?bill=h111-2454/ (last visited July 11, 2012).

[274] *See* Mike Allen, *Gulf Fuels New Energy-Bill Push*, POLITICO (Jun. 14, 2010, 8:51 AM), http://www.politico.com/news/stories/0610/38488.html; Steve Everley & David Roberts, *Cap-and-Trade: A Salon Debate*, SALON.COM (Jun. 23, 2010, 9:25, PM), http://www.salon.com/2010/06/23/cap_and_trade_debate_final_day/print/; *Climate Bill Targets Hot Tubs and Light Bulbs*, WASH. TIMES, June 26, 2009, at A1.

[275] *See generally* JOHN CHARLES KUNICH, BETTING THE EARTH: HOW WE CAN STILL WIN THE BIGGEST GAMBLE OF ALL TIME (2010) (comparing the choice of whether to implement more environmental protections with gambling where the fate of the Earth is at stake).

climate change under a "business as usual," worst-case scenario—somewhere near the high end of the 5cm–32cm sea level rise and the 0.8°C–2.6°C temperature change estimated for 2050 by the IPCC Working Group II.[276] In other words, the fossil fuel industry would be made insurers of last resort should the worst-case scenario happen. Liability would be modeled loosely on CERCLA (also commonly known as Superfund),[277] which effectively adopted the "polluter pays" principle to effect the internalization of toxic waste externalities by industry.[278] Like CERCLA, liability should be joint and several, though some allocation among fossil fuel industries might be appropriate given their relative contribution to climate change—that is, coal is worse than oil, which is worse than natural gas. Like CERCLA, liability would be strict, and defenses would be limited. Unlike CERCLA, private compensatory damages would be available, as would natural resources damages and response costs. Also unlike CERCLA, the prospect of liability would be established long before the environmental crisis manifests itself.

Climate advocates are already trying to establish this sort of liability principle through common law litigation efforts, usually based on public nuisance theories. These actions have had limited success so far. *Comer v. Murphy Oil USA*,[279] seeking recovery for Hurricane Katrina damages, was dismissed by the district court on standing and political question grounds. It was initially reinstated by a Fifth Circuit panel, whose decision was then vacated when a petition for rehearing en banc was granted.[280] Ultimately, so many Fifth Circuit judges recused themselves from participating in the rehearing en banc that a quorum was lacking, so the panel decision remains vacated and the district court's dismissal stands.[281] The other prominent public nuisance litigation, *American Electric Power v. Connecticut*,[282] brought on federal interstate common law nuisance grounds, was similarly dismissed at the district court level and reinstated by the Second Circuit. The Supreme Court reversed and remanded the Second Circuit decision, holding that the EPA's authority to regulate GHG emissions displaces the federal common

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[276] WORKING GRP. II, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2001: IMPACTS, ADAPTATION AND VULNERABILITY 27 (James J. McCarthy et al. eds., 2001), *available at* http://www.ipcc.ch/ipccreports/tar/wg2/index.htm.

[277] 42 U.S.C. §§ 9601–9675 (2006).

[278] *See* Thomas W. Church & Robert T. Nakamura, *Beyond Superfund: Hazardous Waste Cleanup in Europe and the United States*, 7 GEO. INT'L ENVTL. L. REV. 15, 31–32 (1994).

[279] Comer v. Murphy Oil USA, 585 F.3d 855 (5th Cir. 2009), *reh'g granted*, (*Comer II*), 598 F.3d 208 (5th Cir.), *appeal dismissed for lack of a quorum*, (*Comer III*), 607 F.3d 1049 (5th Cir. 2010).

[280] *Id.* at 860; *Comer II*, 598 F.3d at 209.

[281] *Comer III*, 607 F.3d at 1053–55; *see also* Alex B. Rothenberg, *Decision by Recusal:* Comer v. Murphy Oil USA *Lets Naysayers and Disqualified Judges in the Fifth Circuit Determine the Outcome of a Case Without a Hearing*, 85 TUL. L. REV. 1131, 1131–32 (2011).

[282] Am. Elec. Power v. Connecticut, 131 S. Ct. 2527 (2011).

law of nuisance.[283] The Supreme Court left open the possibility of state law–based public nuisance claims, presumably based on the common law of the emitting state.[284] At this point in the evolution of climate change, proof of causation for any particular weather event remains extremely problematic.

Federal legislation establishing future liability would provide the certainty that the current attempts at common law remedies lack. Ideally, it would appeal to climate change agnostics who are not ready to believe that climate change is happening, but may be receptive to the concept that if a climate disaster happens and was accurately predicted by the climate scientists, then the industries responsible for the disaster should be held liable. It draws on concepts of scientific epistemology by making climate change liability turn on the verification of climate science by future data observations. By making fossil fuel industries effectively insurers of first resort for the impacts of climate change, these industries would have strong incentives to prevent climate disaster rather than deny its likelihood. As discussed above, the industrial search for scientific truth works best when industry has an economic interest in acting on valid scientific principles (as is true of resource extraction industries and geology as well as the insurance industry and climate change), rather than simply winning the political or administrative battle of ideas (as is true of the fossil fuel industry with respect to climate change and the pharmaceutical industry with respect to drug approvals). And while compensatory liability is by its nature retrospective, the cost internalization function of future liability should have immediate impacts that will raise the relative costs of fossil fuels to reflect these future damages. For example, the prospect of future liability will increase capital costs for such companies.[285] The SEC disclosure and accounting principles might require potentially liable industries to set aside substantial reserves for climate damages as the reality of catastrophic climate change becomes more apparent.[286]

There are some obvious philosophical and practical objections to this approach.

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[283] *Am. Elec. Power*, 131 S. Ct. at 2537–39. For a discussion of the EPA's regulatory authority, see Massachusetts v. EPA, 549 U.S. 497, 532–35 (2007).

[284] *Id.* at 2540; *see also* Int'l Paper Co. v. Ouellette, 479 U.S. 481, 497–500 (1987) (holding that in the case of interstate water pollution, common law public nuisance principles of the source state apply).

[285] *See* Tom Zeller Jr., *Banks Grow Wary of Environmental Risks*, N.Y. TIMES, Aug. 31, 2010, at A1 (N.Y. ed.), *available at* http://www.nytimes.com/2010/08/31/business/energy-environment/31coal.html?_r=1/.

[286] *See* Commission Guidance Regarding Disclosure Related to Climate Change, 75 Fed. Reg. 6290, 6296 (Feb. 8, 2010) (to be codified at 17 C.F.R. pts. 211, 231 & 241). *See generally* Jason C. Jones, *Environmental Disclosure: Toward an Investor Based Corporate Environmentalism Norm?*, 20 B.U. PUB. INT. L.J. 207 (2011) (discussing the need to inform shareholders and investors of corporate environmental impacts so that shareholders are empowered to demand responsible environmental practices).

A. Industry Lobbyists Will Defeat Such Legislation

One practical objection is that fossil fuel industry lobbyists will effectively prevent enactment of climate compensation and liability legislation just as they have blocked enactment of cap-and-trade legislation. This is a real problem; however, contingent future liability legislation at least weakens the industry position by removing the argument that climate change is not happening or is a liberal hoax of some sort. If climate change does not happen, liability would never kick in.

B. Contingent Liability Fails to Address the Arguments of Skeptics Who Agree that the Global Climate Is Changing, but Deny that Anthropogenic GHG Emissions Are the Cause

Another objection is that, while contingent future liability blunts the objections of those climate skeptics who argue that the global climate is not in fact warming significantly, it does not rebut those who accept that the climate is changing, but believe the change is natural rather than anthropogenic. In fact, the House legislation seeking to reverse EPA Administrator Jackson's endangerment finding under the Clean Air Act itself includes a recitation that "there is established scientific concern over warming of the climate system based upon evidence from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level,"[287] but prominently omits any acknowledgement that human beings are responsible for climate change. The logical and rhetorical answer to this objection is that the trigger for liability would be at a level of temperature increase that is beyond any natural variability in the paleoclimate record over the past 20,000 years, including the so-called medieval warm period that climate skeptics rely on to argue that observed climate change is within natural variability. The premise of this Article is that logic and rhetoric do not carry the day in the marketplace of ideas, so this objection has some force. The argument that "climate may be changing, but it cannot possibly be our fault so no-one should be liable for damages" will continue to have cognitive appeal. One solution might be to further condition liability on a factual finding, based on expert testimony after a jury trial that the severe climate change was in fact caused by anthropogenic GHG emissions.

C. Fossil Fuel Industry Companies Will Avoid Liability by Distributing Profits Before the Liability Trigger Event and Declaring Insolvency at the Time Compensation Becomes Due

This is a real practical problem with a prospective retroactive liability proposal. One of the largest problems for CERCLA liability has been the problem

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[287] H.R. REP. NO. 112-50 § 4 (2011), *available at* http://www.gpo.gov/fdsys/pkg/BILLS-112hr910rh/pdf/BILLS-112hr910rh.pdf.

of "orphan sites"—contaminated sites for which all potentially responsible parties are insolvent, out of business, or both.[288] The problem would only be greater for industries that have an opportunity to plan for insolvency before the liability trigger occurs. The United States could at least partially address this problem by making climate liability nondischargeable in bankruptcy and by including aggressive claw-back provisions in the climate liability legislation. This could perhaps be achieved by allowing plaintiffs to recover all distributions to shareholders and executive compensation up to twenty years prior to the liability trigger. While many assets will still be hidden from recovery, the current cost internalization of such a claw-back provision (because of its effects on capital markets)[289] would be beneficial.

D. Future Climate Liability Would Be Too Little, Too Late, and Will Not Prevent Climate Disaster

This proposal would not be likely, by itself, to prevent catastrophic climate change or even fully mitigate the United States' contribution. But the hope is that the current cost-internalization effects of a certain future liability would raise the relative costs of fossil fuels more fully to reflect their true future environmental costs. In this way, it would operate similarly to cap-and-trade or carbon taxes, but less directly. The prospect of future liability would also fully enlist industries that are currently opposed to efforts to avoid catastrophic climate change and to mitigate damages. This change in culture might also change the terms of the debate and make more aggressive climate change prevention measures more likely—that is, by giving a prominent industry a financial stake in the scientific validity of climate science and not just a stake in preventing the political acceptance of climate science. Thus, ultimate popular acceptance of climate science may be more likely (drawing on Wonnell's thesis that truth-seeking elites help spread truth throughout the marketplace of ideas). In addition, climate liability legislation would be compatible with other legislative efforts to increase alternative energy sources and promote renewable energy.

CONCLUSION

The climate science consensus, which demands immediate action to avoid catastrophic climate change, faces substantial barriers to acceptance in the United States' political marketplace of ideas. Scientific truth-finding and political truth-finding constitute competing epistemological systems, and there is every reason to prefer the scientific method (even with its constructivist flaws) to political truth-

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[288] *See* Kenneth K. Kilbert, *Neither Joint nor Several: Orphan Shares and Private CERCLA Actions*, 41 ENVTL. L. 1045, 1067–69 (2011).

[289] *But see* ANDREI SCHLEIFER, INEFFICIENT MARKETS: AN INTRODUCTION TO BEHAVIORAL FINANCE 10–23, 28–52 (2000) (arguing capital markets are not efficient, particularly when it comes to long-term costs).

finding when it comes to making predictions of future conditions that demand current policy responses. Yet, this political marketplace of ideas occupies a foundational place both in First Amendment doctrine and in the conception of the American system of self-government. This foundational role of the political marketplace of ideas precludes effective modification of the marketplace of ideas to promote acceptance of the climate science conclusion either through regulation, administrative bypass of the political debate, or direct government participation in the debate. Realistic legislative response to this paradox of political truth contrary to scientific truth must take the political truth into account. Such a realistic legislative response might include prospective retroactive liability, which would depend on a climate trigger that constitutes verification of current scientific predictions of climate change. Although this trigger might not happen for decades, the certainty of liability would have current cost-internalization effects that would help mitigate climate change and increase the scope of the truth-seeking community.