

Expert Advocacy:
The Public Address of Scientists in a Post-Truth Society

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Abstract

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In this dissertation, using classical and contemporary rhetorical theory I examine the public advocacy efforts of American scientists as they respond to perceived threats by elected officials on the integrity of science and its role in policymaking. Through analyzing texts including presidential addresses by the American Association for the Advancement of Science, open letters by the Union of Concerned Scientists, Stand Up for Science rallies, and the evolution of the March for Science mission statement, I explicate the diverse ways in which scientists understand the relationship and obligation of scientists and science to society. The epistemic positionality of science and scientists manifests differently in the cases analyzed, and coincides with a wide range of rhetorical strategies built upon those differences, from economic prosperity, American exceptionalism and patriotism, and social and environmental justice framing, to war metaphors, parrhesia, eunoia, and transcendent and constitutive rhetorics. The different conceptualizations of the scientist and citizen subjectivities have shown a trend toward integrstion that demonstrates the emergence of what I call the scientist-citizen. As scientists increasingly reflect on their professional and social obligations in response to contemporary sociopolitical tensions, they find a rightful place not only.

TABLE OF CONTENTS

List of Figures	vi
Acknowledgments.....	vii
Chapter 1. Introduction	1
1.1 Science and Society	10
1.2 Scientific Ethos	20
1.3 Scientists and Public Advocacy	25
1.4 Chapter Previews	32
Chapter 2. In Service of Society: Self-Reflective Discourse in a Scientific Community.....	37
2.1 Opening Remarks.....	46
2.2 Presidential Address: Science and Technology for the Public Good	53
2.3 Speaking Up for Science.....	59
Chapter 3. Letters to Power: Authority Appeals by a Nonprofit Science Organization.....	62
3.1 Letters to Power	69
3.2 Scientist Statement on Restoring Scientific Integrity to Federal Policy Making, 2004	70
3.3 Reception Analysis	80
3.4 Science and the Public Interest, 2016	89
3.5 2016 Reception Texts	94
3.6 Power in Letters?	98
Chapter 4. Stand Up for Science: At the Intersection of Science and Society	101
4.1 Stand Up for Science San Francisco.....	103
4.2 Stand Up for Science Boston	110
4.3 Scientists on the Frontline.....	115

Chapter 5. What do we Want? Evidence-Based Claims! When do we Want it? After Peer Review!.....	121
5.1 The Scientists’ March on Washington.....	124
5.2 March for Science.....	131
Chapter 6. Conclusion.....	139
6.1 Lessons Learned.....	140
6.2 Research Questions Answered.....	149
6.3 Where Do We Go From Here?	153
Appendix A: Event Timeline.....	161
Appendix B: Transcription of Stand Up for Science Rally at AGU, December 13, 2016	162
References.....	184

List of Figures

Figure 1. Scientists' March on Washington Logo.....	127
Figure 2. March for Science Logo.....	132

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Chapter 1: INTRODUCTION

“Scientists must learn to communicate with the public, be willing to do so and indeed consider it their duty to do so.”

The Royal Society, 1985¹

The 2017 March for Science was a protest march unprecedented in terms of the scale and breadth of scientists and science supporters involved.² Perhaps more noteworthy is that it happened despite scientists typically being reluctant to engage in political protests for fear of their work being perceived as partisan.³ Institutional norms and standards within the enterprise of science frequently discourage this form of public interface, assuming that scientists’ ethos resides in a

¹ The Royal Society, “The Public Understanding of Science,” (1985): 6. Retrieved from https://royalsociety.org/~media/Royal_Society_Content/policy/publications/1985/10700.pdf.

² Chris Mooney, “Historians Say the March for Science Is ‘Pretty Unprecedented,’” *The Washington Post* (April 22, 2017) https://www.washingtonpost.com/news/energy-environment/wp/2017/04/22/historians-say-the-march-for-science-is-pretty-unprecedented/?utm_term=.03f0258bd8fd.

³ Sarah Kaplan, “Science Societies Have Long Shunned Politics. But Now They’re Ready to March,” *The Washington Post* (February 24, 2017) https://www.washingtonpost.com/news/speaking-of-science/wp/2017/02/24/science-societies-have-long-shunned-politics-but-now-theyre-ready-to-march/?utm_term=.11ace94c4330.

process rather than in an ethic.⁴ However, some exigencies seem to call for scientists to speak out in public debates. For political issues that possess scientific complexity, those who know the most about that issue may feel a calling to join in public deliberation, but self-censor for fear of their work losing credibility and potential impact. Given the tension between public responsibility and professional norms, much can be learned from a study of scientists engaged in public political action about how the dual subjectivities of the concerned citizen and professional scientist are maintained, redefined, and merged. Scientists deploy alternative articulations of duty and justifications for public engagement to overcome perceptions of political partisanship. They reconstitute the scientist's ethos, making appeals to a range of rhetoric techniques and forms including didacticism, transcendence, parrhesia, display of eunoia, and framing. The following study tracks these articulations and appeals through increasingly direct channels in the context of the inauguration of the Donald Trump presidency, between December 2016 and April 2017.

In a tweet on November 6, 2012, Donald Trump said: "the concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive."⁵ He additionally called global warming a hoax in tweets on January 25, 2014, and twice on January 29, 2014.⁶ On January 18th, 2016, he clarified this position on *Fox & Friends*, saying:

⁴ Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1962).

⁵ Louis Jacobson, "Yes, Donald Trump Did Call Climate Change a Chinese Hoax," *Politifact* (June 3, 2016) <http://www.politifact.com/truth-o-meter/statements/2016/jun/03/hillary-clinton/yes-donald-trump-did-call-climate-change-chinese-h/>.

⁶ Jacobson, Yes, Donald Trump.

Well, I think the climate change is just a very, very expensive form of tax. A lot of people are making a lot of money. I know much about climate change. I'd be – received environmental awards. And I often joke that this is done for the benefit of China. Obviously, I joke. But this is done for the benefit of China, because China does not do anything to help climate change. They burn everything you could burn; they couldn't care less.⁷

After the election, Donald Trump suggested that he had an open mind on climate change science and addressing the issue. In a November 22, 2016 interview with *The New York Times*, he said “I think there is some connectivity. There is some, something. It depends on how much. It also depends on how much it's going to cost our companies. You have to understand, our companies are noncompetitive right now.”⁸ Early comments like these and the appointment of agency administrators who dismiss or downplay the settled science of climate change have been the impetus for concern by scientists and their allies about the funding of climate-related research projects and the declining influence of science on public policy.⁹

⁷ *Supra*, see note 6.

⁸ Arthur Sulzberger, “Donald Trump’s New York Times Interview: Full transcript,” *The New York Times* (November 23, 2016) https://www.nytimes.com/2016/11/23/us/politics/trump-new-york-times-interview-transcript.html?_r=0.

⁹ Those appointments include Steve Bannon, Senior Advisor; Ben Carson, Housing Secretary; Michael Flynn, National Security Advisor; Rick Perry, Secretary of Energy; Mike Pompeo, Director of the CIA; Reince Preibus, Chief of Staff; Scott Pruitt, Secretary of the EPA;

These concerns among members of the American scientific community turned out to have merit. The Trump administration has proposed significant cuts to U.S. science and environmental agencies' budgets. President Trump's 2020 budget includes 9% cuts in non-defense discretionary spending which would dramatically affect science research. The EPA is facing a 31% budget cut that would end global climate change research programs. The National Oceanographic and Atmospheric Administration (NOAA) is also facing a 17% budget reduction that will cut into the effectiveness of weather reporting and monitoring of natural disasters and curtail studies of climate change. The National Institute of Standards and Technology faces a 30% cut, the Department of Energy a 15% cut, and the National Science Foundation and National Institutes of Health would both lose 12% of their funding.¹⁰ In addition to these budget cuts, Trump intends to pull out of the Paris climate accord¹¹ and deregulate greenhouse gas

Jeff Sessions, Attorney General; Rex Tillerson, Secretary of State; and Ryan Zinke, Interior Secretary.

¹⁰ Phil Dzikiy, "More Trump Budget Cuts: EPA and NOAA, Elimination of ARPA-E Advanced Energy Agency," Electrek (March 11, 2019) <https://electrek.co/2019/03/11/trump-budget-epa-cuts/>; Andrea Widener & Cheryl Hogue, "Science Slashed in Trump's 2020 Budget Proposal," *Chemical and Engineering News* (March 13, 2019) https://cen.acs.org/policy/research-funding/Science-slashed-Trumps-2020-budget/97/i11?fbclid=IwAR0Ad1zG9DzDUwGc44-c70-eqtVXuYqfOjXdRYgAfSuHFrA04_o6n3YHSsk.

¹¹ According to Article 28 of the Paris Agreement, the withdrawal process from the Agreement can begin four years after it came into effect. The earliest date that the United States could withdraw is November 4, 2020, one day after the 2020 Presidential election.

emissions. His 2019 Earth Day speech captures the essence of these moves, nodding to historic economic and job growth but failing to mention climate change.¹²

Ten years ago, political scientists Steinar Andresen & Jon Birger Skjærseth found that 1) scientific research is generally recognized as a significant supplier of relevant knowledge, 2) governments rarely explicitly dispute what the scientific community considers to be ‘consensual knowledge,’ and 3) faced with broad consensus among competent experts on the description and diagnosis of a (severe) environmental problem, governments most often do, in fact, take some kind of collective action.¹³ Current events suggest that in the U.S., we are seeing the rare exception to these general rules. The budget cuts outlined above speak to the administration’s failure to see the value of some strains of scientific research. Governments may be reluctant to challenge scientific conclusions openly, but moves to exploit uncertainty or favor biased interpretations are frequent, particularly in recent years.¹⁴ The U.S. government is taking collective action, but all indications suggest that these actions run counter to the warnings and policy prescriptions from the scientific community.

¹² Ari Natter, “Trump Ignores Climate Change in Earth Day Statement” *Bloomberg* (April 22, 2019) <https://www.bloomberg.com/news/articles/2019-04-22/trump-earth-day-message-touts-job-gains-ignores-climate-change?srnd=good-business>.

¹³ Steinar Andresen and Jon Birger Skjærseth, “Science and Technology,” in *The Oxford Handbook of International Environmental Law*, ed. Daniel Bodansky, Jutta Brunnée, and Ellen Hey (Oxford, UK: Oxford University Press, 2007): 182-202.

¹⁴ Andresen and Skjærseth, Science and Technology.

The political culture in which perceived attacks on science reside has been described as ‘post-truth’ politics. This 2016 Oxford Dictionaries Word of the Year refers to the belief that circumstances exist in which objective facts are devalued, and personal beliefs are more influential drivers of public opinion.¹⁵ It has been considered a product of populism, and the postmodern academic discrediting “the truth” in favor of relativized and pluralistic “truths.”¹⁶ In the political realm, post-truth politics developed most visibly with the rise of spin doctors performing government public relations, a trend that extends well beyond the so-called partisan war on science, or the geographic confines of the United States.¹⁷ New communication technologies and a less trustful public have aided in the pervasiveness of these developments.¹⁸ The term has been popularized with the Trump presidency in response to his many assertions of questionable veracity.¹⁹ His impressive Twitter following makes him a gatekeeper of sorts, enabling him to communicate directly to his followers and bypass the fact-checking that is

¹⁵ Alison Flood, ‘Post-Truth’ Named Word of the Year by Oxford Dictionaries, *The Guardian* (November 15, 2016) <https://www.theguardian.com/books/2016/nov/15/post-truth-named-word-of-the-year-by-oxford-dictionaries>.

¹⁶ Andrew Calcutt, “The Surprising Origins of ‘Post-Truth’ – And How It Was Spawned by the Liberal Left,” *The Conversation* (November 18, 2016) <https://theconversation.com/the-surprising-origins-of-post-truth-and-how-it-was-spawned-by-the-liberal-left-68929>.

¹⁷ Calcutt, *The Surprising Origins*.

¹⁸ *Ibid.*

¹⁹ “Donald Trump’s File,” *Politifact*, <https://www.politifact.com/personalities/donald-trump/>.

expected of news organizations. This and the opportunity provided by social media for the public to consume information that reflects their values makes the public less willing to accept facts that contradict their preferred beliefs.²⁰

With words and actions against climate science coming from places of political power, it is little wonder that polls of the American public do not reflect an acceptance of the overwhelming agreement among climate scientists that climate change is happening and is predominately anthropogenic in origin. In a nationally representative survey, only 48% of U.S. adults reported believing climate change to be due to human activity.²¹ Only 27% accurately indicated that almost all climate scientists agree that human behavior is mostly responsible for global climate change.²² Despite this low estimate of the scientific consensus, Americans are still most likely to trust information about the causes of climate change from climate scientists, over news media, energy industry leaders, and elected officials.²³ Knowing this, it is tempting to

²⁰ Jonathan Freedland, “Post-Truth Politicians Such as Donald Trump and Boris Johnson Are No Joke,” *The Guardian* (May 13, 2016) <https://www.theguardian.com/commentisfree/2016/may/13/boris-johnson-donald-trump-post-truth-politician>; Stephan Lewandowsky, “Beyond Misinformation: Understanding and Coping with the “Post-Truth” Era,” *Journal of Applied Research in Memory and Cognition* 6, no. 4 (December 2017): 353-369.

²¹ Cary Funk and Brian Kennedy, “The Politics of Climate,” *Pew Research Center* (October 4, 2016) http://assets.pewresearch.org/wp-content/uploads/sites/14/2016/10/10092738/PS_2016.10.04_Politics-of-Climate_FINAL.pdf.

²² Funk and Kennedy, *The Politics of Climate*.

²³ *Ibid.*

conclude that scientists are just not doing a very good job of communicating the scientific consensus to the American public. However, a closer look at the data suggests that something more complicated is going on here.

These findings actively follow political party lines. Although nearly half of U.S. adults believe climate change to be human-made, only 15% of conservative Republicans reported as such. This divide has grown from a 25% difference between Republicans and Democrats regarding belief in anthropogenic climate change in 2006 to a 46% difference in 2016.²⁴ These results are the product of Democrats trending slowly toward increased acceptance of anthropogenic climate change and Republicans slowly trending toward its rejection. Concerning the scientific consensus, 70% of liberal Democrats reported that almost all climate scientists agree compared to 16% of conservative Republicans. Whereas 70% of liberal Democrats trusted climate scientists a lot, only 15% of conservative Republicans expressed such trust.

Perhaps most interestingly, liberal Democrats were most likely to believe that the best available scientific evidence influences climate research and secondarily by a concern for the public's best interests whereas conservative Republicans indicate the most significant influences to be scientists' desire to advance their careers and their political leanings.²⁵ These findings suggest that identification with a political party is a powerful interpretive filter and that the issue of climate change is politically charged. If the motives of climate scientists are believed to be self-serving, then trust in them will diminish, and if trust is diminished then claims of scientist unity around a scientific consensus on climate change will be met with skepticism. This initial

²⁴ *Supra*, see note 21.

²⁵ *Supra*, see note 21.

distrust of climate science and scientists makes it hard for scientists and their supporters not to seem partisan when they talk about the facts regarding climate change. For scientists, the scientific norm of avoiding partisan politics is complicated in this set of circumstances as their seemingly neutral public communications are interpreted as having a political bias.

Awareness of the scientific consensus correlates with an acceptance of climate change.²⁶ Knowledge of the consensus, though, is not merely a matter of exposure to scientific information. Perceptions of climate scientists as credible experts and of the factors that influence their research findings are split along political party lines. Conservatives, then, predominately reject the scientific consensus because they do not perceive most climate scientists who claim there is a consensus to accurately represent the data. Additionally, the spread of misinformation is shown to cancel out the effect of accurate scientific information.²⁷ It is at this impasse, where scientists have reached and reported overwhelming consensus about the origins and threats of climate change yet have largely failed to persuade large segments of the public and policymakers, that this study begins.

²⁶ John Cook, “Consensus Confirmed: Over 90% of Climate Scientists Believe We’re Causing Global Warming,” *The Conversation* (April 14, 2016) <https://theconversation.com/consensus-confirmed-over-90-of-climate-scientists-believe-were-causing-global-warming-57654>.

²⁷ Aaron M. McCright, Meghan Charters, Katherine Dentzman, and Thomas Dietz, “Examining the Effectiveness of Climate Change Frames in the Face of a Climate Change Denial Counter-Frame,” *Topics in Cognitive Science* 8 (2015): 76-97.

1.1 Science and Society

Scientists are frustrated as they see their work misrepresented and politicized. What has resulted is a double-bind experienced by scientists as they negotiate professional Mertonian norms, particularly disinterestedness, with moral obligations as concerned citizens and early-warners. Where once scientific arguments were used with little hesitation to legitimize political regimes and policy agendas, now scientific consensus is disregarded if it is politically or ideologically inconvenient.²⁸

Science advocacy organizations have emerged as forums for the discussion of professional ethics and the moral implications of their work, while also acting as platforms for public outreach that often confront or circumvent traditional news media channels. Such activities create tension with expectations of professional objectivity as they may not have outcomes that are politically neutral in the context of a partisan divide over belief in the science of climate change. Political scientist Roger Pielke Jr. suggested a way forward for scientists who inform policy called the ‘honest broker’ approach, where a range of policy alternatives are given and associated with scientific findings and uncertainties.²⁹ While this suggestion is appealing, in practice, it is untenable. Republicans who do not believe that anthropogenic climate change is even happening, or that it is dangerous, are unlikely to be swayed by multiple policy options for

²⁸ Kelly Moore, Daniel Lee Kleinman, David Hess, & Scott Frickel, “Science and Neoliberal Globalization: A Political Sociological Approach,” *Theory and Society* 40, no. 5 (2011): 505-532.

²⁹ Roger A. Pielke, Jr., *The Honest Broker: Making Sense of Science in Policy and Politics* (Cambridge, UK: Cambridge University Press, 2007).

responding to the crisis. They are stuck in the conjectural and qualitative stases, respectively, so a solution to dispute at the level of the procedural stasis (regarding policy) is irrelevant.

Additionally, every scientist is a human being, with ethical responsibilities that arise from the various identity categories they occupy in modern life. With this in mind, a significant opportunity arises to analyze the conflictual nature of coexisting subjectivities, such as professional scientist, state employee, moral individual, and concerned citizen. The present study aims to do just this, asking why scientists engage in various forms of public address and the effects of such public address on the epistemic authority of scientists and their practice.

Given the widespread, multiple, and imminent impacts of climate change on all sectors of society, scholars have written much about climate change communication. They focus on a variety of related issues, from media coverage of the science and the controversy to framing and social movement strategy.³⁰ Scholars have also written specifically on the rhetoric of climate scientists communicating to the public. Much of this scholarship concerns the scientific report

³⁰ Maxwell T. Boykoff and Jules M. Boykoff, “Balance as Bias: Global Warming and the US Prestige Press,” *Global Environmental Change* 14, no. 2 (2004): 125-36; Danielle Endres, Leah M. Sprain, and Tarla Rai Peterson, ed., *Social Movement to Address Climate Change: Local Steps for Global Action* (Amherst, NY: Cambria Press, 2009); Libby Lester and Brett Hutchins, “The Power of the Unseen: Environmental Conflict, the Media and Invisibility,” *Media, Culture & Society* 34, no. 7 (2012): 847-863; Matthew Nisbet, “Communicating Climate Change: Why Frames Matter for Public Engagement,” *Environment: Science and Policy for Sustainable Development* 51, no. 2 (2009): 12-23.

genre. Carolyn Rude analyzed reports on energy policy by the Union of Concerned Scientists.³¹ She pointed out that these reports aim to influence future action, acting as strategic tools for advocacy by taking a case directly to the public. The UCS reports in her study do not use neutral and detached language typical of scientific reports, but neither do they come off as hysterical. The style reflects engagement and concern while maintaining a balance between deliberative and epideictic rhetoric, offering both sound science and ethical arguments grounded in social responsibility. It is this balance of sound science and delineation of social responsibility that gives the UCS and its reports authority and credibility. Rude later expanded upon this work to propose that reports by groups like the UCS work toward social change by facilitating repeated rhetorical acts.³² Delivery of conclusions can take place over time and include many activities, such as field work, updates, and other publications which build upon or reference the original report. Rather than waiting for an audience to read a report, advocates seek out audiences and adapt the report to them through synthesis and condensation.

The usability of a text, such as a report, becomes just as important as its accuracy and correctness. The most prominent series of climate change reports comes from the Intergovernmental Panel on Climate Change, whose five reports over the last 29 years have drawn both media and scholarly attention. Although claims of scientific consensus have not

³¹ Carolyn D. Rude, "Environmental Policy Making and the Report Genre," *Technical Communication Quarterly* 6, no. 1 (1997): 77-90.

³² Carolyn D. Rude, "Toward an Expanded Concept of Rhetorical Delivery: The Uses of Reports in Public Policy Debates," *Technical Communication Quarterly* 13, no 3 (2004): 271-288.

always been a component of IPCC reports themselves, such claims have been used when IPCC scientists represent the report's findings to the public. In analyzing the first IPCC Assessment Report, Jean Goodwin posits that consensus claims are purposely constructed and aimed at non-scientist audiences.³³ Consensus claims are appeals to authority that also function to prevent non-scientists from seeking out alternative experts. This popular rhetorical appeal has drawbacks, notably the existence of scientists and scientific research that counter the consensus. The existence of a minority group holding a counter-position reveals that the IPCC has conducted boundary work for the inclusion of some voices, but not others, in the consensus. The boundary between insiders and outsiders in this context can appear to be based on political views rather than scientific evidence. The lesson to be learned is that claims to authority can open an argument space wherein denialist objections are legitimized.

IPCC reports were also examined in a study by Lynda Walsh that sought to understand how the IPCC responded to the damaged appearance of consensus following Climategate and how they tried to preempt such critique two years earlier in their 2007 4th Assessment Report.³⁴ Walsh shows us that federal scientists, such as those that make up the IPCC, must negotiate their ethos as citizens, professional scientists, and as policy scientists. Although these scientists are

³³ Jean Goodwin, "*The Authority of the IPCC First Assessment Report and the Manufacture of Consensus*," Paper Presented at the National Communication Association Conference, Chicago, November, 2009.

³⁴ Lynda Walsh, "Before Climategate: Visual Strategies to Integrate Ethos across the 'is/ought' Divide in the IPCC's Climate Change 2007: Summary for Policy Makers," *Poroi* 6, no. 2 (2010): 33-61.

commissioned to produce work to inform policy, presumably because of their scientific ethos, their involvement in politics, for some, warrants an attack on their Mertonian ethos in what is called the is/ought paradox. This is the assumption that if a scientist says something bad “is” happening, then an implicit conclusion that follows is that we “ought” to do something about it. In other words, their claims of fact and definition have an implicature of value and policy, whether they mean them to or not. The IPCC responded to this paradox by bracketing off their scientific ethos from their ethos as citizens. One way in which this was done can be found in the use of visualizations of climate models, that essentially shift the burden of proof from ethos to logos and pathos. Although this strategy has shown success with some audiences, this tactic did not avoid the is/ought paradox as the IPCC authors intended, as their critics may now interpret scientists’ statements as fitting the “ought” stases of value and action that argue for the withholding or selection of policy alternatives. What this suggests is that the social position of the policy scientist needs to be restructured for their suggestions to be more widely heeded.

As these studies show, scholars have actively pursued an understanding of the strategies used in reports by climate scientists to persuade policymakers, and the issues discussed in this scholarship are the same as the issues I have identified: a need on the part of climate scientists to negotiate the space between scientific and social responsibility, and the difficulty of successfully doing so in a partisan political climate. Climate communication occurs in other genres beside the scientific report. Efforts have increasingly been made by environmental advocates to reach a wider public more directly through traditional social movement rhetoric. It is in forums squarely addressing the deliberating public that this dissertation resides. As scientists take advantage of these public forums and genres, they find a more extensive range of persuasive strategies but also discover that their public ethos cannot be presumed, and challenges to their epistemic authority

are amplified as they move further from forms of communication considered standard in the technical sphere.

When scientists communicate outside the domain of research articles and reports, they use strategies familiar to scholars of rhetoric. The public address of scientists communicating to scientist audiences and to the public is fertile ground for analysis as these forms of public communication are likely to provide insight into how scientific values travel between technical and public spheres. An important component of public address is how it can call people together to enable the identity constitution of audience members. But how might constitutive rhetoric work when speaker and audience occupy conflicting expert and lay identities?

Although the study of public address was traditionally focused on speech analysis, today the field covers many forms of public persuasion. Public address in this dissertation includes not only oratory, but open letters and public statements which are forms of public interaction that produce discourse within and between groups, often with the purpose of social change. Scientists have used these channels of communication both within the scientific community and without.

One form of public communication by scientists that has been studied by rhetoricians is public debate between scientists and citizens. According to Goodwin and Lee Honeycutt, in debates, arguments travel from the technical to the public sphere, and technical arguments are transformed into appeals to expert authority.³⁵ More specifically, discourse changes from a focus on the analysis of evidence to the trustworthiness of scientists. When scientists speak against an opponent's case, they tend to concentrate less on the opponent's evidence and more on the

³⁵ Jean Goodwin and Lee Honeycutt, "When Science Goes Public: From Technical Arguments to Appeals to Authority," *Studies in Communication Sciences* 9, no. 2 (2009): 19-30.

opponent. Additionally, technical arguments are found not readily to travel across the boundary between scientific and public contexts, but scientists personally and their conclusions do travel. These findings suggest that more attention needs to be paid to how scientists can maintain legitimate authority in public contexts.

Through her study of climate scientist Stephen Schneider's televised debate with an audience of self-described skeptics, Goodwin reminds theorists to be cognizant of the practical knowledge used by arguers in public contexts.³⁶ Such knowledge includes strategies for reducing the distance between scientists and laypeople, showing values and concerns, and demonstrating scientific modesty, all of which enhance the perception of scientist credibility. Goodwin also points out that Schneider did not engage points that were outside the scientific consensus, hence exerting control on the issues under debate. He refused to respond in kind to attacks on his credibility, instead reframing the interaction to emphasize trust. Skeptical audiences do not often provide the ideal context for good reasons to thrive but constructing an interaction where good reasons can be used to affect future action is primarily the purview of the arguer. By showing trust in the audience and treating them as worthy conversation partners, Schneider made an exchange of argument possible, despite an argumentative context that was less than ideal.

³⁶ Jean Goodwin, "Climate Scientist Stephen Schneider Versus The Sceptics: A Case Study of Argumentation in Deep Disagreement," In *Proceedings of the Seventh Conference of the International Society for the Study of Argumentation*, Amsterdam, Netherlands, 2015; Jean Goodwin, "How to Exercise Expert Authority: A Case Study of a Scientist Facing The Sceptics," *Argumentation et Analyse du Discours* 15 (2015) <http://aad.revues.org/2035>.

Goodwin's study demonstrates how scientists might address the distrust some audiences hold of them.

Two critical issues arise out of this literature that informs the present study. First, scientists are communicating to the public in traditional political forums and genres, with existing expectations for argumentative decorum. Secondly, climate scientists need to and are increasingly working to engage audiences who do not readily trust them. The forums, genres, and rhetorical strategies available to climate scientists within agonistic and divided contexts deserve further study. The scientific consensus concerning anthropogenic climate change has not translated into public understanding nor political action, and with environmental tipping points nearing and windows of action closing, climate scientists urgently need to use all the available means of persuasion to overcome public disbelief and inaction.

The rhetorical defense of climate science in the form of (counter)public intellectualism is underway, as scientists increasingly stand in opposition to lobbyists, skeptics, and deniers while constituting a counterpublic discourse that rhetorically participates in multiple scientific and lay publics.³⁷ My review of the literature shows that there have been many individual, case-based studies, but there are few extended examinations of the rhetorical dynamics of scientists as they engage in spoken, written, and embodied public address that protests political inaction on climate change. Such a study can help uncover how scientists adapt (or fail to adapt) their appeals to differing, and often fractured, publics and how these publics interpret increasingly direct forms of advocacy by those within the scientific community. Considering the public address of

³⁷ Brett J. Bricker, "Scientific Counterpublics: In Defense of the Environmental Scientist as Public Intellectual," *Topoi* (November 14, 2014): 1-12.

scientists in the context of the climate change controversy through a rhetorical lens reveals differing self-perceptions among scientists of the role that science plays in society and the expectations of nonscientists about how scientists can and should engage with the public.

Because of the seeming novelty of the phenomenon, the activist, public address of scientists is of particular interest to public sphere scholars in communication and political science. In her 2013 book, rhetorician of science Leah Ceccarelli examined the use of the frontier of science metaphor in the discourse of scientists. In it, she acknowledged the lack of literature concerning the public address of scientists, defined as the scientist's "relatively unmediated appeals to prospective supporters, patrons, voters, and new recruits to a scientific career."³⁸ Scientists addressing publics should be keen to consider the ancient rhetorical rule of knowing your audience. When NASA scientist James Hansen testified to Congressional committees in 1988, his testimony was of scientific, authoritarian ethos addressing a political elite.³⁹ When marine biologist Rachel Carson published *Silent Spring* in 1962, she spoke to both the political elites and the public.⁴⁰ There is a history of scientists reaching out to non-expert publics, and of

³⁸ Leah Ceccarelli, *On the Frontier of Science* (East Lansing, MI: MSU Press, 2013), 16.

³⁹ Richard D. Besel, "Accommodating Climate Change Science: James Hansen and the Rhetorical/Political Emergence of Global Warming," *Science in Context* 26, no. 1 (2013): 137-52.

⁴⁰ Kenny Walker and Lynda Walsh, "'No One Yet Knows What the Ultimate Consequences May Be': How Rachel Carson Transformed Scientific Uncertainty Into a Site for Public Participation in *Silent Spring*," *Journal of Business and Technical Communication* 26, no. 1 (2012): 3-34.

rhetoricians studying them, but how this is done and the frequency of such engagements has changed with the growing urgency of climate change.

At the core of communicating science to public audiences lies an inherently rhetorical dimension. Scientists may be stepping up their efforts of direct public engagement with nonscientists, but their credibility with this audience is not universally recognized. The public discourse arena is notably fragmented by communication technologies that allow the customization of news and discourse exposure. When individuals do not encounter topics like climate change or science in their everyday life, the media representation of these issues sets the terms of the encounter. Customizable exposure and consumption of media frames and discourses create echo chambers and bubble filters that restrict exposure to and dialogue among diverse world events and interpretations. Rhetoric becomes vital in helping traverse various publics that see and know the world differently. A rhetorical examination of the public address of scientists in differing public arenas can unveil how scientists make identification appeals, articulate their social responsibilities, and reaffirm their credibility to diverse audiences. With conflicting messages about the existence and urgency of climate change circulating in the public sphere, scientists must employ new means of outreach to communicate their research and convey urgency to inspire action.

Examining the public address of scientists, this study explores how scientists enact their understanding of their responsibility to inform the rest of the citizenry, particularly when their credibility is tarnished, and their findings dismissed. The politicization of climate science and the voice of climate denial have polarized the public's understanding of this issue. In response to these challenges, scientists too are reevaluating their relationship with the rest of society and the extent to which they must go to warn the public of impending environmental collapse and its

myriad social effects. Exploring how scientists engage with audiences in differing public arenas, how they enact their credibility and goodwill, and how they respond to push back from nonscientists can help illuminate why (and in what situations) the public address of scientists persuades or fails to persuade. Central to the persuasiveness of a scientist's arguments is the display of scientific ethos.

1.2 Scientific Ethos

Aristotle outlined three components of ethical demonstration: a rhetor's good sense (phronesis), moral character (arête), and goodwill (eunoia). A rhetorically constructed ethos can inspire confidence and trust with broad audiences by engaging perceptions of good character. Scientific ethos refers to the rhetorical construction of scientific character. These constructions manifest in texts and within culturally driven notions about the character of science and scientists.⁴¹ As seen in the politicization of climate science, these local and cultural constructions often oppose each other.

The ethos of scientists is generated by scientific practice and supported by broader cultural norms. For example, within scientific fields, scholarly misconduct is regulated through professional channels; all scientists must demonstrate adherence to ethical commitments expected of members of that scientific community. Ethos is constructed through publications, conference presentations, and grant proposals, among other texts, when scientists display conformity to ethical commitments such as disinterestedness, depersonalization, deference, and

⁴¹ Carol Reeves, "Scientific Ethos," in *Encyclopedia of Science and Technology Communication*, ed. Susanna Priest (Thousand Oaks, CA: SAGE Publications, 2010): 750-752.

skepticism.⁴² Some textual features that work toward establishing scientific ethos include the use of passive voice, appropriate use of hedging terms, using citations, and conceding to the flaws and alternative interpretations of their research.⁴³ A scientist who does not display these commitments may not be viewed as credible. Of course, a scientist's standing in the community also plays into assessments of credibility.

Atypical contexts can sometimes induce adjustments in scientists' display of ethos. For example, "scientists making revolutionary claims that confront beliefs in both scientific and popular culture may appeal to ethical investments in both domains. Paradoxically, these circumstances may require authors to be conventional to gain a hearing for unconventional ideas and even *radically creative in convincing their audience that they are not, in fact, outrageously radical.*"⁴⁴ There is historical precedence for such challenges. Rhetorical analysis of Darwin's *Origin of Species* reveals the construction of scientific and personal ethos to persuade audiences of the plausibility of descent with modification when empirical evidence and close observation of actual specimens were lacking.⁴⁵ In contrast with Darwin's cautious and culturally-sensitive tone, Watson and Crick conveyed a confident, bold, and radical character when announcing the

⁴² Reeves, Scientific Ethos.

⁴³ *Ibid.*

⁴⁴ *Supra*, see note 41, emphasis added.

⁴⁵ John Angus Campbell, "The Polemical Mr. Darwin," *Quarterly Journal of Speech* 61, no. 4 (1975): 375-390; John Angus Campbell, "Why Was Darwin Believed? Darwin's Origin and the Problem of Intellectual Revolution," *Configurations* 11 (2003): 203-237.

double helix structure of DNA in a 1953 paper in *Nature*.⁴⁶ Consideration of the rhetorical construction of ethos helps to identify the factors motivating a rhetor's persuasive choices.

Perceptions of scientific ethos also preexist in public audiences and should be considered by any scientist wanting to engage with these audiences. Well-publicized scientific achievements, such as the development of atomic weaponry, landing on the moon, and the Human Genome Project contribute to these public perceptions of what science is and who scientists are. Whether scientists are deemed heroic or naïve,⁴⁷ public perceptions depend on the outcomes of research and the narratives of scientific activity propagated in media.⁴⁸ Celebrity scientists may also set the prototype for audiences that otherwise lack familiarity with the scientific enterprise. Astrophysicist Neil deGrasse Tyson, evolutionary biologist Richard Dawkins, and science educator Bill Nye are some of the most recognized faces of science in America due in large part to their many television appearances. However, do these charismatic personalities help or hinder the social perceptions of science? It may be the case that some constructions of scientific ethos will garner admiration from the public while instigating attack by other scientists. Similarly, nonscientists may lose confidence in scientists when they include hedging language and degrees of uncertainty in their science communication, elements that

⁴⁶ Michael S. Halloran, "The Birth of Molecular Biology: An Essay in the Rhetorical Criticism of Scientific Discourse," *Rhetoric Review* 3, no. 1 (1984): 70-83.

⁴⁷ Leah Ceccarelli, "Scientific Ethos and the Cinematic Zombie Outbreak: Science in Fictional Narratives," *Mètode Science Studies Journal* 6 (2016): 107-113.

⁴⁸ Reeves, Scientific Ethos.

connote good science within the scientific community but contrast with common misconceptions in society of science being about certainty, confidence, and displays of authority.

Given that perception of what science is, who scientists are, and the relationship between science and society differ between communities of scientists and nonscientists, a closer examination is necessary for the current study to understand how scientists engage in invention when speaking to nonscientist audiences. Ceccarelli explains that scientists often construct their public ethos through the frontier metaphor.⁴⁹ Scientists in this view are independent men who bravely explore the uncharted margins of the natural world. However, she also shows that popular filmmakers have a propensity for depicting scientists as incompetent, clumsy, and foolish.⁵⁰ From zombie movies to all forms of science fiction, experimental science is often framed as a contemporary Pandora's box. The self-reflexive scientist who is tied in an ethical web to other scientists and a broader public might not be a media mainstay, but elements of this perspective can be seen in the public address of scientists as they communicate with public audiences about the urgency of climate change and the integrity of science.

Coined by the Quakers in the 1950s, the phrase "speaking truth to power" refers to taking a stand against fascism and other forms of totalitarianism. It has also come to refer to the belief that scientists will deliver honest and sometimes uncomfortable truths to those in power.

Scientists, in this latter view, can speak truth to power because they are unimpeded by economic

⁴⁹ Ceccarelli, *On the Frontier of Science*.

⁵⁰ Ceccarelli, *Scientific Ethos*.

self-interest or partisan bias.⁵¹ Merton argued that a self-governed, autonomous scientific enterprise, characterized by the norms of universalism, communitarianism, disinterestedness, and organized skepticism, is a pillar of a democratic society.⁵² These values supported a social contract between science and the state wherein the government provides research funding but leaves the research agendas to the scientific community. In practice, scientists cannot follow the idealized norms of science because they, like all humans, are influenced by values, interests, and policy perspectives that are apart from scientific norms. The balance of separation and mutual dependency between science and politics has become a focal point in studies of the ethos of science.⁵³

Complications scientists face in engaging nonscientist actors in nonscientist arenas has given rise to ethos appeals that sharply contrast with the ideals depicted by Merton. Often the truths spoken must be tailored to the expectations of a discourse community. When matters of scientific fact are linked to societal choices, “science [turns] into a more complex, less pure, and less autonomous institution.”⁵⁴ Focusing on public address texts by scientists and the reception of those texts, this study interrogates the pervasiveness of and deviation from Mertonian norms in such texts in the context of a science-based controversy. Aristotelian conceptions of phronesis,

⁵¹ Javier Lezaun, “Speaking Truth to Power: Science and Policy,” in *Blackwell Encyclopedia of Sociology*, ed. George Ritzer (Blackwell Reference Online, 2007).

⁵² Robert K. Merton, *The Sociology of Science: Theoretical and Empirical Investigations* (Chicago: University of Chicago Press, 1973).

⁵³ Lezaun, *Speaking Truth to Power*.

⁵⁴ *Ibid.*

arête, and eunoia will help to explain how Mertonian norms are maintained, abandoned, or rearticulated by diverse groups of scientists as they communicate their research in public and political arenas marked by fragmentation and countervailing voices that discredit climate science and scientists. Despite the contextual obstacles they face, many scientists increasingly believe they have a moral obligation to speak out and warn the public of imminent threats from climate change.⁵⁵ The competition between and rhetorical negotiation of dual identities that include both the detached researcher and the environmental physician, charged to both diagnose an ill and prescribe a cure, is a tension that is explored across cases in this study.

These understandings of scientific ethos can help explain the argumentative choices made by scientists as they publicly address varying audiences in varying contexts. By focusing on texts surrounding the climate change controversy and the reception of those texts, this study offers an extension of the work of rhetoricians of science in this area by considering the rhetoric of credibility, goodwill, and authority in the context of a science-based controversy, as scientific rhetors engage publics that perceive science, scientists, and their claims differently. It is hoped that this study can assist science communicators with their charge of better informing people in a democratic society about the urgency of climate change and its impacts.

1.3 Scientists and Public Advocacy

As scientists increasingly step outside the comforts of their labs and conferences, their actions in the public sphere bring to attention issues regarding the role of science in society and the

⁵⁵ Robert Cox & Phaedra Pezzullo, *Environmental Communication and the Public Sphere* (Los Angeles: SAGE, 2016).

relationship between scientists and nonscientists. The debate over climate change brings climate scientists in conversation with politicians, the public, and colleagues, all of which have different relationships with and understandings of science and its role in policymaking. For example, scientists and their professional associations send letters to policymakers with strong consensus appeals, they give addresses to their colleagues in annual conferences to reaffirm their values, and they rally and march in the streets alongside diverse members of the community. These various genres, audiences, and contexts speak to different assumptions about the relationship between science and society (with science as generator of economic innovation or defender of the public good) and how scientists are expected to fulfill their societal responsibilities (letting facts speak for themselves or engaging in more direct intervention). The climate change controversy provides the necessary impetus to require climate scientists to think about how their credibility is influenced by the public's perception of them. Study of divergent articulations of the duties of scientists in their respective contexts allows us to answer questions about the complicated relationship between scientific ethos and decorum as the technical and public sphere blur together. Three interrelated questions shape this study.

First, what rhetorical strategies do scientists and scientific organizations use to be recognized as credible when engaging in discourse concerning their social role and responsibilities? The range of genres and mediums now being used by climate scientists has dramatically expanded, many of which are in the public sphere.⁵⁶ When arguments travel

⁵⁶ G. Thomas Goodnight, "The Personal, Technical, and Public Spheres of Argument: A Speculative Inquiry into the Art of Public Deliberation," *Argument and Advocacy* 48, no. 4 (May 2012): 198-210; Jean Goodwin, Climate Scientist Stephen Schneider; Jean Goodwin, How to

between spheres, they are transformed and judged based on different standards.⁵⁷ It is important to understand the ways that scientific ethos is used or transformed by advocates as they engage in nonscientific or hostile contexts while maintaining decorum appropriate to that arena. This study aims to uncover how discourses of credibility adapt to their audiences when a rhetor must persuade that audience of his or her legitimacy, authority, and goodwill when speaking about the epistemic value of science as it informs policy.

Second, how have scientists negotiated tensions in their role as public advocates? This question presupposes that there are tensions between traditional understandings of professional norms and a new sociopolitical context marked by filter bubbles and the democratization of

Exercise Expert Authority; Jean Goodwin & Lee Honeycutt, When Science Goes Public; Ron Von Burg, “The Day After Tomorrow?: Rhetoric, Film, and the Global Warming Debate,” *Critical Studies in Media Communication* 29, no. 1 (March 2012): 7-26; Kenneth C. Walker, “A Year of Deliberating Danger(ously): A Network Typology of the Loaded Climate Dice,” In *Typologies as Techniques for a Post-Critical Rhetoric*, ed. Lynda Walsh and Casey Boyle (New York: Springer, 2017): 175-196; Lynda Walsh & Kenneth C. Walker, “Perspectives on Uncertainty for Technical Communication Scholars,” *Technical Communication Quarterly* 25, no 2 (2016): 71-86.

⁵⁷ Goodwin, Climate Scientists Stephen Schneider; Goodwin, How to Exercise Expert Authority; Goodwin and Honeycutt, When Science Goes Public; Lezaun, Speaking Truth to Power; Reeves, Scientific Ethos; Walsh, Before Climategate; Walsh and Walker, Perspectives on Uncertainty; Charles A. Willard, *Argumentation and the Social Grounds of Knowledge* (Tuscaloosa, AL: University of Alabama Press, 1983).

expertise.⁵⁸ The question concerns how contemporary scientists maintain or defend their self-perception of being objective scientists while also being activist citizens,⁵⁹ and how they conceptualize the nature of their obligation to inform the public or act on its behalf.⁶⁰ In addition to knowing what rhetorical strategies a rhetor used to be perceived as credible, it would be insightful to understand how those in the scientific community articulate the fissures within their community and the decorous extent of their social actions.⁶¹

⁵⁸ Richard Besel, "Opening the "Black Box" of Climate Change Science: Actor-Network Theory and Rhetorical Practice in Scientific Controversies," *The Southern Communication Journal* 76, no. 2 (2011): 120-136; Goodwin, Climate Scientist Stephen Schneider; Goodwin, How to Exercise Expert Authority; Moore, Kleinman, Hess, and Frickel, Science and Neoliberal Globalization; Mark Moore, "The Union of Concerned Scientists on the Uncertainty of Climate Change: A Study of Synecdochic Form," *Environmental Communication* 3, no. 2 (July 2009): 191-205; Walsh, Before Climategate.

⁵⁹ Reeves, Scientific Ethos; Von Burg, *The Day After Tomorrow*.

⁶⁰ Bricker, Scientific Counterpublics; David Collingridge and Colin Reeve, *Science Speaks Truth to Power: The Role of Experts in Policy Making* (London: Frances Pinter, 1986); Cox and Pezzullo, *Environmental Communication*; Goodwin and Honeycutt, When Science Goes Public; Lezaun, *Speaking Truth to Power*.

⁶¹ Bricker, Scientific Counterpublics; Gabriel Cutrufello, "The Public Address and the Rhetoric of Science: Henry Rowland, Epideictic Speech, and the Nineteenth-Century American Science," *Rhetoric Review* 34, no. 3 (July 2015): 275-291.

Third, how are different rhetorical strategies of scientists interpreted by their audience as these discussions move from a technical argument sphere to increasingly public settings?⁶² If rhetors find themselves having to work increasingly hard to be heard and to have their insights acted upon, how do audiences interpret and respond to various enactments of scientific, social duty? To be able to assess the effectiveness of arguments in use, it is necessary to look at reception texts in addition to the text in question.⁶³ Prescriptions can then be made to better aid climate advocates as they work for social and environmental change and the maintenance of scientific integrity in society.

A rhetorical analysis of the public address of scientists in a time of environmental urgency and concentrated politicization of science can reveal the strategies of gaining credibility used and the success of those strategies in engaging these publics. Such knowledge will allow for a better understanding of how enactments of credibility shape how the public interprets and responds to scientist activism and advocacy. As the sociopolitical context and fragmentation of publics rapidly evolve, more research is needed regarding the relationship between scientific experts, nonscientist citizens, and policymakers. Additionally, more information is needed about the effect of efforts to bridge divided publics to reestablish scientific ethos. This study aims to provide insight into public discourse about scientific integrity and social responsibility and the role scientists play in that discourse. A better understanding of the rhetoric of scientists can be

⁶² Leah Ceccarelli, "Polysemy: Multiple Meanings in Rhetorical Criticism," *Quarterly Journal of Speech* 84, no. 4 (1998): 395-415; Ceccarelli, *Science in Fictional Narratives*; Goodwin, *Climate Scientist Stephen Schneider*; Goodwin, *How to Exercise Authority*.

⁶³ Ceccarelli, *Polysemy*.

used to help guide scientists and science advocates in bridging publics and responding to diversity in the perception of scientists' professional and personal responsibilities, as they work to defend the public good in a democratic society.

Tracing the discourses of social and professional responsibility among scientists as they move through the public sphere from a place of assumed authoritative ethos to egalitarianism and activism can shed new light on ideological fissures that have always existed within the scientific community. Examining their responses to a changing sociopolitical context where science is increasingly politicized, and its credibility is brought into question, opens consideration of the impact of social forces on the self-perception of scientists' responsibilities to their craft and to their broader communities as concerned citizens. I will also explore reception discourses, examining the various responses and interpretations nonscientists post about scientists' expressions of ethos, articulations of responsibility, and their activist actions. Such analysis creates a better understanding of the complicated relationship between science and society, and how scientists can more effectively communicate with and within a fragmented public sphere.

As the climate change controversy demonstrates, different groups of people can form and maintain vastly different interpretations of the world around them. Although physical phenomena like heat waves, droughts, floods, and hurricanes can be experienced by anyone, their meaning is shaped by culturally-learned discourses which influence our perceptions of reality. Rhetoric is central in the constitution of these realities. Language and other symbol systems affect the world. Even scientific discourse has rhetorical dimensions. When communicating controversial topics with diverse audiences, scientists are keen to adjust their messaging accordingly. The rhetorical perspective and its focus on impact is an effective approach for attending to the strategic choices made by scientists in displaying scientific ethos from one audience and context to the next.

For this study, I will employ a close textual-intertextual analytical approach because it privileges the text while also bolstering claims of effect by examining the reception of the text. Close textual analysis seeks to explain how texts are designed to produce meaning and cause the effect of persuasion. As a scholarly practice, it works through close attention to the “interplay of ideas, images, and arguments as they unfold within the spatial and temporal economy of the text.”⁶⁴ This approach assumes that the rhetorical force of a text cannot be easily understood upon a superficial reading because rhetorical force is a complex set of symbolic actions which require an attentive eye for textual detail to recognize them. The critic employing close textual analysis pays mind to context but focuses primarily on the rhetorical structure of the text itself and considers aesthetics to be of potential rhetorical force.⁶⁵ Close textual analysis aims to account for the gestalt of a text’s parts.

Despite its potential for uncovering persuasive strategies, close textual analysis has potential pitfalls that should be addressed. Critics who apply this method focus on the rhetorical structure of a text but cannot legitimately make claims about the rhetorical efficacy of that text based on that analysis alone. Assessing efficacy relies on giving attention to reception texts such as newspaper articles, interviews, and book reviews. A detail-oriented close textual analysis can determine the persuasive request made by the text, but without a close reading of intertextual materials (reception texts), it cannot determine whether that request arrived at its presumed target

⁶⁴ Stephen H. Browne, “Close Textual Analysis: Approaches and Applications,” in *Rhetorical Criticism: Perspectives in Action*, ed. Jim A. Kuypers (Lanham, MD: Lexington Books, 2009): 63-76.

⁶⁵ Browne, Close Textual Analysis.

and was accepted. Examining reception texts helps to attenuate the inherent weakness of close textual analysis. The close textual-intertextual approach to rhetorical analysis aids in understanding how the appeals used in the public address of scientists are received among a variety of contexts and audiences and thus enable prescriptions for climate scientists in similar contextual scenarios.

1.4 Chapter Previews

Chapter 2: In Service of Society: Self-Reflective Discourse among Scientific Communities

This chapter examines how scientists understand and communicate the role of their work in society and the obligations they hold to maintain this social duty. In particular, this chapter looks at how science advocacy organizations conceptualize these themes and communicate them to others in the scientific community. As scientists feel the tension between the Mertonian norm of disinterestedness and obligations as early warners and concerned citizens, they communicate with each other about what scientists can and should do. This communication signifies the permeability of the technical and personal spheres. Analysis of the 2017 AAAS Presidential Address on “Science and Technology for the Public Good” offers a glimpse into how a leader of a professional science association navigates this tension and how this perspective has shifted in response to a more tumultuous sociopolitical context. The AAAS address makes appeals to professional solidarity by articulating how traditionally held professional norms extend to current challenges to the value of science and authority of scientists. My analysis reveals how the AAAS, the world’s largest general scientific society, clarifies the professional and personal identities of its members and their respective social obligations. It also illuminates the organization’s effort to empower scientists through unifying discourse. This chapter reveals the

perceived means and the degree to which the scientific status quo feels compelled to act in the public sphere in defense of science.

Chapter 3: Letters to Power: Authority Appeals by the Union of Concerned Scientists

This chapter explores the rhetorical strategies used by science advocacy organizations and professional associations as they appeal to political actors on behalf of the integrity of science. My analysis will focus on two open letters to government officials and the public from the Union of Concerned Scientists. As these letters reflect the collective voice of many scientists and often relay collective understandings of climate science and epistemological integrity, they are a form of consensus appeal and elevated positionality. They also reaffirm the importance of measured action and respectfully call upon political actors to act in particular ways. The authors and signatories of these letters cultivate scientific ethos and phronesis. Because these letters are openly published, their audience is also the public. Although responses from political actors to these letters are scant, through a consideration of public responses to these letters, I provide evidence of how this rhetorical genre and set of appeals is interpreted by nonscientists in a modern context of widespread skepticism of science.

Chapter 4: Stand Up for Science: Rallies at the Intersection of Science and Society

Whereas statements by professional scientific associations offer institutionally-sanctioned articulations of standing firm in the face of socio-political challenges, not all scientists believe these prescriptions for action are inclusive enough of diverse perspectives within the community or that they go far enough to address perceived threats. Looser affiliations of scientists have joined the conversation about science in society to express different interpretations of their social

duties. Stand Up for Science rallies held outside of the annual American Geophysical Union and AAAS conferences stand in contrast to the more institutional perspectives propagated inside. As they express different means and justifications for science advocacy in the public sphere, these rallies bring to the fore ideological fractures within the scientific community. My analysis looks at the articulation of these commitments, the perceived inadequacy of major science associations to address the needs of all scientists, and their prescriptions for action within the scientific community and within the public sphere in defense of science. Although a driving aim of these rallies is the empowerment of diverse and marginalized scientific viewpoints, they also have received high degrees of media attention. The media coverage of these rallies acts as reception texts that reveal how their messages were interpreted and how the public perceives the moral and professional obligations of scientists.

Chapter 5: What Do We Want? Evidence-Based Claims! When Do We Want It? After Peer Review!

The focus of this chapter is on understanding how scientists organize alongside members of the public. Whereas previous chapters examined the public address of scientists as expressed from a position of professional privilege, here I examine advocacy not from the privileged position of technical expertise but from a position of equality alongside environmentalists, science enthusiasts, and community leaders. This chapter builds from the previous chapter to understand how the prescriptions of activist scientists are actualized in the public sphere. Examination begins by looking at the mission statements, organizational documents, and social media of scientists in the 2017 March for Science. The growing visibility of activist scientists led to vibrant discussions of what perspectives should be represented in the march and what their goals

should be. In response to these highly tumultuous discussions, the March for Science evolved. In this chapter, these changes in the organizational structure and stated missions of the march are analyzed to gain an understanding of the perceived confluence of scientific and citizen subjectivities. For instance, the March for Science underwent social pressure leading to its transformation from a “Scientists’ March for Science” to the more inclusive “March for Science.” Although scientific ethos is still prevalent in the words and actions of activist scientists, a greater emphasis on *eunoia* can be seen as their discourse evolved over time. Using discussion boards and social media as a source for response discourse, I uncover how scientists’ appeals to egalitarianism affect the public’s perception of scientists’ credibility and character.

Chapter 6: Conclusion

This chapter brings together the analysis from the previous chapters to reflect on what they reveal about the developing understanding among scientists of ideological rifts in their understanding of science’s social role, specifically in the context of the climate change controversy. It also reflects on similar discussion among nonscientist members of the public. I return to the research questions and summarize how they were answered by my study. This chapter considers the efficacy of scientists’ efforts to increasingly extend their reach into public engagement, and the implications of these efforts. Some traditional goals of science communication are to make scientific information more palatable to diverse audiences and to bolster the perceived integrity of science in the public sphere. Contemporary political tensions have altered these goals, forcing new reflexivity within the scientific community. In addition to scrutinizing these new goals, this chapter provides prescriptions for climate science advocates derived from the intersection of my study and prior analyses of diverse communication media

and appeals. Finally, I consider the broader implications of understanding the changing media and political contexts that motivate scientists to engage in public address and activism. I discuss what such findings tell us about the ethos of scientists and how it is maintained as they navigate the tensions between professional norms, social obligations, and personal concerns.

Chapter 2: IN SERVICE OF SOCIETY: SELF-REFLECTIVE DISCOURSE IN A SCIENTIFIC COMMUNITY

On February 6, 2017, the *New York Times* stated that “researchers are now undergoing a political awakening, contemplating what their role should be for at least the next few years.” In this article, historian of science Naomi Oreskes is quoted saying “many scientists do feel the time for sitting on the sidelines is past” but the *New York Times* writers point out that “an activist role is not an easy fit for many scientists.”⁶⁶ The intersection of science and activism is partly rooted in democratic idealism, an expectation for all concerned voices to participate in public sphere discussions. In the case of scientists, this call for public engagement is accentuated because they are often the most informed citizens on issues of public concern through the research which they conduct. Many governments fund science so that its insights may address social concerns, notably through informing legislation.

This call for public engagement is not new. In a 1996 *Science* editorial, Jaleh Daie, Botany professor and president of the Association for Women in Science, laments on the close of an era of “generous and stable federal funding of science, long taken for granted” and acknowledges that the scientific community has been reluctant to engage in the politics of budget allocation.⁶⁷ She explains that although professional scientific societies have become more

⁶⁶ Amy Hamon and Henry Fountain, “In Age of Trump, Scientists Show Signs of Political Pulse,” *New York Times* (February 6, 2017)

<https://www.nytimes.com/2017/02/06/science/donald-trump-scientists-politics.html>.

⁶⁷ Jaleh Daie, “The Activist Scientist,” in *Science* 272, no. 5265 (1996): 1081.

involved in the political process, much remains to be done. She then calls for individual scientists to wear the “scientist citizen” hat with confidence and purpose, insisting that scientists establish relationships with elected officials and use “effective communication that is factual and devoid of rhetoric” while also helping the public to appreciate and acknowledge that science and technology profoundly impact people’s quality of life. She concludes by framing her call as the invention of a new species of scientist undergoing a professional evolution.

Jaleh Daie’s call for the dawn of the scientist citizen foreshadows active discussions today among scientists concerning the effects of their work in society and reflection on the obligation they hold to the public, which often funds their work or whom their work affects. As Daie points out, scientists should rethink their defensive position on funding issues, and could benefit from a more active role in the political process and attention to communicating the value of science to elected officials and the public. Although students of language and persuasion may bristle at the recommendation that scientists should use “effective communication that is factual and devoid of rhetoric,” they know the spirit of her call for effective communication is one that demands attention to rhetoric. The struggle for funding which Daie identifies is still of great concern, but an additional exigency exists in the contemporary political climate that has accelerated discussion of scientists’ citizen duty, namely the dismissal of scientific findings as motivated by partisan politics.

Funding issues are a perennial concern for scientists, but many of the recent causes for concern and feelings of uncertainty among scientists arose with the election of Donald Trump, who energized skepticism of scientific consensus on scientific issues. In addition to dismissing the scientific community’s findings on climate change, in 2014 he promoted an unscientific link

between vaccines and autism when he tweeted that “so many people who have children with autism have thanked me—amazing response. They know far better than fudged up reports!”⁶⁸

The day before the general election, Donald Trump announced his intention of nominating Scott Pruitt, a skeptic of the scientific consensus on climate change, as head of the EPA.⁶⁹ Former Exxon Mobile CEO Rex Tillerson was nominated as Secretary of State on inauguration day. The day after the inauguration the National Park Service released photos of the last three inaugural crowd sizes which elicited dispute from our president, suggesting his further dismissal of objective facts. Two days after that the EPA ordered a media blackout and hiring freeze, suggesting that government scientists were being muzzled or pushed away for political reasons. One week after inauguration was the first travel ban executive order, which would restrict scientists along with everyone else from certain countries from entering the US. After the confirmation of Rex Tillerson, Scott Pruitt, and climate change skeptic Rick Perry as Energy Secretary, came executive order 13783 which acted to review and rescind environmental protections that had been established on the basis of scientific research. A month after this was the April 22nd March for Science.

⁶⁸ Jacobson, “Yes, Donald Trump”; Chief Editor “Trump Claims Vaccines and Autism are Linked but His Own Experts Vehemently Disagree,” *Explain Life* (November 14, 2018) <https://explainlife.com/trump-claims-vaccines-and-autism-are-linked-but-his-own-experts-vehemently-disagree-2712/>.

⁶⁹ Ryan Schleeter, “3 Things Scott Pruitt Has Actually Said About Climate Change,” *Greenpeace* (December 7, 2016) <https://www.greenpeace.org/usa/3-things-scott-pruitt-actually-said-climate-change/>.

This empowering yet divisive action preceded only by weeks the EPA's removal of climate change data and information from their website, the Department of the Interior's orders to encourage fossil fuel exploration and extraction on public lands, a proposed budget by the White House that cut funds for the EPA, FDA, CDC, DOE, and NIH, and President Trump announcing plans to withdraw from the Paris Agreement.⁷⁰ To many within the scientific community, these acts signaled a widespread dismissal of science as having a role in policymaking and a significant challenge to the epistemic validity of science.

With all changes in administration come changes in agenda prioritization and the means for their attainment, but the magnitude and frequency of these recent changes have been a wakeup call to the American scientific community concerning their role in society and the weight of their voice in policymaking. These events have encouraged some to take on an activist role in the public sphere. However, political scientist Roger Pielke suggests that scientists speaking out about political policy face a troubling dilemma.⁷¹ When scientists are perceived to have a political agenda, they lose their credibility and allow policymakers to ignore the scientific information they provide.⁷²

⁷⁰ Michael Greshko et al., "A Running List of How President Trump is Changing Environmental Policy," *National Geographic* (May 3, 2019) <https://news.nationalgeographic.com/2017/03/how-trump-is-changing-science-environment/>.

⁷¹ Roger Pielke, "When Scientists Politicize Science: Making Sense of Controversy over The Skeptical Environmentalist," *Environmental Science and Policy* 7, no. 5 (2004): 405-417.

⁷² Edward J. Rykiel, "Scientific Objectivity, Value Systems, and Policymaking," *BioScience* 51, no. 6 (June 2001): 433-436.

Under such a no-win rhetorical situation, the individual scientist speaking truth to power is limited in their capacity for outreach and ability to maintain resistance. Professional norms and standards within the scientific community are frequently interpreted as dissuading scientists from engaging in political discourse. One such set of norms was introduced by Robert Merton, who described an ethos of science comprised of professional values including communalism, universalism, disinterestedness, and organized skepticism.⁷³ The dual tension of adhering to disinterestedness while also defending science and scientists as pillars of democracy is at the root of contemporary conversations among scientists as they contemplate what they can and should do in the face of the administration's science denial and dismissal. Despite institutional pressure to remain divorced from anything that smacks of political interest, many scientists have taken Daie's advice and have reflected on how to advocate for science in public and political forums while maintaining the ethos they hold of themselves and which society expects of them. Non-profit scientific organizations have been at the fore of offering guidance in these regards.

Contemporary scientific institutions and organizations first began to form during the late 16th Century, when particular ways of conducting scientific research became mutually agreed upon and normalized.⁷⁴ Scientific societies like the Academia dei Lincei, founded in 1603 in Rome, the Royal Society of London, in 1660, and the Académie des Sciences in Paris, founded in 1666, met to share ideas and experimental results, becoming early and respected scientific

⁷³ Robert K. Merton, "The Normative Structure of Science," in *The Sociology of Science: Theoretical and Empirical Investigations* (Chicago: University of Chicago Press, 1973 [1942]).

⁷⁴ David E. Newton, *Science and Political Controversy: A Reference Handbook* (Santa Barbara, CA: ABC-CLIO, 2014).

communities. The establishment of scientific journals, often affiliated with scientific societies, additionally normalized ways of practicing science and created a sense of community for contributors. The practice of scientific research as a solitary activity, as lived by figureheads like Copernicus and Galileo, was coming to an end, being replaced increasingly by teamwork and distributed collaboration with peers.⁷⁵

Jumping many years ahead, we witness the founding of the American Association for the Advancement of Science (AAAS) in 1848. Its founding shared the same goals as earlier science societies, with the stated purpose of “promot[ing] intercourse between those who are cultivating science in different parts of the United States, to give a stronger and more general impulse, and a more systematic direction to scientific research in our country; and to procure for labours of scientific men, increased facilities and a wider usefulness.”⁷⁶ Today the AAAS has over 120,000 members and publishes the largest peer-reviewed scientific journal in the world, *Science*. This society, like many contemporary science societies, expanded the scope of its goals over the years to meet contemporary exigences, influencing policy by educating government agencies and elected officials on matters of public interest. The AAAS Mission goes further today, listing many ways that the organization strives to advance science, including aims to: promote and defend the integrity of science and its use, provide a voice for science on societal issues, promote

⁷⁵ Newton, *Science and Political Controversy*.

⁷⁶ 1856 AAAS Constitution, <https://www.aaas.org/page/1856-aaas-constitution>.

the responsible use of science in public policy, and increase public engagement with science and technology.⁷⁷

Considering the public address of AAAS-affiliated scientists in this contemporary sociopolitical context through a rhetorical lens reveals the self-perceptions among scientists of the role that science plays in society. Gabriel Cutrufello points out that “public addresses about scientific practice made to academic audiences have been understudied by rhetoricians of science” and that “public address about science is an important genre, which explicates and connects in productive ways some of the ethos-constructing concepts present in the more commonly studied genres of the discipline.” In his analysis of nineteenth-century public addresses about science, he explains that “epideictic speech activates listeners’ preconceived understandings and marshals those preconceptions in support of new attitudes.”⁷⁸

When it comes to political oratory, the welcome and keynote address genres are less explored than other forms of public address, but perform important rhetorical and political work.⁷⁹ Ted Sheckels examines political party conventions, where he claims that the keynote genre is dying. It is alive and well in academic conferences though. His observations about

⁷⁷ American Association for the Advancement of Science, “Mission and History,” <https://www.aaas.org/mission>.

⁷⁸ Gabriel Cutrufello, “The Public Address and the Rhetoric of Science: Henry Rowland, Epideictic Speech, and Nineteenth-Century American Science,” *Rhetoric Review* 34, no. 3 (July 2015): 275-291.

⁷⁹ Theodore F. Sheckels, “The Keynotes of the 2016 Political Conventions: The Death of a Genre?” *American Behavioral Scientist* 61, no. 4 (April 2017): 401-413.

trends in keynote addresses over the years apply to the academic context as well: that multiple speakers are becoming more frequent and as a result, conference-goers are given multiple themes and definitions of who they are. Keynotes in both scientific and political settings function as a complex of constitutive discourses. Celeste Condit's analysis of Nobel Prize speeches finds that the epideictic discourse of Nobel Laureates to others in the scientific community has the potential to shape and reaffirm internal values such as those delineated by Merton, but that often these expressions of community values fail to display goodwill toward humanity.⁸⁰ These epideictic genres warrant further study, as they have the capacity to address and unify concerns within the scientific community, such as, in this study, the anti-science statements and actions of the Trump administration.

This chapter examines the rhetoric of the largest general scientific professional society, the AAAS, as it defines sociocultural struggles faced by the collective scientific community. Because of its size and its diverse disciplinary membership, analysis of AAAS communication allows for a fair representation of the greater scientific community. I strive to explicate how scientists, and science advocacy organizations, conceptualize and communicate to others in the scientific community the role of their work in society and the obligations they hold to maintain this social role. Scientists feel the tension between the Mertonian norm of disinterestedness and their obligations as early warners and concerned citizens. Scientists communicating what scientists can and should do when faced with such conflicts can be revealing. Through definitions of the duty of scientists to the public and the scientific enterprise itself, scientific

⁸⁰ Celeste Condit, "The Character of Scientists in the Nobel Prize Speeches," *Public Understanding of Science* 27, no. 4 (May 2018): 417-432.

organizations outline appropriate modes of action for scientists who are also citizens in a broader public. Especially pertinent in the public address of the AAAS is the rhetorical construction of scientific ethos.⁸¹

In the 2017 AAAS annual meeting presidential address, given on February 16th and titled “Science and Technology for the Public Good,” evolutionary biologist Barbara Schaal speaks about the role of science in society as many in the scientific community grapple with how to bridge the growing divides between public understanding of science, subsequent policy discussions, and scientific consensus.⁸² The impetus for these themes comes from the deep unease within the scientific community about the administration change in the United States government. Following the travel ban and communication restrictions for federal scientists, the speech reaffirms faith in the scientific method, the importance of evidence-based facts in policy-making, and the necessity of communicating to policymakers and the public the importance of basic research for a myriad of social goods. Much can be learned from rhetorical analysis of this text about how the AAAS reconstitutes scientific ethos and authorizes public actions. My analysis of the 2017 address, and the welcome and introduction speeches that preceded it, helps

⁸¹ Lawrence Prelli, “The Rhetorical Construction of Scientific Ethos,” in *Landmark Essays on the Rhetoric of Science*, ed. Randy A Harris (Mahwah, NJ: Hermagoras Press, 1997): 87-104.

⁸² Barbara Schaal, Christina Paxson, and Geraldine Richmond, “2017 Annual Meeting: AAAS President’s Address,” AAAS (February 16, 2017), <https://www.aaas.org/events/annual-meeting/2017/aaas-presidents-address>. There is no published transcript of this speech, but a video is available here from which I conducted my analysis.

to clarify the AAAS's view of scientific ethos in the current era, and in particular, their perception of science's social obligations in the face of sociopolitical pressures.

2.1 Opening Remarks

The 2017 AAAS meeting theme was “Serving Society through Science Policy.” This theme reflected growing interest in the scientific community about how best to inform policies with scientific evidence. The AAAS 2017 Annual Meeting website elaborates upon this theme, insisting that policies should be informed by the best available evidence but acknowledging that other factors, alongside science, translate knowledge into viable policy options, such as societal norms and cultural values.⁸³ Of concern for this analysis is the question of what the roles are for scientists as individuals and for the scientific enterprise as a whole in the policy landscape. Three speakers opened the conference on its first night, Geraldine Richmond, Presidential Chair in Science and Professor of Chemistry at the University of Oregon and Chair of the AAAS Board, gave a short message of welcome; Christina Paxson, AAAS Meeting Co-Chair and President of Brown University, offered an introduction; and finally Barbara Schaal, evolutionary biologist, vice president of the National Academy of Sciences, and 2017 AAAS president, gave the keynote address.

Geraldine Richmond opened the annual meeting by honoring those who support the mission of AAAS to advance science, technology, and engineering throughout the world for the

⁸³ “2017 Annual Meeting Theme: Serving Society Through Science Policy,” *American Association for the Advancement of Science*, accessed May 16, 2018, <https://www.aaas.org/page/2017-annual-meeting-theme-serving-society-through-science-policy>.

betterment of all people. Her opening remarks repeatedly emphasized that the AAAS meeting is an international gathering, representing more than fifty countries. She pointed to the January 27, 2017, White House executive order on immigration and visas, only three weeks prior, as straining this collaborative mission. Her thesis is clear, that “science depends on openness, transparency and the free flow of ideas, and people.” Limiting this flow harms science. This component of science aligns well with Merton’s norm of communism.

According to this norm, intellectual properties and scientific discoveries should be shared by a global scientific community. With this value in mind, Richmond pointed out that the AAAS and more than 180 universities, science, engineering, and education organizations have urged President Trump to rescind the executive order. Richmond argued that Trump administration limitations on the ability of scientists to freely travel to communicate with their peers and the public would harm the scientific enterprise. The understood importance of participation in annual conferences like the AAAS annual meeting and the acknowledgment that some members may not be able to attend drove the point home that current policies impede the progress of science.

Richmond then exclaimed that we must and will continue to speak out publicly on these issues, emphasizing that they are critical for science to flourish and serve society. Here the purpose of the scientific enterprise is identified as a communal good, an engine by which society benefits. She extended a message of welcome to all voices. In her concluding remarks, she returned to her point that the AAAS is an international and diverse gathering and recognized award-winning early-career women scientists in the developing world. She drove the point home by concluding her recognitions with the information that one recipient could not come due to travel uncertainties resulting from the White House executive order. Limiting the flow of

science harms society, she argued, and the scientific community is obligated to speak out to reopen America after this executive blockage of people and ideas. Richmond did not clarify which channels for speaking out she preferred, but she did authorize some degree of civic action when she critiqued political challenges to scientific norms that benefit all people.

The travel ban executive order was only one exigency identified by the opening speakers. Economics and Public Policy professor Christina Paxson next identified a series of concerns that galvanize the scientific community. She began by identifying the purposes of the AAAS annual meeting, “to recognize advances in scientific research and discovery and in doing so we affirm our faith” in what we can scientifically know to be true. Her commitment to empiricist epistemology as a matter of faith speaks to the purpose of science residing not only in objective observation but also in moral obligation.

In reference to an infamous Trump administration faux pas, Paxson affirmed that evidence-based facts, not alternative facts based on opinion and belief, are a scientist’s “currency”.⁸⁴ Jabs at the executive branch, as Richmond also made with her critique of the

⁸⁴ During a Meet the Press interview on January 22, 2017, Kellyanne Conway, a counselor to the President, famously used the expression “alternative facts” when defending White House Press Secretary Sean Spicer’s false statement about the attendance numbers of Donald Trump’s inauguration. When pressed during the interview with Chuck Todd to explain why Spicer “utter[ed] a provable falsehood,” Conway stated that Spicer was giving “alternative facts.” Todd responded, “Look, alternative facts are not facts. They’re falsehoods.” This utterance quickly made national news and was circulated online as a meme-worthy condensation symbol for the anti-science attitude of the Trump presidency. “Conway: Press Secretary Gave

travel ban, resonate with an audience that is politically aware, and likely left-leaning, further constituting the scientists' identity by displaying shared concerns. The money metaphor of evidence-based facts as currency speaks to the source of scientists' influence in society, economic development as the gateway to prosperity.

Scientific discovery is celebrated throughout this speech, but threats to the scientific enterprise that concern many scientists are also addressed. Paxson identified four concerns of the scientific community: possible reductions in federally-funded science research, fear of clampdowns on science communications issued by federal agencies, the executive order on immigration, and a more existential concern that the work of science is increasingly undervalued. It is this last point that resonates with the audience's concern over "alternative facts" and the seeming dismissal of science in policymaking in the current administration. Yet as Paxson acknowledged the "risks, threats, to the scientific enterprise that all of us are concerned about," the currency and enterprise metaphors place science at the top of a capitalistic hierarchy, failing to acknowledge the concern that some have for the potentially adverse effects of scientific work on the world. Pushing for a free flow of science may not mean the flow is in the direction of the people who most need it. There was no room for self-reflexive criticism of science in Paxson's speech.

Instead of acknowledging the actions of scientists that might have led to a loss of trust on the part of a broader public, Paxson framed scientists as victims of aggression. In response to what they perceived as oppressive acts, she said that scientists have participated in Sign-On

Alternative Facts," NBC News, 22 January 2017, <https://www.nbcnews.com/meet-the-press/video/conway-press-secretary-gave-alternative-facts-860142147643>.

letters, planned marches, and founded an organization urging scientists to run for public office. But such actions are not as unprecedented as they may seem. To contextualize the anti-science antagonism she identified in this speech, Paxson argued that the current series of “politically and socially motivated assaults on academia and science aren’t new,” tracing such attacks to at least the 1925 Scopes Trial. This reference is an apt one as it relates to teaching evolution in schools, a scientific controversy muddied with public policy that still exists. As a modern corollary, Paxson states that state legislation has banned the use of scientific estimates of future sea level rise and rejected National Academy of Sciences education standards because they include discussion of evolution, climate change, and embryonic stem cells. These are clear breaches of the political sphere into the technical sphere, and a violation of the epistemically-authoritative positionality scientists maintain in projecting their scientific ethos.

Perhaps most telling in this speech of institutional response to perceived anti-science political actions is in her reaffirmation that current political concerns are nothing new for scientists. Metaphors that drive this point include history as a film rerun (“now, the truth is, we’ve seen this movie before”) and history as circular (“at various times in our history the scientific community has been compelled to respond to waves of science denial”). She acknowledged the great deal of uncertainty scientists are feeling under the Trump administration (“we’ve arrived at one of these moments”) but suggested that responding to such exigencies is part of the scientific enterprise (“so as before, we’ll refine the case for science”). Scientists are “compelled” to enter the public sphere to advocate for the epistemological merits of science in public policy, and always have been. This normalizes scientific activism and is a potentially effective way of responding to the double bind that scientists face when venturing into the public sphere. By claiming that scientists have always been activists when the need arises, they

can break out of the trap that says scientist citizens are, by definition, politicizing science, and are thus no longer credible as scientists.

In this speech, Paxson defined the things the scientific community stands for: science as an engine of economic growth and prosperity; second, science as a basis for sound policy, which will therein produce positive outcomes in a myriad of material and social capacities; and lastly, science as a global public good that significantly benefits from incorporating the best, the brightest, and the most diverse thinkers. If science is the basis of sound policy and is a global public good, the responsibility of scientists calls for “standing up” and clearing the blockages keeping the scientific enterprise from advancing, as Richmond previously described. The travel ban is here indirectly referenced as the audience is reminded that “people from everywhere add to the global marketplace of ideas.” The economic metaphor of a global marketplace and the economic frame for judging the value of science align with Ceccarelli’s observation of an economic appeal in anti-Trump opinion editorials written by scientists. In Paxson’s speech, economic arguments are at the center, although war-on-science framing, which Ceccarelli also found in scientist opinion editorials, supplements the science-leads-to-prosperity frame.⁸⁵

After delineating what to her the scientific community stands for, Paxson identified the collective challenge of presenting research in ways that cast science as a collaborative undertaking, for the public good, and as a pathway to prosperity. This suggestion appears to

⁸⁵ Leah Ceccarelli, “The Defense of Science in the Public Sphere,” *Proceedings of the Ninth Conference of the International Society for the Study of Argumentation*, edited by Bart Garssen, Gordon R. Mitchell, and Jean H. M. Wagemans (Sic Sat, 2019), 192-3
http://cf.hum.uva.nl/issa/ISSA_2018_proceedings.pdf.

recognize that framing science with *eunoia*, a critical argument for legitimacy and purpose in the rhetoric of expertise, may help rebuild public trust.⁸⁶ Paxson explicitly affirmed this in stating that “evidence of impact [of science’s results] goes a long way toward building public trust and confidence around the value of science.” She argued that the value of science has been diminished in the public eye and must be restored through deliberative attempts to restore confidence and trust in science as an enterprise and in the scientists that conduct this work.

Paxson offered a practical suggestion for presenting research with such a goal, through learning to tell stories, and in particular, stories about how basic research builds the base for applied research. She argued that to restore confidence and trust, scientists must tell stories of why their collective work is vitally important to the everyday lives of members of the public they serve. Although Paxson acknowledged the open letters, marches, and political campaigns of scientists, they are not explicitly approved in the speech but treated as a reaction, a deviation from the ideal. She more conservatively recommended that scientists point to their accomplishments and impacts on the world and tell stories of how society has improved through scientific discovery. She concluded, “let’s go on with our research” and suggested the results will speak for themselves. This specter of the information-deficit model with the occasional scientist reminder serving to relieve the deficit is a troubling ending for her speech. If this is the advice that scientists are giving each other about how to respond to the rhetorical situation they face, it might explain why they are making little headway.

⁸⁶ E. Johanna Hartelius, *The Rhetoric of Expertise* (Lanham, MD: Lexington, 2010).

2.2 Presidential Address: Science and Technology for the Public Good

The Keynote speaker, Barbara Schaal, was last to speak. Dr. Schaal's accolades include Dean of the Faculty of Arts and Sciences and Distinguished Professor of Biology at Washington University in St. Louis, the first female Vice President of the National Academy of Sciences, counsel and envoy appointments by President Obama and Secretary Clinton, and a litany of research and service awards. Her opening PowerPoint slide reiterated the conference theme, "Science and Technology for the Public Good," and her first words were welcoming the "wonderfully diverse crowd here this evening" with a "special welcome to international visitors," thus building upon the previous speaker's emphasis of international collaboration as a foundation of science. Schaal explained that the conference theme of science and policy was chosen a year before because they knew it would be the start of a new presidential administration. She thereby normalized the sociopolitical context and depoliticized her activism by confirming that the theme was non-partisan, explaining that "with every administrative change there is always a sense of uncertainty, even if it is Democrat to Democrat or Republican to Republican, and that with all changes the case for science must be re-made." She did, however, acknowledge that to her this is a time of unanticipated uncertainty. She insisted that a clear and forceful defense of science is necessary so that "our government understands the essential, the critical, the necessary role that science plays in our lives." This theme was prominent in each of the speeches.

Although Schaal explained that there is uncertainty with every administrative change, she pointed to a particular concern throughout the last decade

that the entire scientific enterprise is under threat. That the position of science in the world is eroding. There is a concern that the role of science is being marginalized.

Concern that science will be discounted as just another belief system or another political system. Concern that there may be intensifying, even hostile...hostility, toward science, and we've seen that in many parts of the globe.

With such concerns and in view of such uncertainty, Schaal called for the entire scientific community to make a clear case for the role of science across our new administration and for the role of science in policy. She asserted that science is a public good and that it is essential for the wellbeing of all nations and that "we have a great story to tell." It is interesting that the 10-year time frame is used when a more accurate sense of uncertainty would encompass the George W. Bush administration's war on science. The territorial and directional metaphors here ("the position of science in the world is eroding," "the role of science is being marginalized") are the type of elitist appeals Ceccarelli warned scientists against using.⁸⁷

After this introduction, Schaal set the foundation for her argument with the claim that developments central to our everyday lives in the modern world, and which improve our lives, are based on scientific discovery. She then provided many examples, including advances in medicine, food and health, aeronautics, computers and IT, and energy, to name a few. She extended her defense of science beyond the taken-for-granted everyday technologies we all use, to make a case for science and technology producing jobs and providing strong and durable economies. She insisted that "science is an essential component of economic prosperity and a strong economy leads to a stable society." This use of economic framing is consistent throughout her address and helps her avoid the charge that scientist-citizens are politicizing science with their pro-science activism. This appeal to national wealth is well-designed to

⁸⁷ Leah Ceccarelli, *The Defense of Science in the Public Sphere*.

dampen the charge that her critique of the anti-science moves of a Republican administration is a partisan attack (and thus unworthy of a scientist).

To keep developing these everyday comforts and economic prosperity, she said that we need “to stimulate new technologies for the future, through the development of policies across the entire pipeline, from basic discovery through the deployment of those technologies.” It is at this point that she presented a PowerPoint slide that depicts this “pipeline,” a flow from discovery to basic research, to applied research, product development, and finally production. Her vision of the scientific enterprise as a unidirectional pipeline, with scientific achievement acting as the pressure forcing economic and social goods to the masses is an evocative metaphor. Restating this metaphor later in the speech, Schaal asked the audience “how do we keep the benefits flowing? How do we provide the discoveries that keep new industries growing?” Economic prosperity for science is correlated with trickle-down economic and social benefits for industry and the people who rely on it. In the context of the Republicans’ push for an actual pipeline (Keystone XL), and liberal critique of it, her alignment of science with a metaphoric pipeline seems calculated to further soften the partisan tone of her anti-Trump critique.

Schaal’s presentation emphasized the discovery and basic research aspects of the pipeline because they are the least understood and have been called into question repeatedly. She explained that the connection between curiosity-driven research and the benefits our society receives is not straightforward, but that all applied research rests on basic research. Herein lays the challenge for the scientific community: “it is really difficult for those outside of science to see the direct connection between a wide-ranging, diverse, apparently unfocused basic research enterprise and the development of new technologies and industries.” This conceptual difficulty

has led to the public mocking of research projects, the Golden Fleece awards, and Congress questioning basic research. The difficulty making a case for basic research is identified in the inability to predict the utility of a research project and the large amount of time it can sometimes take for basic research to prove fundamental to a valuable new technology. These features of basic science make it easily marginalized.

According to Schaal, the defense of science, and in particular basic research, must be made again and again “to educators and to the public which is the ultimate source of support for science.” She suggested that not having broad support will result in policies that dampen basic research and thus limit future developments that enhance lives globally. Yet despite the material goods that come from scientific research, she explained that the goal of the scientific enterprise is not for new industries and jobs but is also to develop an understanding of the biological and physical world, and the societies within it. Schaal acknowledged here a value that she shares with her audience of fellow scientists, even while arguing that another value must be embraced to get the public to support science.

At this point, Dr. Schaal talked about the value of social sciences in addressing social issues that challenge all nations, and she pointed out that these sciences seem to be the first to be “caught in the cultural and political crosshairs.” Even the humanities are included in her list of important, but threatened, social goods which is interesting since humanities are not included in the AAAS repertoire. This may be because when funding cuts are proposed, humanities tend to be the first in line, and saying nothing in those moments eliminates potential allies. Schaal pointed to the AAAS’s efforts alongside many other organizations to support education, with programs to capture the interest of students and work toward maintaining an environment where the lessons of science can be taught without fear of censure or reprisals. Schaal explained that

pushback against science education from religious or political groups harms science and the pipeline while undermining the education of students. Science education and strengthening the training of the next generation of scientists are missions of the AAAS and pushback against science education both hampers current economic development via the science pipeline and erodes the future of its maintenance and growth. The scientist-citizen here would be justified to speak out on behalf of science because of these threats.

Dr. Schaal identified two aspects of the scientific enterprise that seem to be under unusual scrutiny and threat in the United States: the ban on communication for some government agencies and the policies and executive orders, like the travel ban, which interfere with the conduct of science. She emphasized that “these are not political issues. Science is not a political construct or a belief system. Our concern is regarding the weakening of the scientific enterprise and the long-term harm to the nation and to the global output of science that might result.” Science being defined as an enterprise precludes science being understood as a community, profession, or a practice. This reprise of the economic metaphor (“enterprise,” “weakening,” “global output”) may grant her a route to claim that her statement is not political because it is about strengthening the American economy, a bipartisan goal. To represent scientist activists as nonpartisan (and thus, not easy to just dismiss as unscientific hacks politicizing science), she aligned science with economics.

With the best interest of the nation in mind, she acknowledged that “many of us feel that it is important to speak up, not as individuals with a political agenda, although all of us do have political opinions of course, but rather as scientists advocating for policies that foster science.” Here she most clearly commented on the dual identities of concerned citizen and scientist, with the scientist subjectivity taking the fore in advocating for science policy. She reminded her

scientist audience that a tenet of science is open and free communication, of ideas, methods, and results, and that stifling open communication across agencies, laboratories, and countries removes an essential component of the scientific enterprise. Regarding the recent immigration and visa policies, Schaal explained that this dampening of the international nature of science, by impeding the movement of people across borders, inhibits the benefits science provides for all people. These tenets match Dr. Richmond's description of science, speaking to the Mertonian norm of communism, yet might be considered the opposite of an American business ethos, where capitalistic gain, not sharing of communal goods, is privileged.

While displaying a slide titled "Speaking Truth to Power," Schaal elaborated on another role of science, to give an unbiased assessment of the current state of knowledge in a particular area, especially when that assessment is crucial to developing policy. "Policy needs to have a basis in facts and evidence," she said, but she reminded the audience that science is not the only factor in drawing up policy. Other factors she mentioned include social issues, timing, budget, international relationships, and economic considerations. Good policy then requires a lot of considerations, but Schaal explained that it "cannot be based on ignoring relevant information or a distortion of facts to conform to a political or cultural agenda." She again framed science as being "for the betterment of humankind" and traced this goal to the Age of Enlightenment. In a reprisal of her thesis statement, she explained "that's what we strive for in science. To use our understanding of the natural world to serve humanity, we need to hold these principles now, providing current, timely, and vetted information to our governments so policies serve all of society." The swift appointment of science advisors in the new administration is a means Schaal identified to guide policy and base policy in facts. Implicit in these principles is an assumption that the appropriate channel for serving society through science is through the legislature and

the executive branch of government. Providing research reports and congressional testimonies are the primary tools by which scientists can do this. Absent is an acknowledgment of the role of marches and petitions in persuading a broader public, identified (if not promoted) by Paxson.

In her concluding remarks, Schaal reminded her audience that “we have an obligation as members of the science community to clearly communicate the value of science. Science is a public good. And it is central to the functioning of governments, to the wellbeing of its citizens, and to the overall health of our economy, and the health of our planet.” She argued that the scientific community must oppose policies that restrict participation across borders based solely on religious or national origin. She identified climate change, new infectious diseases, and new sources of clean energy as challenges that “transcend political boundaries and require the global community to work on them.” “These are not political issues,” she insisted. She concluded her speech by stating that “it is our obligation as scientists and citizens. We need to speak up for science. We need to make the case for science. Join us at AAAS. Be a force for science.” This powerful call to action uses anaphora and short sentences for impact as she attempts to inspire inspiration in an audience sundered by recent challenges to their collective influence. Within institutional boundaries and professional norms, advocacy as a collective role for scientist-citizens is sanctioned.

2.3 Speaking Up for Science

Science is defined by all three speakers as rooted in collaboration and a free flow of ideas and people, which the travel ban and communication limitations impinge upon. The speakers also frame contemporary struggles as business as usual in the scientific enterprise, maintaining that the case for science must be periodically reasserted. One way that they make this case is by

highlighting the many developments that have enhanced everyday life, with the added intention of justifying the necessity of basic research which is most at risk of funding cuts. Economic framing was the primary approach of each speaker. They all insisted that science serves society and needs to focus on rebuilding public trust, an acknowledgment of the importance of eunoia. All encouraged the scientific community, donning their scientist subjectivity, to tell stories, and to speak out on its behalf, but discouraged them from doing so under the hat of the individual with a political agenda.

Acknowledgment of direct advocacy and interaction with the public is referenced but not sanctioned in any of these addresses. The institutionally sanctioned modus operandi is communication to policymakers, under the assumption that they speak for the people. With the first March for Science on the horizon and scientists finding themselves “compelled” to defend themselves and their place in society, it’s no surprise that war metaphors are prevalent through the speeches. But such metaphors establish an antagonistic relationship between scientists and nonscientists, which might not serve science well in the long term.

The three speeches worked together to construct an understanding of current socio-political events as standard in the lifecycle of the science and society relationship: “the truth is, we’ve seen this movie before,” “at various times in our history the scientific community has been compelled to respond to waves of science denial,” “with every administration change there is always a sense of uncertainty, even if it is Democrat to Democrat or Republican to Republican, and with all changes the case for science must be restated.” Each of these statements worked to depict science advocacy as non-partisan: “we must and we will continue to publicly speak up on these issues that are so critical for science to flourish and serve society,” “we stand for economic development as the gateway to prosperity,” “science is an essential component of economic

prosperity and a strong economy leads to a stable society.” An economic frame dominated these speeches as a means by which to transcend perceived partisanship. The scientist is backgrounded to the science they produce, and because it provides societal benefits, this pipeline must be maintained. These engineers of a fashion are called to duty only when repairs are required.

Chapter 3: LETTERS TO POWER: AUTHORITY APPEALS BY A NONPROFIT SCIENCE ORGANIZATION

In 2005, historian of science Naomi Oreskes reviewed 928 abstracts, published in refereed scientific journals, with the keywords “global climate change.”⁸⁸ None of the papers disagreed with the scientific consensus that the Earth’s climate is being affected by human activities. Perhaps more consequentially, Doran & Zimmerman (2009) surveyed 10,257 Earth scientists, asking them “Do you think human activity is a significant contributing factor in changing mean global temperatures?”⁸⁹ 97.4% answered yes, and in doing so, originated the 97% scientific consensus statistic. This finding has since been replicated.⁹⁰

⁸⁸ Naomi Oreskes, “The Scientific Consensus on Climate Change,” *Science* 7, no. 5 (October 2004 [corrected January 21, 2005]): 369-383.

⁸⁹ Peter Doran & Maggie Zimmerman, “Examining the Scientific Consensus on Climate Change,” *Eos* 90, no. 3 (January 2009): 22-23.

⁹⁰ William Anderegg et al., “Expert Credibility in Climate Change,” *Proceedings of the National Academy of Sciences* 107, no. 27 (July 2010): 12107-12109; John Cook et al., “Quantifying the Consensus on Anthropogenic Global Warming in the Scientific Literature,” *Environmental Research Letters* 8, no. 2. (2013); John Cook et al., “Consensus on Consensus: A Synthesis of Consensus Estimates on Human-Caused Global Warming,” *Environmental Research Letters* 11, no. 4 (2016).

Despite this scientific consensus, the public has been found to believe that scientists are nearly evenly divided as to whether human activity is causing climate change.⁹¹ Awareness of the consensus affects the public's acceptance of climate change and support for climate change action. The lack of awareness has contributed to Republican voters dismissing climate change as a serious agenda issue. Alarming, the American Republican party is the only "climate-denying conservative party in the world."⁹² When political leaders hold divergent positions on addressing climate change, the public becomes more polarized along party lines.⁹³ Even when Republican leaders do not actively deny the science, their followers do. Republicans comment on climate change significantly less often than Democrats, suggesting that in an era of political polarization, Republican voters take cues from Democratic leaders by choosing to reject climate science simply because leading Democrats express alarm about it.⁹⁴ Communicating the expert consensus on climate change has been found to decrease political polarization on the issue and

⁹¹ John Cook, "Consensus Confirmed: Over 90% of Climate Scientists Believe We're Causing Global Warming," *The Conversation* (April 14, 2016).

⁹² Dana Nuccitelli, "The Republican Party Stands Alone in Climate Denial," *The Guardian* (October 5, 2015) <https://www.theguardian.com/environment/climate-consensus-97-per-cent/2015/oct/05/the-republican-party-stands-alone-in-climate-denial>.

⁹³ Thad Kousser & Bruce Tranter, "The Influence of Political Leaders on Climate Change Attitudes," *Global Environmental Change* 50 (May 2018): 100-109.

⁹⁴ Eric Merkley & Dominik Stecula, "Party Elites or Manufactured Doubt? The Informational Context of Climate Change Polarization," *Science Communication* 40, no. 2 (April 2018): 258-274.

increase acceptance of climate science and climate change policies.⁹⁵ But doing so is no simple task since Republicans assume that scientists commenting on climate change are doing so from a partisan position.

The questions of when and how scientists should participate in public communication and policy debates are not new. Scientists who worked on the Manhattan Project founded the Federation of Atomic Scientists in 1945 with the mission of educating the public, press, and policymakers about important science and technology security problems.⁹⁶ Their 1949 Constitution explains that they “formed to meet the increasingly apparent responsibility of scientists in promoting the welfare of mankind and the achievement of a stable world peace. . . . The need for a more active political role of scientists has been brought into sharp focus by the atomic bomb.”⁹⁷ A similar nonprofit organization, the Bulletin of the Atomic Scientists, was also organized in 1945, to educate the public about nuclear weapons, and later, climate change. The theoretical physicist Stephen Hawking spoke at the Royal Society in London at a BAS conference in 2007, telling his audience that “As we stand at the brink of a second nuclear age and a period of unprecedented climate change, scientists have a special responsibility, once again, to inform the public and to advise leaders about the perils that humanity faces.” Because scientists understand the dangers of the technologies they have helped to create, “as citizens of

⁹⁵ Sander van der Linden, Anthony Leiserowitz, & Edward Maibach, “Gateway Illusion or Cultural Cognition Confusion?” *Journal of Science Communication* 16, no. 5 (2017): A04.

⁹⁶ The Federation of Atomic Scientists changed its name to the Federation of American Scientists in 1946.

⁹⁷ Federation of American Scientists. *Preamble to the Constitution, F.A.S.* (1949).

the world, we have a duty to share that knowledge. We have a duty, as well, to alert the public to the unnecessary risks that we live with every day . . . Scientists need to channel their efforts wisely and engage with the political process nationally and internationally.”⁹⁸ These organizations see scientists as responsible for the effects of their work on the world and as carrying a duty to mitigate these risks by communicating their specialized, exclusive knowledge to the public.

Albert Einstein similarly considered political action as connected to his self-image as a scientist. He believed that by observing the objective world, a true scientist overcomes selfish desires, and is thus qualified to provide moral standards for the social and political realms.⁹⁹ In this scientific rendition of Quintilian’s “good man, skilled in speaking,” Einstein expected social and political involvement from scientists. Not doing so he could only explain as a weakness of character. In a 1933 letter to physicist von Laue, he wrote “I do not share your view that the scientist should observe silence in political matters, that is human affairs in the broader sense. . . . Does such restraint not signify a lack of responsibility?”¹⁰⁰ Here we see technical expertise giving the scientist a responsibility to be “citizens of the world” concerned with “human affairs,” a social sphere in which the technical arena is subsumed.

⁹⁸ Steve Connor, “Hawking Warns: We Must Recognize the Catastrophic Dangers of Climate Change,” *The Independent* (January 18, 2007).

⁹⁹ Giuseppe Castagnetti et al., *Foundations in Disarray: Essays on Einstein’s Science and Politics in the Berlin Years* (Max Planck Institute for the History of Science, 1997).

¹⁰⁰ Otto Nathan & Heinz Norden, *Albert Einstein über den Frieden: Weltordnung oder Weltuntergang?* (Peter Lang, 1975): 234.

In response to signing an open letter urging Congress to trust mainstream climate research, Peter Gleick, climate scientist and president of the Pacific Institute, acknowledges that “there was a very strong feeling that it is our responsibility to try, and that even if the letter is ignored, it would be worse not to have reached out to Congress.”¹⁰¹ He points out that open letters are a common approach used by scientists to reach out to policymakers and the public.¹⁰² Scientists tend to have little political power, but open letters enable scientists to overcome their small numbers, limited budgets, and political naivete by publicly organizing to speak truth to power. Early examples of this rhetorical genre include a 1945 petition to the President of the United States from 70 Manhattan Project scientists and the Russell-Einstein Manifesto which called for world leaders to seek peaceful resolutions to forestall nuclear annihilation. The use of such letters by scientists and scientific organizations has proliferated in recent years.¹⁰³

To better understand how authority is conveyed in the public sphere by science advocacy organizations and how scientists try to avoid charges of partisan bias when acting as scientist-citizens, I analyze two open letters by the Union of Concerned Scientists in this chapter. Reception texts were then collected to determine if these letters were received as the analysis

¹⁰¹ Lauren Morello, “Lobbying: Award-winning Scientists ask Congress to take a ‘Fresh Look’ at Climate Change,” *Conservation Now* (February 2011) <http://conservation-now.blogspot.com/2011/02/lobbying-award-winning-scientists-ask.html>.

¹⁰² Peter Gleick, “From Nuclear War to Climate Change: Letters from Scientists to Policymakers,” *The Huffington Post* (December 1, 2016) <https://www.huffpost.com/entry/from-nuclear-war-to-climate-change-13354064>

¹⁰³ Gleick, *From Nuclear War to Climate Change*.

suggests. Both letters are exemplary of this genre because they have among the most considerable number and the most celebrated co-signatures, have received the most extensive media coverage, are addressed to policymakers and the public, and rely on consensus and authority appeals on behalf of the integrity of science and its place in decision-making.

The Union of Concerned Scientists (UCS) is a nonprofit science advocacy organization whose membership includes both professional scientists and private citizens. It was founded in 1969 at MIT by faculty and students with the aim of examining governmental policies where science and technology are of significance and ensuring that science and technology are used for the benefit of humanity.¹⁰⁴ An impetus for the formation of the UCS was nuclear proliferation and the use of scientific knowledge for the creation of weapons in the Vietnam War.¹⁰⁵ Their scope has since expanded to include problems of climate change and genetic manipulation. The UCS works to educate politicians and the public about world problems that have a grounding in science while also offering ways to address those problems.

The first open letter examined in this chapter is the UCS's 2004 "Scientist Statement on Restoring Scientific Integrity to Federal Policy Making."¹⁰⁶ This statement boasts Nobel

¹⁰⁴ Founding Document: 1968 MIT Faculty Statement," *Union of Concerned Scientists*, 1968, <http://www.ucsusa.org/about/founding-document-1968.html#.WMiOOfrLb0>.

¹⁰⁵ David Newton, *Science and Political Controversy: A Reference Handbook* (Santa Barbara, CA: ABC-CLIO, 2014).

¹⁰⁶ "2004 Scientist Statement on Restoring Scientific Integrity to Federal Policy Making," *Union of Concerned Scientists*, <https://www.ucsusa.org/our-work/center-science-and-democracy/promoting-scientific-integrity/scientists-sign-on-statement.html>.

laureates, leading medical experts, former federal agency directors, and university chairs and presidents as signers (including biologists David Baltimore, E.O. Wilson, and author of *The Population Bomb*, Paul Ehrlich). This letter, written in response to actions taken during George W. Bush's first term, will be compared to the UCS's 2016 letter "Science and the Public Interest: An Open Letter to President-Elect Trump and the 115th Congress."¹⁰⁷ Signed by 22 Nobel Prize winners and more than 5,000 other scientists, this letter, like the 2004 statement, articulates the role of science in society and the nature of current obstructions against the fulfillment of that role.

The rhetorical strategies used within the letters, written by the same organization but in response to the actions of two different executive administrations, will be documented and analyzed. This comparison allows us to both see what appeals shift as the letters move from past (after Bush's first term) to future-oriented (at the beginning of the Trump presidency) and track public interpretation of similarly themed messages. How might sociopolitical differences account for changes in the appeals used by the UCS and were their efforts persuasive in the two cases? As these letters reflect the collective voice of many scientists and relay collective understandings of science, they are a form of consensus appeal. They also reaffirm the importance of measured action and respectfully call upon political actors to take such action. The authors and signatories of these letters cultivate scientific ethos, and in particular its component phronesis. Because these letters are openly published, their audience is also the public. Responses from political actors to

¹⁰⁷ "Science and the Public Interest: An Open Letter to President-Elect Trump and the 115th Congress," *Union of Concerned Scientists*, <https://www.ucsusa.org/center-science-and-democracy/promoting-scientific-integrity/open-letter-president-elect-trump>.

these letters are scant, but through a consideration of the public responses that exist to these letters, I will provide evidence of the interpretation and perceived efficacy of this rhetorical genre and this particular set of appeals in a modern context of widespread skepticism of science.

3.1 Letters to Power

Open letters emerged as a useful medium of political activity in late eighteenth century Europe, giving a voice to anyone with a pen.¹⁰⁸ This discursive formation quickly made its way to the United States where it became a favorite genre for political debate in the colonial period.¹⁰⁹ Open letters tend to appear in two forms: letters to the public and letters addressed to specific correspondents that are then made public. Very often this latter form functions through apostrophe, where the letter to the addressed correspondent acts as a frame by which the author addresses a broader public.¹¹⁰ Such open letters typically are addressed to multiple audiences as were the letters in this study.

Browne suggests that open letters are a hybrid discursive form, which unites elements of familiar letters, the biblical epistle, and the didactic epistle with characteristics of political

¹⁰⁸ Mary A. Favret, *Romantic Correspondence: Women, Politics, and the Fiction of Letters* (Cambridge, UK: Cambridge University Press, 1993).

¹⁰⁹ Michael Warner, *The Letters of the Republic: Publication and the Public Sphere in Eighteenth-Century America* (Cambridge, MA: Harvard University Press, 1990).

¹¹⁰ James Jasinski, *Sourcebook on Rhetoric: Key Concepts in Contemporary Rhetorical Studies* (Thousand Oaks, CA: Sage Publications, 2001).

oration.¹¹¹ The Union of Concerned Scientists' 2004 *Scientist Statement on Restoring Scientific Integrity to Federal Policy Making* particularly relies on didacticism, as it exercises authority and gives instruction. Browne also argues that open letters provide readers with footing and standards for enacting political judgment.¹¹² This medium not only informs and argues but also enables personal experiences to fit the decorum of public arenas, thus bridging private and public life.¹¹³ Browne's observation that open letters are commonly used to rehabilitate personal character is also pertinent here. When considering the 2004 letter's didactic tone and prominent display of acclaimed and numerous cosigners, it can be seen to inform while also reaffirming the ethos of federal scientists in the realm of policymaking.

3.2 *Scientist Statement on Restoring Scientific Integrity to Federal Policy Making, 2004*

In 2003, Representative Henry Waxman asked the U.S. House of Representatives Committee on Government Reform to study how the Bush administration was dealing with federal scientists. The investigation found that the administration was interfering with the flow of scientific information in many areas, including environmental health, global warming, HIV/AIDS, and

¹¹¹ Stephen H. Browne, "Edmund Burke's *Letter to a Noble Lord*: A Textual Study in Political Philosophy and Rhetorical Action," *Communication Monographs* 55 (1988): 215-229.

¹¹² Browne, Edmund Burke's *Letter to a Noble Lord*; Stephen H. Browne, "The Pastoral Voice in John Dickerson's First *Letter From a Farmer in Pennsylvania*," *Quarterly Journal of Speech* 76 (1990): 46-57.

¹¹³ Jasinski, *Sourcebook on Rhetoric*.

lead poisoning.¹¹⁴ In 2004, the *Denver Post* reported that the Bush administration “has installed more than 100 top officials who were once lobbyists, attorneys or spokespeople for the industries they oversee,” many of whom benefitted their former industries; “they knew which changes to make because they had pushed for them as industry advocates.”¹¹⁵ In addition to these reports, the UCS had previously documented a number of abuses of science immediately preceding the release of their own 2004 report, including: industry influence on a lead poisoning prevention panel, the cancellation of an agricultural brochure telling farmers how to reduce greenhouse gas emissions, distortion of breast cancer science, suppression of information on air pollutants, the alteration of an EPA climate change science document, and the manipulation of endangered species science, among many other infringements.¹¹⁶

On February 18, 2014, the UCS held a press conference to announce the publication of *Scientific Integrity in Policymaking: An Investigation into the Bush Administration’s Misuse of Science*, a report that calls out the Bush administration for suppressing and misrepresenting scientific information. The UCS report stated that:

A growing number of scientists, policy makers, and technical specialists both inside and outside the government allege that the current Bush administration has suppressed or

¹¹⁴ Newton, *Science and Political Controversy*.

¹¹⁵ Anne C. Mulkern, “When Advocates Become Regulators,” *The Denver Post* (Denver, CO), (May 23, 2004) <http://www.commondreams.org/headlines04/0523-02.htm>

¹¹⁶ “Abuses of Science: Case Studies,” *Union of Concerned Scientists*, n.d., <http://www.ucsusa.org/our-work/center-science-and-democracy/promoting-scientific-integrity/abuses-science-case-studies#.WMhgqPkrI2w>

distorted the scientific analyses of federal agencies to bring these results in line with administration policy. In addition, these experts contend that irregularities in the appointment of scientific advisors and advisory panels are threatening to upset the legally mandated balance of these bodies.¹¹⁷

A public statement was released in conjunction with the report and signed by 62 preeminent scientists, including 20 Nobel laureates, National Medal of Science recipients, former senior advisers to administrations of both parties, and members of the National Academy of Sciences. After its release, those numbers grew to 48 Nobel laureates, 62 National Medal of Science recipients, 127 members of the National Academy of Sciences, and more than 15,000 U.S. scientists.¹¹⁸

The 2004 *Scientist Statement on Restoring Scientific Integrity to Federal Policy Making* relies on claims of nonpartisanship and arguments about the importance of scientific insight in policy making as it chastises the Bush administration for its interference in federal science.¹¹⁹

The letter begins with an apt quote from George H. W. Bush that previews these arguments:

Science, like any field of endeavor, relies on freedom of inquiry; and one of the hallmarks of that freedom is objectivity. Now, more than ever, on issues ranging from climate

¹¹⁷ “Scientific Integrity in Policy Making: An Investigation into the Bush Administration’s Misuse of Science,” *Union of Concerned Scientists*, 2004, http://www.ucsusa.org/sites/default/files/legacy/assets/documents/scientific_integrity/rsi_final_fullreport_1.pdf

¹¹⁸ Herbert N. Foerstel, *Toxic Mix?: A Handbook of Science and Politics* (Santa Barbara, CA: ABC-CLIO, 2010).

¹¹⁹ “Scientist Statement,” *Union of Concerned Scientists*.

change to AIDS research to genetic engineering to food additives, government relies on the impartial perspective of science for guidance (1990).¹²⁰

The freedom of inquiry expected for science is normalized when it is described as “like any field of endeavor.” Objectivity is prized in this description of freedom of inquiry. Merton stated that “objectivity precludes particularism” when describing his scientific norm of universalism and went further to say that “free access to scientific pursuits is a functional imperative.”¹²¹ Although objectivity can be seen within the broader framework of Merton’s institutional imperatives of modern science, it also immediately concerns organized skepticism. George H. W. Bush is reaffirming the value of such scientific norms and indirectly proclaiming that they should be respected by those outside the scientific community. This is a peculiar argument since in many fields of endeavor objectivity may not be necessary (i.e., business or the arts). Objectivity is not a hallmark of “freedom of inquiry” – but it is a hallmark of the scientific method. Neither the scientific method nor “Freedom of inquiry” is necessary for any “field of endeavor.” To align them all connects science with other American occupations and values. Regardless of the logic of this move, Bush Sr. acknowledges the urgency and importance of scientific input into policy-making processes as the government “relies on” impartial science “for guidance,” “now, more

¹²⁰ To see the quote in the context of the speech where it originally appeared, see George H. W. Bush, “Remarks to the National Academy of Science” (speech, Washington, D.C., April 23, 1990), *The American Presidency Project*, <https://www.presidency.ucsb.edu/documents/remarks-the-national-academy-sciences>.

¹²¹ Robert K. Merton, *The Sociology of Science: Theoretical and Empirical Investigations* (Chicago: University of Chicago Press, 1973).

than ever.” When the antagonist of the letter is Bush’s son, this reaffirmation, preceding the didactic scolding to come, is a robust criticism of the latter Bush administration.

The epigraph to the letter suggests that Bush Sr. was on board with the Mertonian norms of scientists. The letter itself argues that his stance, along with that of many public leaders before him, helped to create an exceptional United States. The UCS letter explains that the “successful application of science has played a large part in the policies that have made the United States of America the world’s *most powerful* nation and its citizens increasingly *prosperous* and *healthy*” (italics added). The public goods of free inquiry in science include benefits to citizens and the status of the nation as a global power. Per the letter, the objective consideration of scientific input “has long been adhered to by presidents and administrations of both parties,” however the George W. Bush administration has “disregarded this principle.” In an effort at proving that Republican administrations are not typically anti-science, Richard Nixon’s support of the Clean Air Act of 1970 is cited as “prevent[ing] more than 200,000 premature deaths and millions of cases of respiratory and cardiovascular disease.” George H. W. Bush is again cited for supporting the Clean Air Act Amendments of 1990 and bringing its benefits to the public. President George W. Bush is thus identified as an outlier, breaking a lengthy adherence to scientific advice in American politics.

It is significant that no Democratic presidents or cabinet officials are mentioned in the letter. The UCS is holding the then current Republican administration up against previous Republican administrations. In an attempt to avoid their criticism being dismissed as partisan, they avoid anything that could make it seem like they are charging a Republican war on

science.¹²² Measuring George W. Bush against other Republicans, the UCS can imply that their criticism is not coming from the left, but from the current administration's failure to follow 'universal' American values, shared by left and right alike. The UCS highlights the extraordinary nature of Bush's interference by saying "Other administrations have, on occasion, engaged in such practices, but not so systematically nor on so wide a front." They do not say which administrations have engaged in such practices in the past, being careful not to appear politically partisan.

The EPA administrator under Nixon and Ford is quoted lamenting the decisions of the current administration, complaining about "how radically we have moved away from regulation based on independent findings and professional analysis of science, health, and economic data by the responsible agency to regulation controlled by the White House and driven by political considerations." Notice here how it is not just scientific data that is being ignored, but also health and economic data. This is not being framed as Republicans versus science; it is being framed as George W. Bush versus the prudent assessment of independent findings and professional analysis (i.e., subjective politics versus objective judgment). Bush is accused of "often manipul[at]ing the process through which science enters into [political] decisions," "consistently misrepresenting findings," and "undermin[ing] the quality and independence of the scientific advisory system and the morale of the government's outstanding scientific personnel" "across a broad range of policy areas." The letter suggests that America and particularly American science has been exceptional, and such exceptionality has given rise to a myriad of social and economic benefits. The degree to which the Bush administration has interfered in federal science is rhetorically constructed as

¹²² Chris Mooney, *The Republican War on Science* (New York: Basic Books, 2006).

being exceptional too, but in a negative way. The nonpartisan respect for science demonstrated by many past political leaders parallels the scientist's objective, impartial search for truth. President George W. Bush, however, has failed to exhibit this virtue.

The *Scientist Statement* is marked by a distinct didactic tone. Beyond providing lessons on the benefits science has provided to Americans, there is a moral and reprimanding inflection throughout the letter. George W. Bush is claimed to have “disregarded the principle” of an “objective and impartial perspective,” a path which leads toward “perilous consequences.” He has “manipulated the process,” placed people “who have clear conflicts of interest” in positions of power, “disband[ed] existing advisory committees,” “censor[ed] and suppress[ed] reports,” “misrepresented scientific information,” “misled the public,” “consistently misrepresented findings,” and “suppressed a study . . . that found a bipartisan Senate clean air proposal would yield greater health benefits than the administration’s proposed Clear Skies Act.” UCS explains that “misrepresenting and suppressing scientific knowledge for political purposes can have serious consequences.” These accusations of bankrupt values and corrupt actions contrast with the depictions of environmental acts by Nixon and Bush Sr., which function as Republican moral exemplars in environmental policymaking, a legacy which the UCS believes the George W. Bush administration should better emulate.

This barrage of condemnation continues as the letter lists additional ways the Bush administration has “undermined the quality and independence of the scientific advisory system and the morale of the government’s outstanding personnel.” The administration “dropped” “highly qualified scientists” “dealing with childhood lead poisoning, environmental and reproductive health, and drug abuse,” “censor[ed]” Department of Health and Human Services, Agriculture, and Interior scientists, “support[ed] revisions to the Endangered Species Act that

would greatly constrain scientific input,” “disbanded” existing scientific advisory committees on nuclear weapons, and “disregarded the contrary assessment by experts” that Iraq had not sought materials for uranium enrichment. In the concluding calls to action, the letter summarizes these infractions as “the distortion of scientific knowledge for partisan political ends,” that risks the “well being” of the public. Lastly, the letter resignifies this strained relationship between science and politics as the result of moral bankruptcy, calling for a return to the “ethic” and “code of conduct” that once guided American government. It is necessary “to restore scientific integrity,” the letter argues, “in the formation and implementation of public policy.” The accusations by the UCS label Bush’s actions as intentional and immoral. Through emphasizing political interference in public health areas, in particular, the organization paints a picture of an administration that directly, and negatively, impacts all Americans.

The introduction to the letter on the UCS website expresses the desire of the co-signers to “serve our democracy with integrity and bring the full fruits of science to all Americans and to the world.” These scientists position themselves in a subservient role to benefit all Americans. In the letter itself, Bush is accused of “misrepresenting the findings of the National Academy of Science, government scientists, and the expert community at large.” The prestige of the National Academy of Sciences is presumed, and scientists are acknowledged to be in consensus regarding the science of climate change. Scientists are shown to better humanity, having “prevented more than 200,000 premature deaths and millions of cases of respiratory and cardiovascular disease” by advising Nixon to pass the Clean Air Act, and providing “additional benefits of comparable proportions” by advising George H. W. Bush to pass the Clean Air Act Amendments of 1990. The UCS letter refers to government scientists as “outstanding” and “highly qualified.” George W. Bush is also accused of having disregarded the assessments by “experts at Livermore, Los

Alamos and Oak Ridge National Laboratories,” three very well-respected American research institutions. Statements such as this not only critique Bush but praise those Republican presidents who adopt the proper stance toward expert advisors.

Throughout this didactic scolding of President Bush and his administration, the UCS rhetorically constructs a position of nonpartisanship. This construction is necessary to prevent the administration and its supporters from quickly dismissing the scathing claims as having partisan motivations. The reflective quote from George H. W. Bush creates an image of nonpartisanship as it points to a former Republican president as a model in this area. This rhetorical move is strengthened as the letter notes that “the principle has long been adhered to by presidents and administrations of both parties.” The stories of Nixon supporting the Clean Air Act of 1970 and George H. W. Bush supporting the Clean Air Act Amendments of 1990 further endorse this argument. Beyond presidents, the UCS point to a suppressed study that supported a “bipartisan Senate clean air proposal” over the Bush administration's Clear Skies Act. The Republican EPA administrator under Nixon and Ford even calls out the Bush administration for “radically” moving away from “independent findings and professional analysis” and toward “political considerations.”

However, beyond demonstrating the UCS's nonpartisan starting point by holding up other Republican administrations as positive models, the letter-writers relied primarily on appeals to scientific authority, not political authority. Consider, for example, their highlighting of the many and prominent cosigners of the letter. The website introduction to the letter exclaims “over 62 leading scientists—Nobel laureates, leading medical experts, former federal agency directors, and university chairs and presidents—signed the statement below Over the next four years, 15,000 U.S. scientists added their names in support.” Pointing to the sheer number of

signatures and their positions of prominence is an attempt to add credibility through consensus and authority appeals. These scientists and their institutions are imbued with authority for their stature and numbers, and any goodwill they might have conveyed through their praise of other Republican politicians and their pursuit and protection of research agendas that save lives and benefit the many pales in comparison.

A final observation I would like to make is that scientists often expect the Mertonian norms that structure scientists' self-perceptions to be respected and shared by those outside of the scientific community. This expectation is a transference of the discursive standards shared by members of a technical sphere onto members of the public sphere. Whereas Browne wrote about open letters as a bridge between personal and public spheres, the open letter of a professional scientific organization might serve as a bridge between technical and public spheres; the persistent display of scientists as a united, altruistic collective and not as concerned, moral citizens enables such bridging.¹²³ If the scientist subjectivity were displaced for more personal appeals, not as the weight of acclaimed scientists and their institutions but the appeals of motivated individuals, the open letter would be more open to accusations of political partisanship. Banding together under their scientist subjectivity and the goodwill they showed toward other Republican politicians allowed their scathing accusation against the Bush administration to meet the expectations of decorum within both spheres. By claiming that it is not just scientists that are victims, but citizens and moral codes that are under attack, these signers justify their political arguments and accusations as being within the expected purview of

¹²³Browne, *The Pastoral Voice*; Jasinski, *Sourcebook on Rhetoric*.

scientists' duty: to protect citizens and the professional norms of both science and American governance.

3.3 Reception Analysis

To assess whether these arguments were interpreted as decorous, it is necessary to turn to reception texts. Most news sources reporting on the release of the open letter and the report perceived the Union of Concerned Scientists and the letter signers to be acting out of nonpartisanship and to have been compelled to act by infringements on scientific norms and standards upon which the scientific community is based. Reporting the same day as the release of the documents, the *Seattle PI* reproduced many of the accusations made by the UCS.¹²⁴ They also reached out to a professor of zoology at the University of Washington, who said “I’ve never seen it this bad. People will always disagree on the interpretation of facts, but what’s going on now is the systematic suppression of information.” The *Seattle PI* then restated the number and prestige of the co-signers. The newspaper quoted UCS President Kurt Gottfried as saying “we’re not taking issue with administration policies. We’re taking issue with the administration’s distortion ... of science related to some of its policies.” Of note, again, is the harmed body being scientific integrity, not the fired and frustrated scientists impacted by administration interference. The rest of the articles I reviewed provide similar accounts to this *Seattle PI* article, although some included interviews from scientists who further backed up the UCS claims of suppression

¹²⁴ Seattle Post-Intelligencer Staff, “Scientists Rip Into Bush’s Policy, Charge ‘Suppression of Information,’ *Seattle Post-Intelligencer* (Seattle, WA), February 18, 2004 <http://www.seattlepi.com/national/article/Scientists-rip-into-Bush-s-policy-charge-1137320.php>

and manipulation as well as refutations from administration officials. The positionality of the scientists and the tone of their public scolding were not addressed, but their charges against the Bush administration were taken as facts revealed by whistleblowers.

The parties in the UCS letter did not stay silent. The *International Herald Tribune* gave the administration a chance to rebut the charges. It quoted a White House spokesman, who had not seen the report, but who said that the administration “makes decisions based on the best available science.”¹²⁵ John Marburger III, Director of the White House Office of Science and Technology Policy, was also quoted as finding the report “somewhat disappointing . . . because it makes some sweeping generalizations about policy in this administration that are based on a random selection of incidents and issues. . . . I don’t think it makes the case for the sweeping accusations that it makes.” Here Marburger stuck to the conjectural stasis, admitting that science is valuable and disputing the claim that Bush systematically disregards it. His was a charge of cherry-picking, a moral failing for scientists in that it demonstrates a lack of objectivity.

In a switch to the definitional stasis, Marburger acknowledged the assortment of prominent co-signers but said that the stature of those making the complaint is a sign that communication between the White House and the scientific community needs to be improved.¹²⁶ The meaning of the critique is described as a misunderstanding, not moral failures on the part of the administration. “We have to have a dialogue about what is actually happening, but this report does not do it,” he said. Marburger additionally said, in a shift now to qualitative stasis, “I think

¹²⁵ James Glanz, “Scientists Claim Bush Bends Data,” *The International Herald Tribune* (February 20, 2004).

¹²⁶ Glanz, Scientists Claim Bush Bends Data.

there are incidents where people have got their feathers ruffled. In most cases, these are not profound actions that were taken as the result of a policy. They are individual actions that are part of the normal processes within the agencies.”¹²⁷ This representation of the issue by Marburger is advantageous to the Bush administration.¹²⁸ Such refutations reflect a definitional and qualitative stasis wherein the actions by the Bush administration were not a conspiracy against science, but normal politico-scientific jostling. A more pointed alternative interpretation was offered by a Yale physicist who was a science adviser to President H. W. Bush, whom in tu quoque, accused the UCS of their own form of distortion, saying “you know perfectly well that it is very clearly a politically motivated statement.” This apologist’s failure to provide evidence of political motivation suggests just how rhetorically effective the UCS statement was - critics are left sputtering that “you know perfectly well” it must be politically motivated, without evidence from the text to back their claim. The same EPA administrator quoted in the open letter highlighted this failure when he told the Seattle PI, “I don’t see it as a partisan issue at all. If it becomes that way, I think it’s because the White House chooses to make it a partisan thing.”¹²⁹

An editorial printed the next day by Robert F. Kennedy, Jr. in *The Nation*, took the baldly partisan stance that the UCS tried to avoid, calling the Bush administration “flat-earthers . . . aided by right-wing allies who have produced assorted hired guns and conservative think tanks to

¹²⁷ Glanz, Scientists Claim Bush Bends Data.

¹²⁸ Lisa Keränen et al., “Myth, Mask, Shield, and Sword”: Dr. John H. Marburger III’s Rhetoric of Neutral Science for the Nation,” *Cultural Studies ↔ Critical Methodologies* 8, no. 2 (May 2008): 159-186.

¹²⁹ Seattle Post-Intelligencer Staff, Scientists Rip Into Bush’s Policy.

further their goals . . . to suppress science.”¹³⁰ He too touted the signers’ prestige and overall numbers. This article sees itself as allied with the scientist statement (although much more partisan) and adds many additional charges to the Bush administration’s rap sheet of politically-driven manipulations of science. One expert is quoted as saying “I’ve been regulating mining since 1966. This is the most lawless administration I’ve encountered. They have no regard to protecting miners or the people in mining communities. They are without scruples.” Perhaps the most interesting thing about this editorial is Kennedy’s comparison of science to theology, in that science “reveals truths about a changing world” and that “at their best, scientists are moral individuals whose business is to seek the truth.” Mirroring the moral language of the open letter but upping the ante with a religious analogy, Kennedy writes that the actions of the administration “undermine belief in the integrity of the scientific process,” thus aligning the administration with atheists whose sole purpose is to break the faith of the saved. Finally, he writes that “the Bush Administration has so violated and corrupted the institutional culture of government agencies charged with scientific research that it could take a generation for them to recover their integrity even if Bush is defeated this fall.” This article interprets the UCS letter in a way that justifies their political engagement as a defensive reaction from “moral individuals whose business is to seek the truth,” a heroic stand by victims of Bush’s anti-science policies.

The ethos appeal behind the consensus numbers was again reaffirmed in an editorial article that read:

¹³⁰ Robert F. Kennedy, Jr., “The Junk Science of George W. Bush,” *The Nation* (February 19, 2004) <https://www.thenation.com/article/junk-science-george-w-bush/>.

If the complaining scientists were simply diehard Democrats opposed to the administration's conservative agenda or a few cranks upset by cutbacks in research funding, their claims would be easy to dismiss. But this is a group of more than 60 respected academics, a dozen of whom are Nobel laureates and most of whom rarely speak out on political topics. . . . Not even the White House is disputing their credentials, only their conclusions.¹³¹

The warrant allowing the authors of this opinion piece to move from this evidence to this claim is flawed; respected academics who have won prestigious awards and rarely speak out on political topics can simultaneously be diehard Democrats angry about cutbacks in funding. But the fact that the authors of this editorial made the argument is more important than the fact that it is fallacious; they apparently thought the ethos appeal was compelling.

It also is of note that they immediately go to the matter of whether the signatories to the UCS letter are partisan, clearly a concern that the UCS was right to try to preempt in their argument design. The importance of this appeal to objectivity was also reaffirmed in a *Seattle Times* article, wherein the UCS director said in an interview that many scientists who signed the UCS statement "have served in many administrations, so when we say this is a new situation, there's some credibility to that. We're not just out of grad school."¹³² A consensus and stature

¹³¹ Editorial, "Don't Skew the Science," *The Globe and Mail* (Toronto, ON), February 23, 2004, <http://search.proquest.com.offcampus.lib.washington.edu/docview/383811798?accountid=14784>.

¹³² Rick Weiss, "Bush Adviser Defends Role of Science in Setting Policy – Rebuttal Issued to Researchers' Earlier Charges," *The Seattle Times* (April 4, 2004).

appeal is often used by the Union of Concerned Scientists in their open letters as well as by other science advocacy organizations historically and currently. Here the warrant is that age conveys objectivity; young people just out of grad school will go off reactionarily, but not older scientists.

On April 2, 2004, John Marburger issued a second statement dismissing and attempting to debunk the concerns raised in the UCS report and scientist statement. He said most of the accusations were false and, in some cases, “preposterous.”¹³³ He went on to write “the accusations in the document are inaccurate, and certainly do not justify the sweeping conclusions of either the document or the accompanying statement.” Regarding alterations to science advisory committee personnel, he said that the White House was determined to maintain balance on its committees and that asking for experts’ views on issues is a way to achieve diversity. He continued, saying “the accusation of a litmus test that must be met before someone can serve on an advisory panel is preposterous.” Perhaps most telling, he made the point that he was “a lifelong Democrat.” This is the same bipartisan appeal used in the Scientist Statement when it held up prior Republican presidents and administrators.

The point-by-point response by Marburger prompted the UCS to modify its report, which was re-released on April 19, 2004. Despite the revisions, the UCS stated that it “stands by the findings and conclusions of our report.”¹³⁴ The revised report found that the White House response failed to offer substantive evidence to support its claims and relied on arguments

¹³³ Andrew C. Revkin, “Bush’s Science Aide Rejects Claims of Distorted Facts,” *The New York Times*, April 3, 2004, http://www.nytimes.com/2004/04/03/us/bush-s-science-aide-rejects-claims-of-distorted-facts.html?_r=0.

¹³⁴ “Scientific Integrity in Policy Making,” *Union of Concerned Scientists*.

unrelated to the scientists' charges. UCS reported that since the February 2004 publication of the statement and report,

the administration has continued to undermine the integrity of science in policy making seemingly unchecked. Many scientists have spoken out about their frustration with an administration that has undermined the quality of the science that informs policy making by suppressing, distorting, or manipulating the work done by scientists at federal agencies and on scientific advisory panels.¹³⁵

Dr. Gottfried, chairman of the UCS, wrote that "it's possible there are things we got wrong. We're not infallible, like the Vatican or the White House. But I don't think there's any reason to think we got the big picture wrong. In fact, our case is stronger now than when we produced that report."¹³⁶ A *Seattle Times* article later reported on this transaction between the UCS and Marburger, writing that "As with the UCS document, Marburger's rebuttal is a blend of footnoted scientific documentation and personal assertions. Together the two documents offer a reminder that science is a mix of fact and interpretation—which can be difficult to tease apart."¹³⁷ This response suggests that the UCS's strategy was ineffective since it sparked a rebuttal from the administration that allowed it to be dismissed by the public as politics as usual - a mix of fact and interpretation - rather than being objectively true.

¹³⁵ "Scientific Integrity in Policy Making," Union of Concerned Scientists.

¹³⁶ Andrew C. Revkin, "Bush's Science Aide Rejects Claims"

¹³⁷Weiss, "Bush Adviser Defends."

However, there is other evidence that its long-term effect was positive. In President Bush's 2006 State of the Union Address, he vowed to "double the federal commitment to the most critical basic research programs in the physical sciences over the next 10 years."¹³⁸ One way of interpreting this move is as an olive branch to the scientific community. In the face of continued pressure by the UCS and the greater scientific community, Dr. Marburger stated that "the new proposals for increased science funding are not a response to critics of the president's science policy." Going further, he described the criticism from the scientific community as "irrelevant."¹³⁹ However, the explicit support of science that Bush offered at this point in his presidency is hard to interpret as anything but a defensive move. It was not the move that the UCS sought; they had not complained that the president was underfunding basic scientific research. They had complained that he was suppressing inconvenient scientific findings, ignoring science when making policy decisions, and dismissing advisory committees or stacking them with industry hacks. Increasing funding does not reverse those charges. But it does seek to reframe a presidency as more friendly to science.

The 2004 *Scientist Statement on Restoring Scientific Integrity to Federal Policy Making* illuminates one means by which scientists have expressed their grievances to those in political and public arenas. They presented themselves as nonpartisan, by

¹³⁸ George W. Bush, "State of the Union Address" (speech, Washington, D.C., January 31, 2006), *American Rhetoric*, <https://www.americanrhetoric.com/speeches/stateoftheunion2006>.

¹³⁹ Donald Kennedy, "Bush Science Push Fails to Transform Critics," *NPR* (February 26, 2006), <http://www.npr.org/templates/story/story.php?storyId=5232410>.

acknowledging the good of previous Republican administrations. They used that argument to mark the current administration as unprecedented in its perfidy. The UCS authors also decentered scientists' personal identity and instead relied on appeals to consensus and stature; they presented themselves not as disgruntled scientists but as defenders of the public good whose self-regulating standards were being circumvented by meddling political agents. Media that reported on the story predominately agreed with the UCS co-signers and perceived them as being nonpartisan. Dissenting voices accused the group of having a political and partisan orientation, but these alternative interpretations most often came from those closest to the administration in question, and offered little in the way of support for their interpretations.

The scientists who wrote the UCS statement took many rhetorical measures to construct an ethos that justified their open letter and framed its accusatory content as being both nonpartisan and within the purview of the social obligation of science. This ethos was the product of the rhetorical construction of American and scientific exceptionalism and an authoritarian didactic tone that came from the voice of a monolithic scientific community, speaking out in defense of the integrity of an expert advisory process. The UCS letter enabled scientists en masse to instruct the Bush administration on communal values and the importance of free inquiry in science and a robust scientific advisory team for the service of democracy.¹⁴⁰

¹⁴⁰ Further research into the rhetoric of Union of Concerned Scientists and the Bush administration can found in: Meredith Bagley, "Scientific Citizens in the Public Sphere: Integrity, Interference & Intervention," *Communication and Mass Media Complete* (2004); Sally

3.4 *Science and the Public Interest, 2016*

Twelve years later, the UCS published a second letter titled *Science and the Public Interest: An Open Letter to President-Elect Trump and the 115th Congress*.¹⁴¹ A study of similarities and differences between the two texts gives us an indication as to how the UCS believes they can most effectively communicate with the media, the public, and decision makers within the confines of their institutional position. Although the contexts of 2004 and 2016 are somewhat different, the similarities between the texts are apparent. The 2016 letter begins in a way that is almost identical to the 2004 letter. The 2004 letter begins: “Successful application of science has played a large part in the policies that have made the United States of America the world’s most powerful nation and its citizens increasingly prosperous and healthy.” The 2016 letter begins: “Scientific knowledge has

Jackson, “Designing Countermoves to Reshape a Disagreement Space,” *Proceedings of the Alta Conference on Argumentation* (National Communication Association/American Forensic Association, 2006); Mark Moore, “The Union of Concerned Scientists on the Uncertainty of Climate Change: A Study of Synecdochic Form,” *Environmental Communication* 3, no. 2 (July 2009): 191-205; Carolyn Rude, “Environmental Policy Making and the Report Genre,” *Technical Communication Quarterly* 6, no. 1 (1997): 77-90.

¹⁴¹ “Science and the Public Interest: An Open Letter to President-Elect Trump and the 115th Congress,” *Union of Concerned Scientists* (November 30, 2016), <https://www.ucsusa.org/center-science-and-democracy/promoting-scientific-integrity/open-letter-president-elect-trump#.XC-htVxKibg>.

played a critical role in making the United States a powerful and prosperous nation and improving the health and well-being of Americans and people around the world.” Both letters thus start out by reminding the reader of the role that science plays in society: through informing public policies, science allows the United States to become powerful, prosperous, and healthy. The foregrounding of this role for science as a generator of American exceptionalism and its myriad benefits dislodges stereotypes of scientists as being distant from public policy and science being limited to the ivory tower. The work of scientists has direct material consequences to Americans.

The centrality of scientists to American prosperity is presented as transcending the present politically polarized moment in both texts. The timing of the texts in the lifespan of their respective administrations is different, but the sense of responding to an illegitimate partisan challenge to science is similar. Whereas the 2004 letter was written at the end of George W. Bush’s first term, calling out the actions his administration had already done, the 2016 letter has a future orientation reminding the incoming Trump administration of the importance of science-based policymaking and threatening to “stand ready to hold accountable any who might seek to undermine it.” In the 2004 letter, the principle of including objective and impartial scientific input into policymaking “has long been adhered to by presidents and administrations of both parties,” with sole reference to Republican representatives like Nixon, Ford, and George H. W. Bush. Adherence to this principle “prevented more than 20,000 premature deaths and millions of cases of respiratory and cardiovascular disease” through the Clean Air Act of 1970 and its 190 amendments. The 2016 letter does not give respect to previous Republican administrations but it does introduce a transcendent appeal to democracy, wherein the

steps outlined in the letter “are necessary to create a thriving scientific enterprise that will strengthen our democracy and bring the full fruits of science to all Americans.” The economic frame of “scientific enterprise,” the patriotic frame of democracy, and the demonstration of *eunoia* by ensuring distribution of economic benefits to “all Americans” power this transcendent appeal to avoid accusations of this letter being a politically partisan attack.

Science in policymaking is identified in the 2004 letter as being traditional, the status quo, and the Bush administration is charged with having “disregarded this principle.” Because of his non-traditional political stance, the nation will not “benefit fully from its heavy investment in science research and education.” The 2016 letter is less explicit in making connections to the nation’s past but uses similar metaphors of stability and architecture when it recommends that the “Trump administration should ensure our nation’s *bedrock* public health and environmental laws—such as the Clean Air Act and the Endangered Species Act—retain a strong scientific *foundation*” (italics added). Both texts assume that our prosperity is built from sound science influencing policy. The concern that Trump will undermine the role of science in policymaking is depicted as a legitimate fear that he will interfere with an American tradition that has made us exceptional and undergirds our democracy.

Although the opening sentence from both letters is very similar (with the 2004 letter possibly serving as a template for the 2016 letter), the 2016 letter loses the didactic and scolding tone and appeals to Donald Trump, Congress, and the public to do the right thing in the immediate future. This future orientation is spread throughout the letter: it argues that “to build on this legacy...the federal government must support and rely on

science,” it details “actions Congress and the Trump administration should take,” it says “federal agencies should be led by officials with demonstrated track records,” it argues that without action “children will be more vulnerable to lead poisoning, more people will be exposed to unsafe drugs and medical devices, and we will be less prepared to limit the impacts of increasing extreme weather and rising seas,” and it states that “these steps are necessary to create a thriving scientific enterprise that will strengthen our democracy.” The kairos is different from the 2004 text, and this affects the inventional resources that can be drawn upon.

The 2004 letter had 4 years of a Bush administration to critique; the 2016 letter was written before Trump even took office (it was addressed to President-elect Trump). Bush’s poor treatment of science could be said to be unprecedented, but Trump’s would not be (since it had the precedent of Bush). This distinction points less to differences between administrations than to the timing of these letters, and the self-ascribed role of the Union of Concerned Scientists in its advocacy efforts. By 2016, they could no longer wait to see evidence of an administration’s neglect of science; their rhetoric became proactive rather than reactive. A didactic tone makes sense when harms have been documented (such as they did with the release of their 2004 report *Scientific Integrity in Policymaking*).¹⁴² This letter adopts a plaintive tone since it anticipates a Trump administration where science is fettered “by inappropriate political or corporate

¹⁴² Union of Concerned Scientists, *Scientific Integrity in Policymaking* (July 2004), https://www.ucsusa.org/sites/default/files/legacy/assets/documents/scientific_integrity/scientific_integrity_in_policy_making_july_2004_1.pdf.

influence,” much like the Bush administration before. In fact, their fears were well-founded; just a week after this letter was published, Donald Trump announced his intention to nominate Scott Pruitt as the EPA head despite Pruitt having sued the agency on multiple occasions, and despite the fact that he describing himself as “a leading advocate against the EPA’s activist agenda.”¹⁴³

The 2016 letter is titled “an open letter to President-Elect Trump and the 115th Congress,” but second person pronouns are not present. The audience is indicated at two other points in the text, when readers are told that “policy makers and the public” and “decision makers and the public” need high-quality scientific information. Throughout the text, science is described as “serv[ing] the public interest,” scientists are said to “conduct research in the public interest,” and “people benefit when our nation’s policies are informed by science.” These appeals to public interest suggest that the real audience is an American public, not Trump.

There is also some indication that the audience is imagined to be a friendly one, skeptical of Trump’s tendency to favor his supporters over all others. Readers are reminded that the Trump administration has the power to “extend the benefits of science to all people.” Unlike the earlier letter’s appeals to American history with reference to other American presidents, here democracy encompasses “Americans and people around the world,” “all Americans and the world,” and the broader claim that “diversity makes

¹⁴³ Chris Casteel, “Lawsuits by Oklahoma Attorney General Scott Pruitt, others Challenge Obamacare Subsidies,” *NewsOK* (December 5, 2013), [newsok.com/article/3911239/lawsuits-by-oklahoma-attorney-general-scott-pruitt-others-challenge-obamacare-subsidies](https://www.newsok.com/article/3911239/lawsuits-by-oklahoma-attorney-general-scott-pruitt-others-challenge-obamacare-subsidies).

science stronger.” These more inclusive extensions of American democracy are set out in the context of a litany of Trump campaign promises including building a wall along the southern border, banning foreign Muslims from entering the United States, and creating a database of Muslims in the country. Although those actions are not mentioned in the letter, they stand in its connotative shadow.

Calls for diversity and inclusion in the letter respond to threats foreshadowed by Trump’s campaign and election and are paired with promises about the economic and material benefits that unfettered science provides. The scientific community then is framed as both a potential ally and alert critic, “fully prepared to constructively engage with and closely monitor the actions of the Trump administration and Congress. We will continue to champion efforts that strengthen the role of science in policymaking and stand ready to hold accountable any who might seek to undermine it.” This promise to the American people is also a threat in the name of the people, past, present, and future.

3.5 2016 Reception Texts

How this promise and threat played out in reception texts, against the assumption that an open letter from scientists to a Republican president must be partisan (especially after the charge of a Republican war on science during the George W. Bush administration) was split along party lines, despite attempts to overcome those same partisan divisions. A report in the *Washington Post* took the warnings of the UCS scientists as fact and echoed

their call of respect for science in policymaking.¹⁴⁴ It noted that the signers of the open letter advised both Democratic and Republican administrators, that the 2016 letter echoes the 2004 letter, and that the 2016 letter failed to directly refer to George W. Bush despite the fact that many of the signatories and the UCS fought the curbs he imposed during his administration.¹⁴⁵ The partisan overtone came through in this report in the opening line that called the letter “the opening shot in a brewing war over scientific integrity in the future Trump administration,” and a later line reminding readers that the Bush administration “had come under fire for multiple science-related scandals.” The fact that the report was co-authored by Chris Mooney, author of a book titled *The Republican War on Science*, makes it likely that the use of a war metaphor to frame the matter was deliberate.

The Washington Post also approvingly quoted Obama reminding audiences “that one of the things that makes America unique is our ability to attract talent from around the world, to study at some of our greatest universities, and for us to have very practical, reasoned, fact-based empirical ways to figure out how we can make the world a slightly better place,” thus setting up a contrast between the more cosmopolitan Democratic

¹⁴⁴ Juliet Eilperin and Chris Mooney, “Over 2,000 Scientists Urge Trump to Respect Scientific Integrity and Independence,” *The Washington Post* (November 30, 2016), <https://www.washingtonpost.com/news/energy-environment/wp/2016/11/30/22-nobel-prize-winners-urge-trump-to-respect-scientific-integrity-and-independence/>.

¹⁴⁵ Eilperin and Mooney, Over 2,000 Scientists Urge Trump.

president and the incoming nativist Republican president-elect.¹⁴⁶ A similar account of the letter was published in the *Huffington Post*, where readers were reminded that “Trump has dismissed climate change as ‘bullshit’ and a Chinese hoax.”¹⁴⁷ The UCS’s efforts to advocate for science were described by the *Washington Post* report as “simply telling them what we think is going to be important” and a “hope [that] they pay attention.”¹⁴⁸ No other references to the motivations or partisan leanings of the scientists were made; instead, the report spoke to the matter-of-fact nature of the UCS claims and respect for their credibility.

One oppositional reading of the open letter was found in *The Heartlander*, the Heartland Institute’s newsletter, in a piece that quoted the line from the 2016 letter that “we will be less prepared to limit the impacts of increasing extreme weather.”¹⁴⁹ “This too is misleading,” the author claims, in a move that does not attribute political agendas to scientists but instead calls into question their expertise. He refers to the Nongovernmental International Panel on Climate Change (NIPCC), which called this

¹⁴⁶ Eilperin and Mooney, Over 2,000 Scientists Urge Trump.

¹⁴⁷ Chris Angelo, “2,300 Leading Scientists Send Trump A Clear Warning: We're Watching You,” *The Huffington Post* (December 1, 2016) https://www.huffpost.com/entry/2300-scientists-letter-donald-trump_n_583f2bcbe4b017f37fe238df.

¹⁴⁸ Eilperin and Mooney, “Over 2,000 Scientists Urge Trump.”

¹⁴⁹ Tom Harris, “Conservatives Must Strongly Support Trump On Climate Change,” *The Heartlander* (December 14, 2016) <https://www.heartland.org/news-opinion/news/conservatives-must-strongly-support-trump-on-climate-change>.

connection between global warming and extreme weather events a “commonly held perception,” or rather, “a misperception fostered by excessive media attention, and [one that] has no basis in facts.”¹⁵⁰ The NIPCC challenge to the official Intergovernmental Panel on Climate Change (IPCC) reports attempts to offer alternatives to the scientific consensus, suggesting that dissenting voices were intentionally excluded from the official statement. American exceptionalism materializes in the *Heartlander* article’s claim that a failure to follow the lead of President Trump in climate policy would be “a disaster for the United States and indeed for all nations that rely on a prosperous America for freedom.”¹⁵¹ This linkage of American exceptionalism and freedom is more closely aligned with the “Make America Great Again” slogan and vision popularized and enacted by Donald Trump than with the science-enabled American leadership that the UCS promotes. This refutation of one aspect of the scientific statements made in the 2016 open letter acts as a synecdoche for other climate science claims.¹⁵² The scientists aligned with a conservative ideology were seen by the *Heartlander* article as more credible than the UCS scientists, who were perceived as liberal in ideology.

¹⁵⁰ Craig D. Idso, Robert M. Carter, and S. Fred Singer, “Climate Change Reconsidered II: Physical Science,” *The Heartland Institute* (October 2013), <http://climatechangereconsidered.org/climate-change-reconsidered-ii-physical-science/>.

¹⁵¹ Harris, *Conservatives Must*.

¹⁵² Synecdoche as used by the Bush administration and critiqued by the Union of Concerned scientists has been analyzed by Moore, “The Union of Concerned Scientists.”

3.6 Power in Letters?

Consensus claims are made for non-scientist audiences and constitute an appeal to authority.¹⁵³ They are made in times when scientists feel compelled to act politically but without personal responsibility. In public communication, scientists may express scientific consensus on an issue (so that the audience cannot shop around) or make technical claims as a display of their expertise. In these letters, the authority of scientists is explicitly tied to serving the people, benefiting their everyday lives. As we saw with the Heartland Institute response to the 2016 letter, confirmation bias in a digitally-connected world allows for groups of purported experts to be found on any side of any issue, thus calling into question the process by which consensus claims are made, and thus those claims themselves.

If a consensus claim is not enough to limit “shopping around,” what more can we do to advance these scientific findings that are so pertinent to public policy? By demonstrating how they fulfill an exigency (or an impending one), experts appeal to *eunoia*, claiming that they serve the greater good. Being relevant to the everyday life of your audience gives the scientist power, especially when that benefit cannot be attained elsewhere. Educating oneself and working for the community’s betterment demonstrates a commitment to the polis, to serve interests beyond one’s own. The trust of the people is of paramount importance when technical experts make arguments in the public sphere, as epistemological grounds cannot be determined by the audience.

¹⁵³ Jean Goodwin, “The Authority of the IPCC First Assessment Report and the Manufacture of Consensus,” *National Communication Association Annual Conference, Chicago* (November 2009).

The Union of Concerned Scientists represents some of the most distinguished scientists alive. Through unifying to speak as one authoritative body, linking their work to the betterment of the economy and daily living, and articulating the scientific enterprise as grounded in values of democracy and American exceptionalism, the authors attempted to transcend challenges of political partisanship. The UCS published a press release alongside the 2016 open letter stating that “we intend with this statement to give members of the incoming administration and Congress a clear understanding of the standards we will hold them to; to give journalists and citizens across the nation our take on what to look out for.”¹⁵⁴ In a sense, they were preparing the citizenry to bear witness. They have seen this sort of thing before.

The *Washington Post* report on the release of the 2016 open letter saw this connection to the past as well, saying “While it does not directly refer to President George W. Bush’s eight years in office, many of the signatories spent years fighting the curbs imposed on federal scientists during that time.”¹⁵⁵ They report that this letter echoes the one directed at Bush in 2004 and that

The only difference is that at that time, the Bush administration had governed for some four years and had come under fire for multiple science-related scandals. Here, by contrast, scientists are seeking to prevent them by articulating the principle that

¹⁵⁴ Peter Frumhoff, “How the Trump Administration and Congress Should Use Science to Govern,” *Union of Concerned Scientists* (November 30, 2016) <https://blog.ucsusa.org/peter-frumhoff/how-the-trump-administration-and-congress-should-use-science-to-govern>.

¹⁵⁵ Eilperin and Mooney, “Over 2,000 Scientists Urge Trump”

government researchers should be able to follow the evidence where it leads, and should be free to communicate their results to the public.

To generate a voice loud enough to rise above accusations of political partisanship, the Union of Concerned Scientists did more than share a climate science consensus. They rearticulated their collective scientific ethos into expressions of phronesis, eunoia, and arete. When that service to the greater good is framed for an American audience in the language of American exceptionalism, the American Dream, and prosperity and health for all, climate science might have a heavier thumb on policy, and climate action perhaps may become more palatable, at least for those who are not so ideologically aligned with the administration as to be closed to listening to either critique of what has transpired or warnings against what might take place if the public fails to be vigilant.

Chapter 4: STAND UP FOR SCIENCE: AT THE INTERSECTION OF SCIENCE AND SOCIETY

As I detailed in chapter 2, Barbara Schaal’s 2017 AAAS Presidential Address and her opening speakers, Geraldine Richmond and Christina Paxson, spoke to the uncertainty of the enterprise of science under the new Trump administration.¹⁵⁶ They pointed to the travel ban executive order and communication limitations on federal scientists as obstructing the flow of science, from basic research to applications that contribute to the production of our individual and national prosperity. Although admitting that this is a time of particular uncertainty, the speakers normalized the turbulence as being “business as usual” at the intersection of science and public policy, and argued that the case for science must be periodically reasserted. To assert the value of science, the speakers called on their audience of scientists to speak up for science as part of their professional obligation.

However, the AAAS speakers defined the appropriate defense of science in such a way as to effectively divorce the scientist and citizen subjectivities. In their view, scientists should speak out on behalf of science but not as citizens with a partisan agenda since the politically-active citizen subjectivity threatens to contaminate the perceived ethos of the scientist subjectivity. Despite their articulation of sanctioned public engagement (in particular, communicating science to legislative representatives), they placed limits on whom scientists should engage, ignoring broader audiences that have also been the aim of scientist engagement in the past. The scientist-citizens who gathered outside this AAAS meeting did not neglect this broader public. Their

¹⁵⁶ Schaal, Paxson, and Richmond, “2017 Annual Meeting: AAAS President’s Address.”

sense of the proper public audience for scientists to address reflects a difference in assumptions about the separation of scientist and citizen identities, the professional norms and obligations of scientists, a citizen's duty, and the recognition of a contentious sociopolitical environment that encourages a sense of personal and communal introspection.

Public demonstrations are a form of public address that scientists have utilized on rare occasions to communicate with a broader public. The intended audience can be both those present in the immediate setting and those experiencing the demonstration as mediated through news coverage, significantly expanding visibility for the demonstrators and their cause. In this sense, the activists are not communicating “directly” with the public; their communication is mediated by news organizations. But they *are* communicating with a broader public and not just with legislators. Rallies organized and attended by scientists are unusual, but they are perhaps more remarkable because of this. Two such scientist rallies were held in the United States in December 2016 and February 2017, following the election of Donald Trump. The rallies were called “Stand Up for Science,” and were organized by ClimateTruth.Org, The Natural History Museum (a self-described “traveling pop-up museum that offers exhibitions, expeditions, educational workshops, and public programming”),¹⁵⁷ and the Union of Concerned Scientists. Each rally consisted of a series of speakers, most frequently scientists in lab coats, and was held outside of a professional science society annual conference, the 2016 American Geophysical Union (AGU) and the 2017 AAAS annual meetings.

A large contingent of the rallies' attendance consisted of members of the same science societies with whom the Stand Up for Science events coincided. The presence of rallies outside

¹⁵⁷ *The Natural History Museum*, <http://thenaturalhistorymuseum.org/about/>.

these conferences suggests a fracturing of the monolithic image of science and scientists portrayed by the opening speakers at the 2017 AAAS conference. Organizations, in this case, the AGU and the AAAS, are not merely a synecdoche for their membership. Here we see different rhetorical strategies at play that reflect differing values held within the greater scientific community.

4.1 Stand Up for Science San Francisco

On December 13th, 2016, scientists, reporters, and concerned citizens met in San Francisco to support science and protest the perceived anti-science bent of the incoming Trump administration. The rally coincided with the annual meeting of the AGU, the first mass gathering of climate scientists since, as one rally organizer put it, “climate deniers gained unprecedented power” with the victory of Donald Trump in the US election.¹⁵⁸ Roughly 500 people attended the rally, many from the neighboring academic conference. Nine speakers spoke over thirty-six minutes, including both scientists and representatives of NGOs.

The rally followed recent attempts by other scientists to respond to the same exigence, to advise the Trump administration and reassure the public that policy will still be informed by science: more than 800 earth scientists and energy experts signed a letter urging Donald Trump

¹⁵⁸ Beka Economopoulos (Stand Up for Science moderator), *Facebook*, Dec. 13, 2016, <https://www.facebook.com/events/310950549304143/>.

to take six steps to address climate change,¹⁵⁹ 11,000 women scientists signed a public pledge “to build a more inclusive society and scientific enterprise,”¹⁶⁰ leaders of twenty-nine scientific societies signed a letter encouraging Trump to appoint a “nationally respected” science advisor with sufficient expertise,¹⁶¹ and as I detailed in the previous chapter, more than two-thousand scientists and twenty-two Nobel prize winners wrote an open letter to Congress and the Trump administration to set a high bar for integrity, transparency, and independence in using science to inform federal policies. Additionally, Trump’s announcement of his intention to nominate Scott Pruitt as the head of the Environmental Protection Agency was on the minds of those present at the San Francisco rally.¹⁶²

¹⁵⁹ Michael D. Lemonick, “An Open Letter from Scientists to President-Elect Trump on Climate Change,” *Scientific American* (December 6, 2016), <https://blogs.scientificamerican.com/observations/an-open-letter-from-scientists-to-president-elect-trump-on-climate-change/>.

¹⁶⁰ 500 Women Scientists, “*Our Pledge*,” <https://500womenscientists.org/our-pledge>.

¹⁶¹ “AAAS Letter to Donald Trump,” https://mcprod.aaas.s3.amazonaws.com/s3fs-public/content_files/Multisociety%20CEO%20Transition%20Letter.pdf.

¹⁶² Chris Mooney, Brady Dennis, and Steven Mufson, “Trump names Scott Pruitt, Oklahoma Attorney General Suing EPA on Climate Change, to Head the EPA,” *Washington Post* (December 8, 2016), https://www.washingtonpost.com/news/energy-environment/wp/2016/12/07/trump-names-scott-pruitt-oklahoma-attorney-general-suing-epa-on-climate-change-to-head-the-epa/?utm_term=.7f5c82069b8b.

A Facebook event page was created for the rally, on which 182 discussion posts were made, most of which offered reaffirmations of the event's importance.¹⁶³ Some posts, however, raised questions, such as two posts asking "should we wear lab coats" to which the event organizer said "Yes! Scientists, please bring lab coats."¹⁶⁴ Three responses followed, suggesting that the participants should not bring lab coats, to "break the stereotypes," to not "allow detractors to say 'see? Only a few scientists showed up to this rally'" when those who lack lab coats (most climate scientists and nearly everyone traveling to a conference) attend the rally, and to help "politicians and the public ... understand that scientists are everyday people."¹⁶⁵ A response to that last comment clarified her objection to wearing lab coats by stating

Why are politicians and large swaths of the public so distrustful of scientists? At least part of the answer is that we are seen as unrelatable. The point for me is to not just stand up for science. It's also an interest in gaining an understanding of how we as a community can connect with a greater diversity of people (yes, even Breitbart readers)

¹⁶³ Rally to Stand Up for Science, *Facebook*, Accessed February 26, 2019, <https://www.facebook.com/events/310950549304143/>.

¹⁶⁴ Yarrow Axford, "Should We Wear Lab Coats?" *Facebook* (December 7, 2016); Beka Economopoulos, "Yes! Scientists, Please Bring Lab Coats!" *Facebook* (December 7, 2016), https://www.facebook.com/events/310950549304143/?active_tab=discussion.

¹⁶⁵ Mark Andrews, "Break the Stereotype." *Facebook* (December 8, 2016); Jessica Brunacini, "I Think we Should Leave the Lab Coats at Home," *Facebook* (December 9, 2016); Eugenie C. Scott, "Beka Economopoulos, please reconsider," *Facebook* (December 10, 2016), https://www.facebook.com/events/310950549304143/?active_tab=discussion.

more effectively to convey the meaning and value of what we do in order to build a stronger coalition of people who will also stand up for science.¹⁶⁶

In these comments, we see an insistence that scientists are regular people, members of the larger polis who are relatable and connected to nonscientists in essential ways. However, the event organizers did not respond to these suggestions to shed the lab coat, playing up instead the stereotypical image of the scientist for their mediated audience.

Wearing lab coats and holding signs, a group of people “stood up for science” and for getting “out of the lab and into the streets.” Before them was a crowd of hundreds, many with signs themselves.¹⁶⁷ A theme that ran throughout the speeches was that they were reluctant activists, forced by circumstances into public protest. As one speaker put it, “We don’t want to be here. None of us want to be here. We want to be in our labs, we want to be in the field, we want to be with our students. We want to be doing the work that we were trained and educated to do, which is science.”¹⁶⁸ The work of science is defined as being about discovery and understanding the natural world and using that information to make the world a better place for all people. Opening speaker and rally organizer Beka Ekonopolous pointed to decades of

¹⁶⁶ Jessica Brunacini, “No, That Misses the Point,” *Facebook* (December 9, 2016), https://www.facebook.com/events/310950549304143/?active_tab=discussion.

¹⁶⁷ Lizzie Johnson, “Geophysical Union Scientists Protest Trump Appointments,” *SFGate* (December 13, 2016), <https://www.sfgate.com/bayarea/article/Geophysical-Union-scientists-protest-Trump-10794212.php#photo-12039147>.

¹⁶⁸ ClimateTruth, “AGU SF Rally Video,” *Facebook*, Accessed February 26, 2017, <https://www.facebook.com/ClimateTruth/videos/1192543330793734/>.

misinformation and disinformation campaigns that she believes are largely responsible for bringing American science to this place. Peter Fromhoff, Director of Science and Policy at the Union of Concerned Scientists, warned in his speech that “science and evidence ... is at risk of being deeply interfered with in the context of this incoming administration. ... It is at risk of being ignored, disparaged, and disregarded.” The links between industry and electoral politics are recognized by these speakers and blamed for both the inadequate consideration of science in American policymaking and the exclusion of the voices of various publics and their interests.

Environmental justice framing was frequently used as were war metaphors. They said they were going to be “fighting for a price on carbon,” and “turning this great battleship of our country around,” they promised “we will fight back,” “defend our water,” defend our “communities under attack,” and “take on this fight during the Trump admin,” because “the battle goes on,” and we must “never let our lines be crossed without a fight.” There was also an active call to support indigenous and frontline communities like those at Standing Rock and Flint, that was missing from the 2017 AAAS addresses. These appeals to solidarity used combative language more commonly expected of a rally speech than a conference address or open letter. They conveyed a moral line being crossed that impacts more than the scientists themselves, who may be potential allies to the real victims. The victims of the environmental justice frame and scientists, who are typically viewed as authorities, were envisioned as standing in solidarity, giving the impression of scientists having a lower positionality than once perceived and being marginalized by the same political authorities who harmed the oppressed communities they aligned with.

Like the official speeches inside the AAAS meeting, the speakers outside the AGU meeting also said that “the politicization of science is nothing new. As long as there’s been

science, there's been politicization. Maybe they came up together." But these scientists pointed out that now more than ever, it is critical that scientists step forward and make their voices heard, not just to legislators, but to the broader American public. Scientists may want to stay in the lab, but at this moment they have to do something different, to stand up and be counted. In their rally speeches, the speakers insisted that it is not enough just to do science, but that "we have to get out and explain to people, this science matters." While the war metaphor persisted, the narrative of the scientists shifted from "scientists under attack" to "scientists fight back." As one of the speakers said, "Don't get depressed, get organized!" Bodily presence and strength in numbers coincided with a shift from a defensive to an offensive position, in contrast to the cases I examined in the previous chapters.

One speaker pointed out that for the several hundred outside rallying, there are thousands still within the conference and that for too long scientists have rested on the assumption that providing facts was enough. The contemporary moment, they claimed, is a wakeup call for the scientific community that standing up is required. They offered advice to their audience that scientists should not think about advocacy as a political *problem* for scientists but instead as an act in defense of science and a collective responsibility. The rally ended with the call to take what you feel now back into the conference, tell your friends, bring them out into the streets, and make some changes. The call was framed in the end as a moral stand against a war on science and chanting began: "water is life," "protect our communities," "stand up for science," "out of the lab, and into the streets." Stepping out of the sanctioned conference halls of their profession, these scientists called upon their brethren to similarly extend their efforts beyond traditional workspaces and comfort because those spaces are losing their public influence.

The day after the rally, Governor Jerry Brown of California gave a special lecture in which he told the AGU attendees that “it’s up to you as truth tellers, truth seekers, to mobilize all your efforts to fight back.”¹⁶⁹ Rather than characterize scientists as behind-the-scenes advisors to government officials, he described them as political activists, speaking truth to power in the public square. The Natural History Museum website later posted an article that recounted the event, saying “we captured hundreds of news headlines across the globe, and changed the narrative from ‘scientists under attack’ to ‘scientists fighting back.’”¹⁷⁰ The rally was covered in at least 41 news articles. In a BuzzFeed interview with the AGU president, Margaret Leinen acknowledged the concerns raised in the rally but urged calm, saying that “a lot of people like me have seen transitions before.”¹⁷¹ AGU member and NASA scientist Thomas Zurbuchen was also interviewed, urging people to “behave like scientists” and wait for evidence before jumping to conclusions.¹⁷² These sentiments of normalcy and professionalism were also reflected in the 2017 AAAS Annual Meeting Presidential Address held in Boston two months later. But there

¹⁶⁹ Steven Schmidt, “Jerry Brown speaks to AGU National Conf Dec 2016,” *Youtube* (December 14, 2016), <https://www.youtube.com/watch?v=5MLHWFO6DwE>.

¹⁷⁰ Hundreds of Scientists Take to the Streets, *The Natural History Museum*, <http://thenaturalhistorymuseum.org/hundreds-of-scientists-take-to-the-streets/>.

¹⁷¹ Peter Aldhous, “Threatened Climate Scientists Split Over How to Survive Trump,” *BuzzFeed News* (December 14, 2016), accessed February 27, 2019 <https://www.buzzfeednews.com/article/peteraldhous/climate-science-into-the-unknown>.

¹⁷² Peter Aldhous, Threatened Climate Scientists.

too, scientists took to the streets to offer a more radical message of the role of scientists as civic activists.

4.2 Stand up for Science Boston

A sequel to the Stand up for Science Rally at the AGU took place on February 19, 2017, a month after President Trump's inauguration. At that time the National Parks Service and Donald Trump engaged in an inauguration crowd size controversy, a media blackout and hiring freeze was ordered at the EPA, the travel ban executive order captured all headlines, and Scott Pruitt and Rex Tillerson were confirmed. This rally was held in Boston and coincided with the AAAS annual meeting. Many of the themes and speakers were the same, but the number of speakers increased as did the attendance. More than 3000 people turned up to stand up for science and listen to the twelve speakers, consisting of scientists, NGO representatives, and students. The rally was covered by at least 77 news articles.

The Facebook event page this time had 2000 confirmed attendees, 8000 interested, and 249 discussion posts.¹⁷³ A few days before the event, the organizer shared a link about the AAAS Presidential Address earlier that day (February 16th), saying “inspiring take from 3 powerful women in science on why scientists must speak truth to power and resist the anti-science and anti-immigration policies set by this admin #AAASmtg.” Two days later the organizer quoted the keynote speaker Barbara Schaal, who said, “The role of science is to speak truth to power” and “policy cannot be based on ignoring relevant info, nor can it be based on a distortion or a

¹⁷³ Rally to Stand Up for Science, *Facebook*, Accessed February 26, 2019, <https://www.facebook.com/events/1833064620300827/>.

twisting of facts to conform to a political or cultural agenda.” In the context of the speech, this was a recommendation that scientists speak directly to government officials, legislators and the like. In the context of a Facebook event page for a rally, this speech fragment connotes a kind of parrhesia in the public square that protestors offer. Speaking to the public instead, or in addition to public representatives, may stem from a feeling of impotency in communicating through governmental channels. Appealing to their voter base and the media may be more impactful.

A final discussion chain of note was started on the day before the rally. Someone posted a link to a news article with the comment “AP wire service story promoting tomorrow’s science rally #standupforscience.” The event organizer responded to this saying “CBS local picked up the story” and provided a link which read “Scientists plan Anti-Trump Rally in Boston Sunday to ‘Stand up for Science.’” The response to this post reads “calling it ‘anti-trump’ distracts from the purpose of the rally” to which the event organizer responded, “agreed, the rally is not framed as anti-trump by its organizers.” While Trump was frequently referred to in the rally speeches, an effort was made to project an image that the event was a defense of science, not an anti-Trump rally. This transcendence from partisan appeal was similar to those made in the AAAS speeches and the open letters, however the mechanism of this transcendence derived from parrhesia as a scientist-citizen, defending the public and the self as a citizen’s duty, rather than the business-as-usual appeals of the AAAS addresses and the appeals to tradition seen in the open letters.

At the event, chants began early: “we’re standing up for science,” “we’re here in alliance.”¹⁷⁴ Some speakers argued that the goal of the rally was to show the general public that

¹⁷⁴ The Natural History Museum, “Stand Up for Science Rally Boston Copley Sq,” *Youtube* (March 1, 2017) <https://www.youtube.com/watch?v=FQPd6rfqf0w>.

science protects our communities and makes our lives better and safeguards the future for all of us. The speakers each emphasized that science serves the common good and benefits all people, much like the prior AAAS speakers. They argued that science protects the health of our communities, the safety of our families, our children's education, and is the foundation of our economy; they argued that science creates jobs and a future we all want to live in and preserve for future generations. All these are justifications for the scientist speaking truth to power; these are the products and effects of science, not the science itself. As was detailed in the AAAS speeches, basic research is often the first on the science budget chopping block, often perceived as disconnected from the needs of society and embodying the ivory tower depiction of scientists.

A difference between this rally and the AAAS presidential address lies in the argument during the rally that attacks on science are attacks on our families, our communities, and our collective future. These claims may have been implicit in the AAAS address a few days before; they were explicit in the speeches at the rally. Despite this difference, a line from AAAS President Barbara Schaal was quoted in the rally, that speaking "truth to power" is fundamental to our collective wellbeing, that speaking truth to power is not partisan but is patriotic. They argued that both science itself and "the inalienable rights that scientists protect and uphold" are under attack. Throughout the rally speeches, scientists were framed as selfless heroes, protecting the populace, and upholding inalienable rights; they "are real-life super heroes," "they serve the public," "they protect the people," "protect our communities and make our lives better, and safeguards the future for all of us," "we're here because science serves the common good" and "protects the health of our communities," and since "science and democracy are inextricably linked," "standing up for science is a patriotic thing to do. Let's defend our democracy!" Here the scientist-citizen subjectivity is evoked more clearly and forcefully than the appeals to

tradition and positionality that comprised the conference speeches and the open letters. This shift accompanies the change in audience and may reflect an assumption that such appeals will break negative stereotypes of scientists or put a human face to them in the public eye.

Democracy was a frequent appeal in these speeches and was linked with the enterprise of science. The rally's location, Boston, was referenced as the place where our democracy was born. Speaker Naomi Oreskes asked her audience "what is more democratic than science?" She argued that it is not political to defend the integrity of facts and that we must stand together to be prepared to defend our colleagues if and when they need it. She offered an analogy that it is not political to defend your home when under attack just as it is not political to stand up for science, and although she admitted that it might be political to defend the concept of democracy, she suggested that it is not partisan, but rather, is a political value to which we all subscribe. She quoted Thomas Jefferson and Benjamin Franklin, saying "we must all hang together or most assuredly we will hang separately." The next speaker insisted that the "outcomes of our research have always extended beyond the lab, field, conference room. Science has always been political," and that it being political "is a feature, not a bug, because the intersections between science and politics are what make our research relevant, they're what make it matter." She claimed that just because science is political does not mean that it is partisan. When science is for everyone, it transcends boundaries and barriers, she argued. These appeals to American political iconography are similar to those made in the 2004 UCS open letter which drew on prominent Republican political figures as exemplars for the George W. Bush administration. In both cases, scientists made efforts to mitigate accusations of political partisanship with their target audiences.

The overlapping spheres of science and politics most clearly fused with the inclusion of speakers, in both rallies, who emphasized intersectionality, particularly environmental justice, and indigenous and frontline communities.¹⁷⁵ A shared theme was the insistence that scientists and frontline communities should be allies. Scientists who maintain a professional distance were accused of being silent in places like Standing Rock and Flint. Scientists who speak out are embraced. Indigenous knowledge was also referenced in both rallies. Different epistemologies between these communities and scientists were minimized, as both were seen to have similar goals: defense of the environment and its people.

Because the Boston rally followed the travel ban executive order by three weeks, it was a kairotic moment to unify science and immigration activists. To address the travel ban, the Boston speeches emphasized patriotism and an American history of integrating newcomers, a reframing of American history that allowed the speakers to create identification between immigrants and the American public. The speakers acknowledged the role of Boston's history in the formation of American democracy, referenced "unalienable rights" and other Constitutional rights, and quoted Thomas Jefferson and Benjamin Franklin. One speaker recounted their parents' story of immigrating to the United States to become "proud citizens" with advanced degrees, who dedicated their lives to promoting health and safety. Multiple speakers told personal narratives about immigrants pursuing the American Dream and used that frame to bring immigrants into

¹⁷⁵ The term 'frontline communities' refers to groups of people who endure continued, and often systemic, inequities and injustices of one or multiple forms. They are often comprised of people of color, people of lower socioeconomic status, immigrants, and those from rural areas, for example.

view as both citizens who cherish American values and as contributors to the public good, a telos shared by all rally speakers. Albert Einstein, who was also a refugee, was quoted as saying “those who have the privilege to know have the duty to act.” Einstein was an outspoken critic of scientists staying quiet during the rise of Nazi Germany and later the outcomes of continued nuclear weapon research and production. As one speaker put it, “standing up is a patriotic thing to do.” The division of the citizen and scientist subjectivities was here called into question, melding into the scientist-citizen who has a responsibility to speak up when sharing one’s expertise is vital to the public good.

4.3 Scientists on the Frontlines

Alluding to the coexisting citizen and scientist subjectivities, one Boston speaker told a story of a Harvard Professor who said to students “I don’t normally say this sort of thing, but now is the time for action. Do your best work as a scientist and your best work as a citizen.” Those that attended the Stand Up for Science marches did not divorce the two. They did their best work as scientist-citizens. The rally speakers targeted the general public via the news and social media, as well as scientists: those at home, those at the rally, and those still within the conference halls. A tone of fear ran through their speeches, derived from presidential precedent and an abundance of smoke emanating from Trump campaign promises and early administrative actions. A slippery slope was visible to everyone, leading to the loss of funding or jobs for many federal and university scientists and a perceived existential threat to future generations. This tone of fear was less evident in the prior cases studied as strength there came from exerting the image of an authority who sets the tone for other scientists and the administration, not the image of protestors responding to a perceived moral violation, as was present in the Stand Up for Science rallies.

Speaking truth to power was articulated as the frame by which to understand and justify the public engagement of scientists. The idea that scientists have privileged knowledge that can be of use to the public and an obligation to share that knowledge is not new.¹⁷⁶ Science was described by nearly all speakers as a pursuit of truth, and as serving the public good, now and in the future. Speaking out on behalf of science was portrayed as being patriotic as it defends all American citizens, and because it defends all, it becomes a transcendent appeal that creates the impression of not being politically partisan.

In rhetoric, *parrhesia* is a figure of speech which means “to speak candidly.”¹⁷⁷ In Plato’s *Gorgias*, the term is associated with “free speech” as opposed to sophistic rhetoric that bends to the will of whoever pays the speechwriter’s bill.¹⁷⁸ The freedom to speak candidly was a central component of Athenian democracy. As Socrates might attest, there can be consequences for speaking unpopular opinions to power. Michel Foucault developed the concept further as a mode of discourse.¹⁷⁹ To be recognized as using *parrhesia*, the *parrhesiate* must meet several conditions: hold a relationship to truth, be less socially powerful than whomever she is addressing, be a critic of popular opinion or culture, offer speech that brings personal risk, and persist through a sense of duty or obligation. Foucault explains further that the “Agora is the

¹⁷⁶ Lynda Walsh, *Scientists as Prophets: A Rhetorical Genealogy* (New York: Oxford University Press, 2013).

¹⁷⁷ Gideon Burton, “*Parrhesia*,” <http://rhetoric.byu.edu/figures/P/parrhesia.htm>.

¹⁷⁸ Plato, *Gorgias*, trans. Walter Hamilton and C. J. Emlyn-Jones (London: Penguin Classics, 2004).

¹⁷⁹ Michel Foucault, *Fearless Speech* (Los Angeles: Semiotexte, 2001).

place where parrhesia appears.”¹⁸⁰ The public airing of parrhesia creates a situation wherein “a sovereign shows himself to be a tyrant if he disregards his honest advisors or punishes them for what they have said.”¹⁸¹ In such cases, it may be necessary for parrhesiates to create public platforms outside of standards of decorum.¹⁸² Through breaking expectations for delivery, the parrhesiate “can amplify the transgressive nature of their parrhesia.”¹⁸³ Speaking out for science in the streets is breaking such expectations and adds impact to the speakers’ messages. Open letters may not be standard practice, but their use appears within the purview of scientific responsibility. Protest speeches are not.

American scientists, invoking the role of parrhesiates, both justify their activism in the face of perceptions that scientists should remain disinterested, and amplify the pressure of their messages on elected representatives. This move also opens scientists and science advocacy organizations up to effective coalition building with nonscientific organizations as a common telos is emphasized between scientists and activists for environmental justice, indigenous, frontline, and immigrant communities. These rallies and highly visible actions like the March for

¹⁸⁰ Foucault, *Fearless Speech*, 22.

¹⁸¹ Foucault, *Fearless Speech*, 23.

¹⁸² Ruth Osorio, “Embodying Truth: Sylvia Rivera’s Delivery of Parrhesia at the 1973 Christopher Street Liberation Day Rally.” *Rhetoric Review* 36, 2 (March 2017): 151-163.

¹⁸³ Osorio, *Embodying Truth*, 153.

Science help to constitute a new collective identity for scientists that introduces and validates the scientist-citizen subjectivity.¹⁸⁴

Science advocacy organizations may draw on other social movements as a model for how to bring in new members and promote collective action more effectively. Scientist advocates take risks when speaking out publicly, from threats of violence that often accompany public rallies to institutional funding cuts and censure. The merging of citizen and scientist subjectivities gives scientists a way to fulfill the compulsion of social duty from both subjectivities without one contaminating the other. Speaking truth to power, in these rallies, is portrayed as a defensive maneuver turned into an offensive action, built upon a definition of science as serving all people, and compliant with non-partisan patriotic ideals. This helps the scientists to mitigate claims of fulfilling partisan agendas that would tarnish the public perception of scientists' ethos.

Between 1969 and 1971 the leftist, socialist organization Science for the People used unconventional and disruptive tactics at the AAAS annual meetings to draw attention to their assertion that organized science, as ritualized at professional conferences, enables the reproduction of inequality in society.¹⁸⁵ These activist scientists used political theater and disrupted panels to bring into focus the neglected responsibility of scientists, as truth-seekers and truth-tellers, to do science for the people. As sociologist Kelly Moore points out, "Science for the People's main victory at the AAAS meeting was to raise the stakes of ignoring an increasingly

¹⁸⁴ Alberto Melucci, *Challenging Codes: Collective Action in the Information Age* (Cambridge, UK: Cambridge University Press, 1996).

¹⁸⁵ Kelly Moore, *Disrupting Science: Social Movements, American Scientists, and the Politics of the Military, 1945-1975* (Princeton, Princeton University Press, 2008).

vocal subgroup of scientists who wished to redirect science.”¹⁸⁶ Beyond drawing attention to the social obligations of the scientist and citizen, the more recent Stand Up for Science rally speakers also called upon their fellow scientists to redirect science at an institutional level, with these events coinciding with and located at major international professional science organization conferences.

Unlike the official speeches given inside the AAAS, these rally speeches envisioned scientists as citizen activists, not just government advisors. Such an image worked to connect scientists with broader publics. However, they were not always successful in developing that connection. Wearing lab coats was warned against in pre-rally Facebook event discussion posts, but the suggestion to leave such props at home was not heeded. This wardrobe choice acted to confirm a stereotype of the scientist and visually reify a difference between scientists and the rest of the public. While calls were made for coalition-building and the inclusion of diversity as integral to the enterprise of science, and thus the public good, identification with their public audience was impeded by their use of such props, maintaining an implicit understanding of this other audience as separate and unequal. Science communication scholarship suggests that scientists should emphasize social values and build trust when engaging with non-scientist audiences.¹⁸⁷ This can be done through a more thoughtful consideration of positionality. The scientist-citizen is of the people but has exclusive, pertinent knowledge. Efforts should be made to minimize the distinctions that may be perceived between the authority of scientists and the

¹⁸⁶ Moore, *Disrupting Science*, 164.

¹⁸⁷ Laura Lindenfeld et al., “Creating a Place for Environmental Communication Research in Sustainable Science,” *Environmental Communication* 6, no. 1 (2012): 23-43.

experiences of other members of the public. More direct engagement of scientists with the public has the potential to mend the science/society relationship, and should be encouraged institutionally.¹⁸⁸ Each group may then better understand each other and develop greater empathy for one another.

¹⁸⁸ Alan Leshner, “Science and Public Engagement,” *The Chronicle of Higher Education* (October 13, 2006).

Chapter 5: WHAT DO WE WANT? EVIDENCE-BASED CLAIMS! WHEN DO WE WANT IT? AFTER PEER REVIEW!

The public engagement of scientists under the newly elected Trump presidency manifested in several genres with varying degrees of interaction with the American public. Whereas professional science organizations like the American Geophysical Union and the American Association for the Advancement of Science both sent open letters to President Trump and his agency heads calling for the protection of scientific integrity, other groups of scientists took to the streets. The Stand Up for Science rallies outside of the annual meetings of these scientific societies called attention not just to the role that science plays in our everyday lives, but also to the importance of diversity and the free flow of people and ideas to the scientific enterprise. These linkages between the practice of science and diversity created opportunities for coalition building as represented by the many rally speakers from economic and environmental justice groups.

The environmental movement has particularly close ties to science, has practical claims to international solidarity, and often offers a critique of industrial capitalism.¹⁸⁹ In critiquing and offering alternatives to such an omnipotent force as industrial capitalism, forming broad coalitions becomes especially crucial for environmental and social justice organizations and activists. Shifting to a justice frame is one means by which NGOs can garner additional media

¹⁸⁹ Steven Yearley, “Social Movements and Environmental Change,” in *Social Theory and the Global Environment*, eds. Michael Redclift and Ted Benton (London: Routledge, 1994): 150–68.

attention and forge alliances that can enhance influence.¹⁹⁰ As many of the actions on the Trump campaign trail and early days of his Presidency particularly affected government scientists working on climate change issues, a defense comprised of diverse allies and the inclusion of a justice frame made sense. The Stand Up for Science rallies practiced this strategy, which was then utilized at an international level by the March for Science. The decision by the March organizers to embrace this strategy prompted introspection about the fine line between scientist advocacy and activism, where advocacy is the act or process of supporting, recommending, or representing an action or policy, and activism is viewed as taking more direct and vigorous actions to achieve a social or political goal.

On Earth Day, April 22nd, 2017, more than 1 million people attended March for Science rallies and marches around the world. The March for Science organizers stated on their website that “the March for Science champions robustly funded and publicly communicated science as a pillar of human freedom and prosperity” and that “we unite as a diverse, nonpartisan group to call for science that upholds the common good and for political leaders and policy makers to enact evidence based policies in the public interest.”¹⁹¹ This mission defines the March for Science as a “celebration of science” yet also a response to “an alarming trend toward discrediting scientific consensus and restricting scientific discovery.” The organizers acknowledge that the march has inspired conversation about whether scientists should be

¹⁹⁰ Jen Allan and Jennifer Hadden, “Exploring the Framing Power of NGOs in Global Climate Politics,” *Environmental Politics* 24, no. 4 (July 2017): 1-21.

¹⁹¹ “Our Mission,” March for Science, <https://web.archive.org/web/20170322024411/https://www.marchforscience.com/mission/> (March 8, 2017).

involved in politics at all, let alone during these alarming trends, to which they respond, “can we afford not to speak out in its defense?” Although previous presidents have asked for cutbacks in science agency budgets, mass marches to protest such proposed cuts are “pretty unprecedented,”¹⁹² and raise questions of why such public actions have been inhibited and why they are happening now.

The growing visibility of activist scientists has led to vibrant discussions between scientists and other citizens about what perspectives should be represented in protest actions and what their goals should be. The focus of this chapter is on understanding what happens when scientists organize alongside other members of the public as epistemological equals, to advocate for the restoration of scientific integrity in policymaking and to reaffirm the vital role that science plays in society. Whereas the chapters devoted to the conference address and open letter cases examined the public address of scientists speaking or writing from a position of professional privilege, this chapter and the previous chapter’s focus on the rallies and march for science examines advocacy not from the privileged position of technical expertise but from a self-professed position of equality alongside environmentalists, science enthusiasts, and community leaders. To understand the genesis of this strategy, this chapter analyzes the birth of the March for Science on the social news site Reddit and the transformation of its purpose and

¹⁹² Chris Mooney, “Historians say the March for Science is ‘pretty unprecedented’,”

Idaho Statesman (April 22, 2017) <https://www.idahostatesman.com/news/politics-government/article146169319.html>.

goals in the evolution of the official March for Science website.¹⁹³ Changes in the organizational structure and stated missions of the march illuminate the reflexive process of March organizers, scientists, and supporters as they mapped out the perceived confluence of scientific and citizen subjectivities. Recognition that science may be nonpartisan but is certainly political led to reflection on the tensions between professional and social obligations which pulled the scientist subjectivity both toward and away from direct engagement in the public sphere.

5.1 The Scientists' March on Washington

Scientists and their allies organizing the March for Science planned to unite as a diverse, nonpartisan group calling for science that upholds the common good. The scale and novelty of this form of public engagement merit closer examination. Earlier dubbed the “Scientists’ March on Washington,” the intended actions of concerned scientists was met with a social media and news article eruption about why scientists are marching, why some will not march, and why it might be a bad idea. This onslaught of discussion, attack, and feedback led to a transformation of the action into the March for Science, and in the process, the mission, principles, and goals of the movement changed. Of interest was the growing concern for and inclusion of nonscientist voices

¹⁹³ The digital Internet archive Wayback Machine (<https://archive.org/web/>) was used to collect the texts used in this study. The first recorded cached page from www.scientistsmarchonwashington.com was on January 25th, 2017. On February 2nd this web address began to redirect to www.marchforscience.com. Thirty-Two cached pages were compared for content changes until February 15th, when the Diversity Principles section of the March for Science page was added.

into the front and back stages of the March for Science and how this effort affected the perceived credibility and motives of scientists by the nonscientist public.

“There needs to be a Scientists' March on Washington.”¹⁹⁴ Beaverteeth92 – an unlikely moniker behind the catalyst for the science march – penned this comment January 20th, 2017 on the social news website Reddit.com in response to a Vice article that reported that all references to climate change had been deleted from the White House website.¹⁹⁵ This simple comment resonated with other users. Just four days earlier, over 200,000 people had marched in Washington DC for the inaugural Women’s March, with reports of over 3 million marchers worldwide.¹⁹⁶ The women’s march had been organized shortly after the election of US President

¹⁹⁴ dangzal. “All References to Climate Change Have Been Deleted From the White House Website.” *Reddit*, January 20, 2017 https://www.reddit.com/r/politics/comments/5p5civ/all_references_to_climate_change_have_been/dcojgl0/.

¹⁹⁵ Jason Koebler, “All References to Climate Change Have Been Deleted from the White House Website,” *Vice* (January 20, 2017) https://motherboard.vice.com/en_us/article/d7yeej/all-references-to-climate-change-have-been-deleted-from-the-white-house-website-5886b75d0b367c453f87dd14.

¹⁹⁶ Erica Chenoweth, “This Is What We Learned by Counting the Women’s Marches,” *The Washington Post* (February 7, 2017) https://www.washingtonpost.com/news/monkey-cage/wp/2017/02/07/this-is-what-we-learned-by-counting-the-womens-marches/?utm_term=.e67522a03186.

Donald Trump in November 2016, a candidate many saw as anti-woman.¹⁹⁷ The worldwide perception of successful protest through the women’s march led many to rally behind the idea of a scientists’ march. The President had a long history of arguably anti-science remarks both during and before his candidacy – in particular, having questioned the validity of climate change on multiple occasions, proposed deep cuts to environmental protections and research funding, and announcing his intention to nominate climate skeptics as agency heads, including as head of the EPA. The idea of a march to address not just the erasure of climate mentions on the White House website, but the general disregard for climate change science, resonated with many. Dozens of Reddit users responded positively to the proposal, and a participant in the original conversation created a Facebook page, Twitter feed, and a website to organize a march. The March for Science Facebook group grew from 200 members to 300,000 in less than a week, growing eventually to 800,000 members. The coexisting Facebook March event page quickly amassed a following of 30,000 in under a week. Prominent political leaders came out in support of the march, including 2016 Presidential hopeful Bernie Sanders.

Less than a day after the first mention of a Scientists’ March on Washington was coined on Reddit, the domain scientistsmarchonwashington.com was registered. The site featured the original March logo (with a typo) and a heading that read “the responsible application of science

¹⁹⁷ Courtney Weaver, Joe Rennison, Linday Whipp, and Nicole Bullock, “Trump Reacts to Mass Protests with Conciliatory Tweet,” *Financial Times* (January 22, 2017)

<https://www.ft.com/content/7b34cd82-dfe2-11e6-8405-9e5580d6e5fb>.

to government.”¹⁹⁸ The use of the word “responsible” aligns with the European Union’s “Responsible Research and Innovation” program for science ethics.¹⁹⁹ The directionality of the application imagined here – of science *to* government – is interesting for a march that is meant at least partially to protest a perceived reduction in government support for science (i.e., the application of government [funding] *to* science). This directionality is telling as it draws on the linear model of science (i.e., that scientific research leads to applications in the public sphere that lead to national wealth).



Note also their early logo with the picture of the upraised fist. This is a symbol of solidarity and support, probably most familiar in the contemporary American scene as the Black Power salute from the 1968 Olympics. This was considered a radical symbol at the time. The dark yellow, brown, and black coloring, and the black shading of this logo may help to evoke that meaning.

The first post to this blog site opens with a list of propositions of fact and policy that the site organizers accept to be provisionally true, ranging from acceptance of anthropogenic climate

¹⁹⁸ Scientists’ March on Washington, January 21, 2017, <https://web.archive.org/web/20170125030027/http://www.scientistsmarchonwashington.com/>.

¹⁹⁹ Horizon 2020, “Responsible Research and Innovation,” European Union, <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation>.

change and evolution to claims that an American government privileging ideological agendas over science and participating in the devaluing of expertise is dangerous. This list acts as a profession of faith that helps to constitute the scientific community. This post also delineates who can participate in the “Scientists’ March.” “Science is a methodology and a way of thinking. Anyone who uses and values these tools for understanding the world, not just professional scientists, may participate.” In response to the question “Isn’t science apolitical?” they respond “Yes. Scientists, however are not. The march is non-partisan, however, it is intended to have an impact on policy makers.” These earliest of official propositions and stances depict a march for the appreciation and defense of empirical research and its practitioners. These two entities are distinct, with science being seen as apolitical but its users being political agents, although not all belonging to a single political party.

The next day, January 22, U.S. Counselor to the President Kellyanne Conway uttered her infamous statement about “alternative facts.” Within days the Scientists’ March on Washington website was edited to say “there are certain things that we accept as ‘facts with no alternatives’” before continuing with the same list of what it had previously identified as “provisionally true” claims. The authors of the site (and organizers of the march) may have both been feeling pressure to adopt the language of certainty that we hear in public advocacy, rather than the careful language of hypotheses and conditionality that we hear in science, but this was likely also a response to Kellyanne Conway’s “alternative facts” quote that quickly began to circulate in liberal media. In this second draft, exigencies are laid out to justify the march, including the government’s slashing of funding and restricting scientists from communicating to the public. This was likely a response to the media blackout and contract freeze ordered by the EPA just two days before.

This draft also introduces a new name for the public action, the “March for Science,” perhaps in response to a January 25th comment that calls for a name change that is more inclusive.²⁰⁰ The heading on the top of the site did not change for a few days after the “March for Science” rename appeared in the body. The organizers made edits that broadened the intended audience, changing who can participate from “anyone who uses or values these tools [science] for understanding the world, not just professional scientists” to “anyone who believes in empirical science. That’s it. That’s the only requirement.” Then the response to the question of who can participate broadened yet again, changing to “anyone who values science.”²⁰¹ This decentering of scientists is also reflected in a new line in the introduction that claims, “this is a non-partisan issue that reaches far beyond people in the STEM fields and should concern anyone who values empirical research and science.” Edits were also made to the question “Isn’t science apolitical,” cutting the line that “Scientists, however are not.” This made the answer more definitive: “Yes. The march is non-partisan, however it is intended to have an impact on policy makers.” By calling science apolitical and the march non-partisan, the organizers sought to incorporate more people and ways of knowing into their action. The errant implication that scientists might, as a group, be political, and thus belong to the opposition political party, is removed.

²⁰⁰ “Scientists’ March on Washington,” *Wayback Machine* (January 26, 2017) <https://web.archive.org/web/20170126000227/http://www.scientistsmarchonwashington.com>.

²⁰¹ “Scientists’ March on Washington,” *Wayback Machine* (January 30, 2017) <https://web.archive.org/web/20170130034555/http://www.scientistsmarchonwashington.com/>.

The first mention of diversity appears in the comments section to the website on the morning of January 25th. It exclaims that persons with disabilities are also scientists and that diversity should be discussed and planned.²⁰² This suggestion materialized in a revised statement on “What is the Scientists’ March on Washington” that added a diversity statement that read

We will both have a diversity committee and a diverse steering committee that represents people of many backgrounds and identities. Science is done by POC, women, immigrants, LGBTQ, indigenous people, people of all beliefs and non-beliefs. We hope that this diversity is reflected in both the leadership of the march and the march itself.²⁰³

Note that diversity here is defining the scientists – they are a diverse group.

By January 30th, three days after President Trump signed Executive Order 13769 banning visitors to the United States from seven Muslim-majority countries, this diversity statement had expanded to become the most extensive section on the page. The march organizers acknowledge in this section that “these changes [gag orders, funding freezes, and reversing science-based policies] will differently and disproportionately affect minority scientists, science advocates, and the global communities impacted by these changes in American policies.”

²⁰² JacquelineDare’sMommy, “PWDs (persons with disabilities) are also scientists,” *Scientists’ March on Washington* (January 25, 2017), Internet Archive <https://web.archive.org/web/20170126002245/http://www.scientistsmarchonwashington.com/2017/01/what-is-scientists-march-on-washington.html#comment-form>.

²⁰³ “Scientists’ March for Science,” *Wayback Machine* (January 25, 2017) <https://web.archive.org/web/20170125162949/http://www.scientistsmarchonwashington.com/>.

In a direct acknowledgment of their close attention to public feedback, the March organizers stated that “We take seriously your concerns that for this march to be meaningful, we must centralize diversity of the march’s organizers at all levels of planning. Diversity must also be reflected in the march itself, both through the mission statement and those who participate. We hear you and thank you for your criticism.”²⁰⁴ The list of accomplices expanded in subsequent versions to include Asian and Pacific Islander, black, Latinx, people with disabilities, poor, agender, intersex, and non-binary scientists and science advocates. From defending anyone who uses science as a tool, to defending anyone who believes in empirical science as an epistemology, to defending anyone who advocates for science from a number of minority populations, the goal of the movement shifted toward populism, identifying the breadth of demographics and identities of scientists and science supporters. Notice the first description of diversity was of the makeup of scientists themselves, but following the travel ban executive order, diversity was reframed to also bring nonscientists to the march. The travel ban was politically charged and moved thousands to protest at airports. It energized opponents of Trump, and since science relies on the free flow of ideas and people, as we were reminded by Barbara Schaal in her AAAS address, reaction to the travel ban provided a stronger link between the scientific community and potential allies in the general public.

²⁰⁴ “Scientists’ March on Science,” *Wayback Machine* (January 30, 2017) <https://web.archive.org/web/20170130034555/http://www.scientistmarchonwashington.com/>

5.2 March for Science

Scientistsmarchonwashington.com began to redirect to the website marchforscience.com on February 3rd. Some significant changes happened with the new branding which included an updated logo.²⁰⁵



Rather than aligning with radical social movements like Black Power with their logo, they are aligned now with a 1950s image of atomic power rings, from a time when science was revered in America. Those rings circle around an image of the earth, as a reminder that the march is connected to Earth Day, which is also marked by the date and a label reminding us what that date means. The connectedness of the march to nonscientists is reduced with the atomic symbol. They are not aligned with a marginalized group anymore, as they were when they adopted the raised fist. At the very time that they're trying to be more inclusive, they adopt an abstract symbol of science as central, rather than of scientists as political activists. On the other hand, the alignment with environmentalists through the image of the earth from outer space and the Earth Day reminder connects them with nonscientists too.

Other changes are worthy of attention as well. First, the March for Science was described as a “celebration of our passion for science and a call to support and safeguard the scientific

²⁰⁵ “March for Science,” *Wayback Machine* (February 3, 2017)

<https://web.archive.org/web/20170203014734/https://www.marchforscience.com/>.

community.” The first part of this passage reflects a shift in tone that conveys a softer theme of celebrating passion for science, which may act to deflect perceptions of scientists as politically partisan, attacking conservative policymakers and their supporters. However, the second part suggests a defensive position insofar as a need to safeguard the scientific community implies that the community is under attack, thus creating contrast with the celebration theme. The heading just under the new logo reads “SCIENCE, NOT SILENCE” and before the second paragraph viewers are told that “ON APRIL 22, 2017, WE WALK OUT OF THE LAB AND INTO THE STREETS.” These headings convey the language of public protest actions. More significantly, they identify the authors of that action as scientists only, since scientists are the ones with the expertise to counter silence with science, and scientists are the “we” who walk out of the lab and into the streets.

Current policy change exigencies are referenced as having “caused heightened worry among scientists, and the incredible and immediate outpouring of support has made clear that these concerns are also shared by hundreds of thousands of people around the world.” United-front coalitions are alluded to here to create a sense of consensus and elevated public interest, but the worry originates with scientists, and they are the ones who are getting support.

The participants of the March for Science are now defined even more broadly, as: scientists and science enthusiasts. We come from all races, all religions, all gender identities, all sexual orientations, all sociopolitical backgrounds, all political perspectives, and all nationalities. Our diversity is our greatest strength: a wealth of opinions, perspectives, and ideas is critical for the scientific process. What unites us is a love of science and an insatiable curiosity. We recognize that science is everywhere and affects everyone.

The early participant demarcations included those who use and value science as a tool, an empirical process, and a valued epistemology; these descriptions are no longer present on the new March for Science site that lumps together scientists and science enthusiasts. The prominent effort to display inclusivity of participation in the march is a stance in sharp contrast to the authoritative and non-diverse ethos that powered the open letters and conference addresses. The text depicts diversity as a part of the scientific process, bringing in new perspectives and ideas for problem-solving, yet it also depicts diversity from a social justice frame, identifying minority populations as disproportionately victimized by changes to science policy.²⁰⁶

Multiple definitions of participants can speak to different target audiences to win their favor, with any presumed antagonism between empirical epistemology and a plurality of ways of knowing (as in Kellyanne Conway’s “alternative facts”) being bypassed through a strategy of transcendence; alternative perspectives lead to singular facts. Economic and social justice organizations and supports can more readily lend their influence to the March for Science when their interests are permitted to be expressed in their own words and when the coalition members are treated as equals with mutual goals. Hugh Duncan, drawing on Burke, perceives transcendence as a form of “symbolic transformation” when an act of selfish acquisition transforms into a more significant act of protection.²⁰⁷ Transcendence can also be conceptualized

²⁰⁶ Scientists’ March for Science, “Diversity,” Wayback Machine (January 30, 2017)

<https://web.archive.org/web/20170203014734/https://www.marchforscience.com/>.

²⁰⁷ Hugh Duncan, *Communication and Social Order* (London, Oxford Uni. Press, 1962).

as alleviating the sense of fragmentation which characterizes contemporary society.²⁰⁸ As minority identities are redefined and reaffirmed through public acts and movements, it may be that unifying values and goals are sought in fragmented liberal polities.²⁰⁹ Science serves that role in the planning for the March for Science.

Unifying messages come through in the form of *eunoia* demonstrated through concern for people adversely affected by changes to science policy. The new site's diversity statement was mostly intact from the old site, only adding Muslim and non-religious identities to the list. The revised mission statement states in bold that:

the march for science champions publicly funded and publicly communicated science as a pillar of human freedom and prosperity. We unite as a diverse, nonpartisan group to call for science that upholds the common good, and for political leaders and policymakers to enact evidence-based policies in the public interest.

Yet despite the ecumenical spirit of the list of demographically diverse participants and the vision of a "common" good being upheld by a shared commitment to "evidence-based" policy, at the center of this united front are the scientists whose work "is the greatest hope for the future." Science and democracy are joined, and in doing so, the site articulates a perceived social duty held by science and scientists. All people benefit from and can defend science, but only scientists

²⁰⁸ Janice Rushing, "E.T. as Rhetorical Transcendence," *Quarterly Journal of Speech*, no. 71 (1985): 188-203.

²⁰⁹ Alberto Melucci, *Challenging Codes: Collective Action in the Information Age* (Cambridge: Cambridge University Press, 1996).

have the expertise and prophetic ethos to light the path toward economic growth and societal progress.²¹⁰

Just days later the website messaging changed again. Now a justification for the march includes the mischaracterization of science as a partisan issue which has “given policymakers permission to reject overwhelming evidence” as a “critical and urgent matter.” Most notably, however, is an addition under the “March with Us” heading of a statement that reads “the March for Science is an international movement, led by organizers distributed around the globe. This movement is taking place because of the simultaneous realization by thousands of scientists, and science enthusiasts that staying silent is no longer an option.” These sentiments of self-realization continue with the further backgrounding of the scientist in favor of transcendence; the text says “it’s not about scientists or politicians, it’s about the very real role that science plays in each of our lives and the need to respect and encourage research that gives us insight into the world.” The site then points out the recent process of deliberation experienced by the community: “The march generated a great deal of conversation around whether or not scientists should involve themselves in politics.” The conclusion they draw is one of civic responsibility, the necessity to act in the public sphere when the times call for it. Speaking out in defense of science, as articulated here, reaffirms that science is apolitical but must become political in this revolutionary moment of an imminent anti-science paradigm shift in modern political thought.

This hardening of a scientist’s obligation to enter the political arena and public sphere in defense of science may have hit a crescendo with the March for Science, but marches in defense

²¹⁰ Lynda Walsh, *Scientists as Prophets: A Rhetorical Genealogy* (Oxford: Oxford University Press, 2013).

of science funding and the necessity for science to inform policy have precedent, admittedly on a much smaller scale, such as the 2012 Death of Evidence funeral processions in London and Ottawa, the 2013 Stand up for Science rally in Ottawa, the Stand up for Science block in the 2014 Peoples' Climate March, and well-represented 500 Women Scientists presence in the 2017 Women's March. However, these marches did not respond so much to the perceived existential threat to the epistemological value of science that the March for Science organized around. As reflected in the origin and evolution of the March for Science website, this realization was accelerated by social media commentary and particularly acute challenges from the political arena.

With the publication of the second March for Science website, edits and wordsmithing ceased. No comment section was provided either. The March for Science mission, principles, and goals as described on their websites evolved toward coalition building with diverse others, yet spoke solely of the practitioners and advocates of science (who are themselves diverse) guiding society toward prosperity. This separate but (un)equal stance also manifests in the inside jokes and science puns,²¹¹ and lab coat adorned marchers, which reaffirm a distinct identity for scientists from the rest of the science advocates and community organizers.

²¹¹ The signs carried by march participants included the follow, among many others: "More Peer Review, Fewer Alternative Facts," "Time to React," "What do we Want? Evidence-Based Science. When do we Want it? After Peer Review," "I Was Told to Bring a Sign." Politico Staff, "21 of the Best March for Science Protest Signs," *Politico* (April 22, 2017), <https://www.politico.com/gallery/2017/04/22/march-for-science-best-protest-signs-photos-002423?slide=20>. "This is Not What I Meant by Descent of Man," "Protest Sine, Protest

In a particularly fraught climate of anti-authority authority figures running the federal government, the reenactment of the scientists' stereotype may not bridge an ever-widening divide between the public and scientists, who are themselves often viewed as figures of the establishment. As science advocacy has become more embedded in existing, intersectional advocacy, a conflict arises between maintaining a subjectivity of privilege that embraces some truths as more real than others, as measured through communal norms that bend toward objectivity, and the inclusion of diverse ways of knowing, to which many nonscientists subscribe. To overcome this bind, the March for Science seeks to transcend the difference, as they suggest on their website, by embracing diversity as a means toward achieving objective truth. As they put it, "a wealth of opinions, perspectives, and ideas is critical for the scientific process." Science is thus nestled within society and is influenced by it. Attention to this relationship prompted the March organizers to both harden their scientific identity by removing symbols and language of their activist/political identity from the first site and branch out to be more inclusive of various identity groups beyond scientists. Coalition-building, facilitated by the social justice frame, was a rhetorically savvy strategy for motivating broad participation and gaining media attention.

Cosine," "Science Cuts Make me Relatively [Einstein picture] Angry," "We are Not Just Resisters, We are Transformers," "The Universe is Made of Protons, Neutrons, Electrons, and Morons." Akshat Rathi, "The Best Protest Signs from Around the World at the March for Science," Quartz (April 22, 2017), <https://qz.com/966436/march-for-science-the-best-signs-from-protests-around-the-globe/>.

Chapter 6: CONCLUSION

“So let us not be blind to our differences, but let us also direct attention to our common interests and the means by which those differences can be resolved. And if we cannot end now our differences, at least we can help make the world safe for diversity. For in the final analysis, our most basic common link is that we all inhabit this small planet. We all breathe the same air. We all cherish our children's futures. And we are all mortal.”

John F. Kennedy, 1963²¹²

The chapters of this dissertation tracked how scientists articulate the responsibility they hold to society through a range of channels and to diverse segments of the public. The purpose of this study was to identify and understand the likely effectiveness of these scientists' rhetorical moves as they aim to establish or maintain ethos while advocating in the public sphere. My goal is to draw from that analysis to outline suggestions for academics and practitioners who desire to see their work be respected and influential in policymaking. Although climate change science was at the fore throughout the cases presented here, the lessons learned can extend to many hot button public controversies rooted in science. Issues like climate change, such as vaccinations, evolution, and genetic engineering, are subject to public controversy in contemporary society. The choices our society makes concerning these issues must be informed by the best available

²¹² John F. Kennedy, “Commencement Address at American University (speech, Washington, D.C., June 10, 1963), *JFK Presidential Library and Museum* <https://www.jfklibrary.org/archives/other-resources/john-f-kennedy-speeches/american-university-19630610>.

science if we are to appropriately understand, mitigate, or adapt to pressing problems of personal and global significance. Scientists are not the only voices in the public sphere, but their specialized knowledge should give them a prominent seat at all decision-making tables. This seat is often assumed to be theirs by right, but scientists are realizing that this right must sometimes be evoked and, at times, their seat at the table must be earned.

6.1 Lessons Learned

As I detailed in chapter 2, it was less than a month into Donald Trump's presidency and immediately following the January 27th travel ban that the American Association for the Advancement of Science held their annual meeting in Boston. As the largest professional science organization, in membership and disciplinary breadth, the AAAS was well-positioned to address concerns raised by the American scientific community about the perceived anti-science bent of the new Trump administration. Evolutionary biologist Barbara Schaal opened the conference with her AAAS Presidential Address, preceded by opening speakers Christina Paxson, economist and public health expert, and chemist Geraldine Richmond. These speakers collectively attempted to dispel scientists' concerns by normalizing the uncertainty experienced by scientists under the new administration as a reoccurring stage in the enterprise of science and by demonstrating economic framing as a tool by which scientist advocacy can avoid being seen as politically partisan. Scientists, here, were described as neutral and elite carriers of the public good. Telling the story of how basic research leads to the conveniences of everyday life was suggested as a means by which to rebuild public trust in science and scientists. The goal of this approach was presumably to reassert the case for the role of science in public policy through

raising its profile among the public, while also downplaying the role of the scientist in this process.

In chapter 3, my comparative case study of open letters written by the Union of Concerned Scientists in 2004 and 2016 found that scientists were not presented merely as neutral carriers of the public good but as authorities precisely because their work is in the public interest, with particular references to public health advancements. These claims were made by the UCS to establish scientists' collective eunoia. If the work does not speak for itself, it must be spoken for. Science is said to drive American prosperity, and in doing so, contributes to American exceptionalism. In this sense, scientists are not distant from the ideal America citizen, but active contributors to societal progress. The sense that experts are in consensus about the science is indicated by the number and acclaim of letter signers and the decentering of scientists' personal identity; this sense that a scientific community has come together in agreement bolsters the scientists' ethos appeal by indicating that they respect democratic processes, affirming a statement through popular acclaim rather than relying on a single authoritative leader. To stave off allegations of partisanship, the 2004 letter justifies its didactic tone with praise of former Republican presidents and administrators. The 2016 address does not praise former politicians, although it does praise democracy, nor does it have a didactic tone because it was responding to a different kairos and exigency; its future orientation is a reminder and warning to the Trump administration that looking to science to inform policy is the status quo and a practice that strengthens democracy.

In chapter 4, I wrote about the Stand Up for Science rallies that were held outside two major professional science organizations' annual conferences, the American Geophysical Union and the AAAS. The scientists that spoke at these rallies articulated a different perspective of a

scientist's obligations to society than what was presented during the AAAS Presidential Address and gave speeches tailored to a different audience. Whereas the AAAS address was prepared for fellow scientists, the Stand Up for Science rally had many audiences, including scientists inside and outside of the conference, science supporters, and news media. These rally speakers described scientists as being reluctant, fearful parrhesiates, speaking truth to power despite the potential personal backlash they face. They argued that with the privileged knowledge of their craft, scientists have an obligation, as both citizens and scientists, to "stand up for science" because doing so is defending the health and wellbeing of families and communities. Scientists' obligations to the public make them active, visible agents in the public sphere, not neutral carriers of public goods nor figures of moral authority. This is an expression of the scientist-citizen subjectivity. Through the application of war metaphors, environmental justice framing, and appeals to patriotism, these rally speakers attempted to build coalitions with indigenous and frontline communities and the American public more generally who may have different epistemologies but share the same goals. Although the citizen activist subjectivity was frequently evoked as a moral obligation, building trust with the public was hindered by a reliance on embodying scientist stereotypes and maintaining an elevated positionality that limited identification with broader publics that the rally speakers hoped to reach.

In chapter 5, the final case study I analyzed was the genesis and evolution of the Scientists' March on Washington, which eventually became the March for Science. In the initial concept of the march, organizers presented on their event website symbols and language of their activist/political identity. Partly in response to online feedback, the organizers hardened their scientific identity on the updated site by removing activist symbols and language, but also emphasized inclusivity of various identity groups beyond scientists. The social justice frame was

used as a rhetorically savvy appeal for motivating broad participation and gaining media attention. The scientist and citizen subjectivities as separate identities were transcended by embracing diversity as a means toward achieving objective truth. Reframing resistance as a celebration of science and aligning with diversity as critical for the scientific process were attempts to overcome anticipated claims of political partisanship. But in a context where there is a so-called “Republican war on science,”²¹³ a celebration of science that is also a resistance to a Republican administration is hardly nonpartisan. Likewise, in a context where Democrats have claimed diversity as a central value (and Republicans oppose affirmative action, Black Lives Matter, etc.), aligning with diversity can seem partisan as well. Additionally, stereotypical imagery and insider puns were used, hindering possible identification with new and broader audiences, much like in the Stand Up for Science rallies. The celebratory tone and the deemphasizing of the scientist in favor of the science, here as in the conference address, were attempts to activate friendly audiences and make hostile audiences more receptive of scientists and the claims they make. Deemphasizing the scientist may be shortsighted as it reduces the impact of the parrhesiastes. A celebratory tone though may have some merits, as it disarms critics, who are expecting a partisan attack or defense. Celebration may promote inclusivity yet also inhibits the newsworthiness and energizing of mediated audiences.

In each of these cases, we find scientists struggling to characterize the obligation of the scientist to society as being predicated not just on expert authority and professional norms but also including a citizen subjectivity that pleads for its voice to be heard. Authority and positionality appeals dissipate as coalitions and united fronts form. We also see two positions

²¹³ Mooney, *The Republican War on Science*.

maintained concerning the presence of the scientist subjectivity in this advocacy, 1) the backgrounding of the scientist, wherein the products are of their work are highlighted, or their citizen subjectivity is emphasized, or 2) the foregrounding of the scientist as a figure of authority or as a parrhesiate. The choice of which position to emphasize depends heavily on an understanding of the political and rhetorical context, with perceived attacks on the integrity of science viewed either as business as usual or an unprecedented slippery slope toward post-truth politics and policymaking. Each of these genres, from conference addresses and open letters to rallies and march websites, attempts to bolster the credibility of science and scientists in policymaking but does so in ways that could benefit from reflection on the appeals made by the others and what they accomplish.

When the scientist is foregrounded, it may increase the power of their persuasion but activate political tribalism in hostile audiences that these scientists need for political influence. In the open letters chapter, I showed how scientists created an elevated positionality over the public through their didactic tone toward the Bush administration (which was said to be “misrepresenting and suppressing scientific knowledge for political purposes that can have serious consequences” and which impedes the ability of science to provide social goods like “prevent[ing] more than 200,000 premature deaths and millions of cases of respiratory and cardiovascular disease”). For this positionality to be effective, the scientists must be trusted and demonstrate phronesis. The scientist here is an expert whose claims are backed by a consensus of many award-winning peers (“over 62 leading scientists—Nobel laureates, leading medical experts, former federal agency directors, and university chairs and presidents”) and the scientists’ claims to be providing social benefits for all demonstrates phronesis and eunoia (“science has played a large part in the policies that have made the United States of America the world’s most

powerful nation and its citizens increasingly prosperous and healthy”). The didactic scolding in the first letter created an authoritative assertion of power and a belittling of the accused. There is little evidence that these letters were widely circulated, with a primary audience comprised of scientists and the staff of public representatives. It is unlikely that they would sway conservative audiences, if the message reached them at all, who may already associate scientists with liberals and be motivated to reject their authority and expertise. When mediated by newspaper reports though, these letters may work as agenda-setters, helping some audiences recognize that the integrity of science is at issue at all.

Whereas the open letters from the Union of Concerned Scientists promoted scientists’ positional authority through the display of expertise and didacticism, the Stand Up for Science rally speakers were constructed as reluctant parrhesiates (“We don’t want to be here. None of us want to be here. We want to be in our labs, we want to be in the field, we want to be with our students. We want to be doing the work that we were trained and educated to do, which is science”). For these scientists, their social responsibility obligated them to get “out of the lab and into the street.” This obligation did not, however, originate from the scientist subjectivity like it did in the open letters, but here derived from the scientist-citizen subjectivity. Yes, they have expert knowledge, but no they are not looking for any opportunity to jump out and advocate. These scientists stood up for science not by relying on their privileged knowledge and status, but by transcending political partisanship through appeals to democracy (“what is more democratic than science?” and “standing up for science is a patriotic thing to do. Let’s defend our democracy”) and humanity (“protect our communities”). However, the rally genre counteracts the scientists’ attempts to be seen as transcending political partisanship. For the mediated audience, recalling past rallies and their frequent focus on political hot button issues can

influence the interpretation of Stand Up for Science rallies to be seen as subjective and partisan. If this interpretation happens to align ideologically with the scientist, attention may be granted by their audience, and if not, it can be discarded as a partisan appeal that misrepresents science or merely conveys the scientists' need to belong and self-interest. To the immediate audience of scientists, these rally speeches affirm the uncertainty and unease that they have been feeling under the Trump administration while also empowering them to act. The first step in this pursuit would be returning back to the AGU and AAAS conferences and spreading these messages to peers. In doing this, the scientist-citizens may encourage more significant institutional support for their advocacy efforts and identity.

The second approach to the scientist's positionality was the backgrounding of their scientist subjectivity, as was displayed in the conference speeches and the March for Science mission statement. All three AAAS speakers spoke about science through economic framing ("enterprise of science," "people from everywhere add to the global marketplace of ideas," and "evidence-based facts, not alternative facts based on opinion and belief, are a scientist's currency") and used a pipeline metaphor ("to stimulate new technologies for the future, through the development of policies across the entire pipeline" and "how do we keep the benefits flowing? How do we provide the discoveries that keep new industries growing") to showcase the products of science as a taken-for-granted public good ("it is really difficult for those outside of science to see the direct connection between a wide-ranging, diverse, apparently unfocused basic research enterprise and the development of new technologies and industries," "for the betterment of humankind?"). The role of the scientist here is the repairman who fixes this pipeline when political interference arises and then returns to the lab. The concern held by individual scientists about the state of science under the Trump administration was dispelled by a calling back into

the safety of scientific norms and tradition (“politically and socially motivated assaults on academia and science aren’t new” and “now, the truth is, we’ve seen this movie before”). Here the scientists were merely concerned that the flow of the scientific enterprise was interrupted as it brings good to the public. The role of the scientist is not to be an activist but to remind politicians of the value of science by showing how their work impacts people, making the taken-for-granted visible. The products of science are highlighted, and the scientist-citizen identity downplayed so that their arguments and proposals are given a fair hearing and not immediately dismissed as partisan.

For a conference address, the audience was other scientists and the speakers’ messages had a constitutive function which eased concern while sanctioning a channel by which to meet personal feelings of social obligation, routed not through the citizen subjectivity, but through that of the scientist, with safety in tradition and numbers. These speeches, from such a large professional organization, represent the status quo, with the other cases acting as alternative interpretations of the scientist’s civic and professional duties. Science has always been political as it exists interdependently with society, yet the climate of political polarization and distrust of authorities is not business-as-usual. Sticking to tradition and keeping your head down will likely not work to raise the scientist’s integrity in policymaking as these researchers have already been degraded in many instances. The ebb and flow of public opinion are normal, but the concerns of today represent an opportunity to strengthen the relationship between science and society. Holding the course may be preventing the development of something stronger and less influenced by political ideology.

This backgrounding of the scientist subjectivity was also present in the March for Science mission statement, but we also see that it did not originate as such. The Scientists’ March on

Washington foregrounded the scientist, using activist/political language and symbols (such as the upraised fist logo). Science is apolitical, they say, but “Scientists, however are not. The march is non-partisan, however it is intended to have an impact on policy makers.” Like the rally speeches, a march on Washington is a communicative medium imbued with political and often partisan meaning and will be interpreted as such. The activist scientists may attempt to exert their authority rooted in an authoritative epistemology, but this activist identity contaminates the scientist identity and science collectively, undermining their credibility before hostile audiences. This contamination was recognized in community feedback on the Scientists’ March for Science website. (One commentor wrote “The April 29 march is being organized with 350.org. Coalition is necessary for the success of our efforts”²¹⁴; but another cautioned “I would change ‘believe in science’ to ‘accept scientific conclusions.’ ‘Believe’ has no place in scientific inquiry”²¹⁵; and yet another remarked that “we need to convince Republicans to stand with Democrats against Trump - remind them first and foremost what science is and what it has delivered. We need unity

²¹⁴ Theresa Lujan, “I Agree. The April 29 March,” *Facebook* (January 24, 2017)

<https://web.archive.org/web/20170126002245/http://www.scientistsmarchonwashington.com/2017/01/what-is-scientists-march-on-washington.html#comment-form>.

²¹⁵ Unknown, “I Would Change “Believe in Science”,” *Facebook* (January 24, 2017)

<https://web.archive.org/web/20170126002245/http://www.scientistsmarchonwashington.com/2017/01/what-is-scientists-march-on-washington.html#comment-form>.

first.”²¹⁶) This deliberation led to a rebranding of the event as the March for Science. A new face for the movement removed the presence of the authoritative and activist scientist persona and embraced diversity, both demographically and epistemologically (“Our diversity is our greatest strength: a wealth of opinions, perspectives, and ideas is critical for the scientific process. What unites us is a love of science and an insatiable curiosity”). Here it is the citizen that emerges in this united front of scientists and science supporters, and it is the role of the scientist that disappears. These coalitions can provide needed numbers and with it influence, but are still political and likely perceived as partisan; the partisanship is just placed on the scientist-citizen, not the scientist or the enterprise of science. A celebration of science frame helps to demonstrate eunoia to counteract this image of partisanship, but the emphasis on the fruits of science and the downplaying of the role of the scientist in society may make scientists more appealing to a variety of audiences at the cost of retaining some skepticism toward and devaluing of the institution of science.

6.2 Research Questions Answered

The case studies in this dissertation tell us that science is not a monolithic entity. Like the rest of society, in which the practice of science is nestled, scientists have differing perspectives on their obligations to their fellow community members. They also have different ideas about how to establish a scientific ethos predicated on professional norms and fulfilling an obligation toward

²¹⁶ Penny Dacks, “A Scientist’s March is a Powerful Idea,” Facebook (January 24, 2017)

<https://web.archive.org/web/20170126002245/http://www.scientistsmarchonwashington.com/2017/01/what-is-scientists-march-on-washington.html#comment-form>.

bettering society, which their practice grants them the knowledge to do. The role of the scientist has been described in these studies as both objective seeker of truth and subjective engaged citizen. These identities are not mutually exclusive. The maintenance of traditional perspectives on a scientist's duty and the construction of a new scientist citizen's duty require rhetorical work as scientist rhetors attempt to not only reclaim the role that science plays in policymaking but also to reconstitute an identity free from the dissonant sins of partisanship and indifference.

The observations from these cases allow us to answer the research questions established in the introduction. My first and second research questions are related, the first being an inquiry into what rhetorical strategies scientists and scientific organizations use to be recognized as credible when engaging in discourse concerning their social role and responsibilities, and the second asking how scientists have negotiated tensions in their role as public advocates. The strategies employed were broad and derived from assumptions about scientists' decorum when interfacing with the public sphere and the positionality that their epistemic advantage grants them. In the conference address and open letter cases, these strategies included bolstering public support through appeals to tradition (*argumentum ad antiquitatem*), consensus (*argumentum ad populum*), authority (*argumentum ad verecundiam*), political transcendence, and democratic and economic framing. In the rallies and March for Science website, the positionality of the scientist is perceived as more egalitarian and inclusive, relying on constitutive rhetoric for coalition building through war metaphors that align speaker and audience against a common enemy and environmental justice and patriotism framings that do the same, while deploying *parrhesia* as a means of demonstrating *eunoia*. This reluctant obligation to speak truth to power shows a reticence to engage politically and an effort to do so without taking partisan sides. The scientist here is regarded as forced, against his or her self-interest, to be engaged in the public sphere

because speaking truth to power is necessary for defense of the science-to-public good pipeline and the public interest.

My third research question asked how the different rhetorical strategies of scientists are interpreted by their audience as these discussions move from one argument sphere to another. The analysis of reception texts, when available, suggests that despite the appeals to transcendence and *eunoia* to reassert a trustworthy ethos in the public sphere, public interpretation of scientist public advocacy still aligned with politically partisan divides. Often these scientists were preaching to the choir, which may provide the positive reinforcement necessary to empower hesitant scientists to engage in public advocacy, but often failed to soften or transform negative perceptions of scientists among hostile audiences. The instances of scientists' public address analyzed in this dissertation received media attention but may not have had as wide circulation to diverse audiences as was hoped by the scientists involved. Bridges to publics residing on ideologically distinct islands may not have been completed as these publics either consumed differing media through the existence of information cloisters or when exposed (particularly in the case of the March for Science), interpreted these public actions through preexisting cognitive filters, such as cultural cognition and motivated reasoning. The displays of *eunoia* in these messages may have been lost because in all cases, scientists clung tightly to a higher positionality than the public. In a political climate distrustful of authorities, scientists who appeal to their specialized knowledge are seen as taking a position of authority over those who do not have that knowledge, and failure to recognize this public perception forestalls positive reception of any persuasive messaging that follows.

Rhetoricians of science and other science communication theorists have critiqued the information deficit model for communicating science to the general public.²¹⁷ This model attributes skepticism of science to a lack of scientific comprehension. According to the model, effectively transferring scientific knowledge from experts to non-experts, thus resolving the public's knowledge deficit, facilitates understanding and leads to informed decision-making. Undergirding this belief is an assumption that people make rational choices, consciously and fairly weighing the evidence available to them. However, information processing and decision-making may be more complicated than merely leaving the best available science on the loading dock of public opinion. The cases in this study represent turns away from the deficit model, to make science personally relevant when traditional channels of science communication to decisionmakers (through the application of the deficit model) failed to influence public policy. However, this model was still present in a weaker form in the UCS open letters when scientific ethos was reasserted through consensus claims rooted in epistemological authority. The scientists

²¹⁷ See Dominique Brossard and Bruce V. Lowenstein, "A Critical Appraisal of Models of Public Understanding of Science: Using Practice to Inform Theory.," In *Communicating Science: New Agendas in Communication*, Eds. LeeAnn Kahlor and Patricia Stout (London: Routledge, 2010): 11-39; Matthew Kearnes, Phil Macnaghten, and James Wilsdon, *Governing at the Nanoscale: People, Policies and Emerging Technologies* (London: Demos, 2006); Patrick Sturgis and Nick Allum, "Science in Society: Re-Evaluating the Deficit Model of Public Attitudes," *Public Understanding of Science* 13 (2004): 55-74; and John Ziman, "Public Understanding of Science," *Science, Technology & Human Values* 16, no. 1 (January 1991): 99– 105.

designing the messages in these letters seemed to recognize that if the science is not implicitly meaningful, it should be made meaningful and if the science does not appear settled, scientists should reassert a public image of unity.

A move away from this deficit approach to a collaborative model of science communication occurred when the scientist's positionality was rethought. This change was particularly visible in the Stand Up for Science rallies and the March for Science mission statement. In these instances of public communication, making the science itself clear was backgrounded to making scientists appear credible, as highlighted in scientists' expressed reluctance to advocate and in their taking on an obligation to communicate with the public. Science is socially-constructed in these texts to not reside outside of society but to live within it, and the scientist subjectivity cannot be separated from the citizen subjectivity. Here we see the emergence of the scientist-citizen. Despite the scientist's display of *eunoia* and *arete* as a transcendence from politically partisan public perceptions and as an identification appeal with the public, the scientist in the scientist-citizen remained privileged; society was asked to stand with the scientist instead of standing up for themselves. Rallies and marches may grant a mediated platform to display this scientist-citizen ethos, but these genres, being historically the venues of partisan social change, set themselves up for predetermined public interpretations from the start, rendering their message of goodwill and moral excellence mute to those who perceive themselves as on the other side of a partisan divide from the activists.

6.3 Where Do We Go From Here?

How then can scientists counter unflattering public perceptions of their research and their motives? One means would be for scientists to continue turning their ears to the needs of their

audience. Ruth Wooden warns us that “the scientific community disregards the thinking of the public at its own peril.”²¹⁸ After all, the scientific community resides within society, often relies on public funding, and produces knowledge that is likely to impact the broader community of which it is a part. When scientific issues are deliberated in the public sphere, empirical findings are only one consideration; values and ethics also play a role. The qualitative stasis is an inevitable part of judgment where science and government interact. However, too often for scientists, scientific norms are a “separate component of their identity.”²¹⁹ They would like to keep values and facts in separate boxes, but to succeed as scientist-citizens, they will need to learn how to draw rhetorical resources from both loci simultaneously. The public funds science and scientists are accountable to them and have an obligation to serve in the policy arena. Scientists are in a unique position having knowledge derived from their craft, and because of this, they have a higher responsibility to advocate.²²⁰ It is the responsibility of scientists to create dialogue with the public, and to do so drawing on logos *and* pathos appeals. Efforts like the Stand Up for Science rallies and the March for Science are only the first step in this process.

²¹⁸ Ruth Wooden, “The Principles of Public Engagement: At the Nexus of Science, Public Policy Influence and Citizen Education,” *Social Research* 73, no. 3 (Fall 2006): 1057-1063.

²¹⁹ Michael Oppenheimer, “Science and Environmental Policy: The Role of Nongovernmental Organizations,” *Social Research* 73, no. 3 (Fall 2006): 881-890.

²²⁰ Jean Goodwin, “Conceptions of Speech Acts in the Theory and Practice of Argumentation,” *Studies in Logic, Grammar, & Rhetoric* 36, no. 49 (2014): 79-98.

Wooden counters the deficit model when she suggests that dialogue be created by “framing issues in ways that acknowledge scientific content and social and political realities.”²²¹ Lack of science literacy may be overcome when scientists “help Americans think, learn, and make informed choices.”²²² But knowledge alone is not enough. For scientists to understand how they can improve their influence on decision-making processes, they must be reflexive and communicate in ways that are meaningful to their audience. This might not come naturally to scientists and may require retooled science communication training to engage the public in ways that build trust and credibility in science and scientists, and demonstrate that one listens to the public and cares about their views.²²³ When done well, these interactions could strengthen the role of science in society.²²⁴ However, to be heard fairly, the needs of the audience must be privileged, and trust earned.²²⁵

²²¹ Wooden, *Principles of Public Engagement*, p.1059.

²²² *Ibid.*

²²³ John Besley, Anthony Dudo, and Martin Storksdieck, “Scientists’ Views about Communication Training,” *Journal of Research in Science Teaching* 52, no. 2 (2015): 199-220.

²²⁴ John Besley, Sang Oh, and Matthew Nisbet, “Predicting Scientists’ Participation in Public Life,” *Public Understanding of Science* 22, no. 8 (November 2013): 971-987.

²²⁵ Susan T. Fiske and Cydney Dupree, “Gaining Trust as Well as Respect in Communicating to Motivated Audiences About Science Topics,” *Proceedings of the National Academy of Sciences of the United States of America* 111, no. 4 (September 2014): 13593-13597; Jean Goodwin, “Effective Because Ethical: Speech Act Theory as a Framework for Scientists’

The cases analyzed in this dissertation show that a shift is occurring toward a consideration of audience reception. The AAAS speeches, for example, recognized the uncertainty troubling scientists following the election of Donald Trump, acknowledged their fears and mitigated them by subsuming those concerns in the ordinary lifecycle of science/society relationship. The AAAS speakers provided a myriad of everyday examples of how their work benefits Americans and the rest of the world, showing their audience of scientists the sort of stories they can tell to make the practice of science less esoteric and more accessible and appreciated. The UCS open letters drew on frames of economic prosperity, health, and democracy to transcend images of partisanship by appealing to interests that span political divides. The Stand Up for Science rallies brought forth a scientist-citizen subjectivity that displayed *eunoia* to all people, even at the risk of personal retribution. Here again appeals to democratic values and patriotism were drawn on and supplemented by coalition building that demonstrated the linkages between science and society, and notably where weakened linkages created inequalities that challenge our conception of democracy. They came off as concerned citizens, not self-interested and socially-elevated practitioners of arcane arts. The March for Science organizers listened to feedback and adjusted their messaging and general approach appropriately.

The rhetors in all these cases were attuned to their audiences concerns and interests and offered ways forward based on what they believed their audience needed to hear to either feel at ease or feel empowered for action. These are the right actions to take to engage public audiences

Communication,” In Susanna Priest, Jean Goodwin & Michael Dahlstrom (Eds.), *Ethics and Practice in Science Communication*. (Chicago: University of Chicago Press, 2018).

as they recognize the exigency before them and their audience's active role in its interpretation and resolution. Assumptions about what constitutes appropriate decorum in a scientist's advocacy derived from different understandings of the socio-political context. Was the inauguration of President Trump nothing to fear or an indication that something wicked this way comes? AAAS did well to create a unifying discourse that would alleviate paralyzing tensions and provided frames for their members to use that transcend partisanship. The UCS played up their expert knowledge, effectively displaying a scientific ethos that is worthy of public respect and political influence. The scientist subjectivity should not be downplayed or lost, they suggested, because it is what separates the citizen from the scientist-citizen; it gives them power and with that power a social obligation. The Stand Up for Science rallies did well to highlight intersectionality, to both foster a coalition capable of empowering a movement and of providing the direction and energy to nudge institutional change within the sciences in favor of the scientist-citizen subjectivity. Their use of the rally speech genre strengthened the speakers' voices and generated news reports that enhanced visibility for their cause. Finally, the March for Science organizers successfully applied a celebratory tone and encouraged inclusivity, for movement building, visibility, and to dampen the accusatory (and therein politically partisan) tone present in the rallies and the open letters. Much was done right, but improvements are still required to relieve the stress that scientists experienced, often without guidance as to what to do about those feelings as a scientist and as a citizen.

So, what can scientists do to build from these advocacy efforts:

- Understand your audience. Whether it is other scientists, decisionmakers, or the public, each has particular needs. Blanket recommendations will not work as each audience and context differs; effective rhetoric requires a sort of personalized medicine. Use of opinion

polling and cognitive sciences in the construction of persuasive frames might guide these efforts.

- To know your audience, you need to communicate with them, not at them. The conference address and the open letters communicated at their audience, relying heavily on the display of their scientific ethos. This may work in public address directed at internal friendly audiences, but this ethos may not be recognized by audiences outside a scientist's technical sphere. Rallies and marches may bring visibility to the issue of the integrity of science in political decision-making, but these too are often messages to those already faithful. It cannot be assumed that news media or other traditional channels will frame advocacy efforts in less stereotypical and thus polarizing ways. Find and experiment with new and creative interactive channels that facilitate dialogue with audiences where they already reside.
- Reach out to hostile audiences. To enable the policy and behavioral changes necessary to mitigate or adapt to contemporary global issues like climate change and the spread of infectious diseases, all people must play a part. Political polarization and media echo chambers limit opportunities for engagement between people associated with different tribes. Attention to digital media would be a great start here. Connecting with religious and community leaders would be another path towards providing communicative contexts that may facilitate visibility and open dialogue.
- Embrace a scientist-citizen subjectivity. Beyond framing messages to make science meaningful, scientists need to be humanized in the public eye through greater public visibility, respectful dialogue, and an acknowledgment of their concerns and values. Values and ethics embraced by the public are also embraced by scientist citizens. Seeing

that scientists have concerns well beyond their funding and job security can demonstrate a transcendence from partisanship through *eunoia* and make more visible how science benefits all people. Demonstrate that scientists care about their community in such ways.

- Educate the public on not only scientific findings, but also on how science works, and what it can and cannot do. The process of science generates facts and sound theories which scientists are obligated to deliver to the public and policymakers, but the expression of values may be thought to undermine these epistemological goods when what science is is not understood. Accusations of partisanship are enabled by this lack of understanding. In dialoging with the public, talk about how you know what you know, and how there are never certainties in science but decisions must be made regardless based on prudential assessment of what information is available. This should include both the results of sound science and acknowledgment that these findings are only one criterion weighed in public deliberation.
- Encourage institutional change within the academy. Hiring and tenure decisions factor in service but institutions need to go further to incentive communication with the public. The AAAS speeches and the UCS open letters encouraged the use of traditional channels of communication, sharing summaries of scientific work to legislators and administrators. The public, however, is left out of this interaction, leading to a Wag the Dog effect. When scientists are rewarded for spending time to find the channels by which to communicate and develop effective, personalized messaging to various publics, their advocacy will be more productive, and the scientist will become better recognized as a figure in the functioning of society.

- When scientists engage the public, they will benefit from acknowledging that audiences hold pre-existing beliefs. Listening to an audience’s opinions, concerns, and worldviews is enlightening and is an extension of respect, much like what the March for Science organizers did when they revised their webpage and mission. This would also entail the need for scientists to “negotiate their ends honestly, admit the values driving those ends, and coproduce the means that can accomplish the collaboratively chosen ends” in fostering relationship-building.²²⁶ This exchange may be humbling for scientists who might otherwise perceive their audience as deficient in understanding and dismiss important factors of decision-making and identity such as values, beliefs, experiences, and different ways of knowing.

Further research must be conducted to discern just how institutions of science can be made to adopt such a revolutionary change as the incentivizing of public engagement and efforts to effectively influence policymaking. Connecting with a more diverse range of audiences is also crucial. We need the support of all people, regardless of political ideology, to enact policy solutions to our most critical communal problems. Research must be done to burst filter bubbles, winning back conservative audiences through the creation of data and algorithms that would use micro-targeting to reach these audiences, and that would identify and recruit a new breed of

²²⁶ Brian R. Cook and Jonathan T. Overpeck, “Relationship-Building Between Climate Scientists and Publics as an Alternative to Information Transfer,” *Wiley Interdisciplinary Reviews: Climate Change* (2014): 1.

influencers that span political divides.²²⁷ Cognitive scientists and communication scholars need to collaborate with each other and with computer scientists to find these ways forward. We must work to reach out and connect with different audiences, not just the choir. Giving respect, and an open ear, may be what it takes to open the door to the reconceptualization of who a scientist is, what science can and cannot do, and the role science can play in a healthy society.

²²⁷ Andreas Sieber, “Burst the Bubbles: The Future of Climate Campaigning in a Post-Factual Age,” *ClimateTracker* (September 11, 2017) <http://climatetracker.org/burst-bubbles-future-climate-campaigning-post-factual-age/>.

Appendix A

EVENT TIMELINE - Bold entries are cases examined in this dissertation

2004

February 18 **Union of Concerned Scientists release Scientist Statement on Restoring Scientific Integrity to Federal Policy Making (Chapter 3)**

2016

November 8 United States Presidential Election

Nov. 30 **Union of Concerned Scientists release Science and the Public Interest: An Open Letter to President Trump and the 115th Congress (Chapter 3)**

December 7 Trump announcement of intention to nominate Scott Pruitt

Dec. 12-16 American Geophysical Union Fall Meeting

Dec. 13 **Stand Up for Science rally at AGU conference (Chapter 4)**

2017

January 20 Presidential Inauguration; Scientists' March for Science first referenced on Reddit

Jan. 21 **Scientists' March on Washington website was created (Chapter 5);** National Park Service inauguration crowd size controversy

Jan. 23 Media blackout and contract freeze ordered by EPA

Jan. 24 Executive Order 13766, Expediting Environmental Reviews and Approvals for High Priority Infrastructure Projects

Jan. 27 Executive Order 13769, Protecting the Nation from Foreign Terrorist Entry into the United States

Jan. 30 **March for Science website was created (Chapter 5);** Executive Order 13771, Reducing Regulation and Controlling Regulatory Costs\

February 1 Rex Tillerson confirmed Secretary of State

Feb. 15-20 American Association for the Advancement of Science annual meeting, Boston

Feb. 16 **AAAS Presidential Address (Chapter 2)**

Feb. 17 Scott Pruitt confirmed Administrator of the EPA

Feb. 19 **Stand Up for Science rally at AAAS conference (Chapter 4)**

March 2 Rick Perry confirmed as Secretary of DOE

Mar. 28 Executive Order 13783, Promoting Energy Independence and Economic Growth

April 22 March for Science

Appendix B

TRANSCRIPT OF STAND UP FOR SCIENCE RALLY AT AGU, DECEMBER 13, 2016

0:00 [chanting] We're here in alliance, standing up for science. [x5]

0:25 Beka Economopolous – The Natural History Museum

I'm gonna start. I also just want to say that I'm so thrilled to see so many people here. There's hundreds of folks in the crowd. And that this rally builds on the momentum of many scientist led efforts over the last weeks from petitions to open letters. We are getting out of our labs and into the streets, and you're gonna see more of us over the coming months and years, so thank you for coming together. Is Michael Mann here? He will be here soon. I'm gonna introduce our first speaker Dr. Naomi Oreskes, she's a professor in the history of science at Harvard University, and she can tell us a lot about decades of fossil fuel misinformation and disinformation campaigns that have in large part got us to this place. So please welcome Naomi Oreskes!

1:15 Naomi Oreskes – Harvard University

Well it's incredible to be here with all of you today. I have to say I've given hundreds and hundreds of talks to thousands and thousands of people and I'm much more nervous today than I normally am when I talk in public because the bottom line is we don't want to be here. None of us want to be here. We want to be in our labs, we want to be in the field, we want to be with our students, we want to be doing the work that we were trained and educated and raised to do; which is science. It's the work of understanding the natural world, understanding how this beautiful, amazing and complicated world works, and using that information to make the world a

better place for all of us, to make it safe, and to protect the natural environment that God or creation or the Universe gave us. That's what we want to do, but we are at a moment in time, a moment in history where we have to do something else as well; and that's stand up and be counted.

This is a frightening moment. We have seen in the last few weeks how the reins of the federal government are being handed over to the fossil fuel industry. We are looking at the creation of an American oligarchy, run by the very people who have created the situation that is now threatening our own health, our own wellbeing, and our own prosperity. And we have to get that message out. We have to stand up, and we have to say that as scientists, it's not enough just to do our science, we have to get out and explain to people why this science matters; to them, to their lives, to their jobs, to their communities, to their health and wellbeing, and to their prosperity. Because climate change is going to cost every American a lot of money. An Exxon Mobil is going to go to the Russian arctic and make trillions and we, the American people, are going to be picking up the pieces and paying the bill. And that's not OK.

So what I want to say to everyone that's here today, it's absolutely fantastic you're here but it's just the first step. As someone just said, don't get depressed, don't get upset, get organized. Get to work. We have work to do. I see that Citizens Climate Lobby are here. They are amazing, on the ground, grassroots, fighting for a price on carbon, the single most important thing we can do. Because this is a difficult, complicated issue but the single most important thing we can do is to put a price on carbon so we all pay the true cost of fossil fuels. And Citizens Climate Lobby is out there working in every state of this union, mobilizing Republicans, Democrats, and

independents to work for that. Please, join Citizens Climate Lobby or if you don't want to join them, join 350.org. Join Mothers Out Front. Join the Voter Participation Project. But join something.

If we work together, we can change this. We can turn this great battleship of our country around. But it means every one of us has to get to work. A lot of us have been a little bit complacent. A lot of us, especially scientists, have thought 'it's not our job, it's someone else's job.' But it is our job. It's all of our jobs. So please, pick an organization of your choice. All the last couple weeks I've been tweeting about all kinds of great organizations. Donate time, donate money, but do something. Don't get depressed. Get to work! Thank you very much.

4:51 Beka Econopolous

Thank you Naomi. Speaking of tweeting I wanna let you guys know that we're using #AGU16 and #StandUpForScience. This is happening on the occasion of the AGU Fall Meeting. The AGU is the world's largest association of earth scientists. And this is the largest convening of climate scientists since climate deniers gained unprecedented power. There's 26,000 scientists here and we're making our voices heard. Peter Frumhoff from the Union of Concerned Scientists is gonna speak next.

5:33 Peter Frumhoff – Union of Concerned Scientists

Thank you so much. What a beautiful crowd this is. Thank you all for coming out today. I know you're here because you understand just how essential science and evidence is to our democracy. Science and evidence unfettered by political or corporate interference. Science and evidence that

has for decades served as the bedrock for the development of public policies from the Clean Air Act to the Clean Water Act to the Endangered Species Act and we can go on and on to the Paris Agreement on climate change that are designed to protect public health and the environment. And science and evidence that I know you all get is at risk of being deeply interfered with in the context of this incoming administration. I know you share the fear that I have, that so many of us have, that science and evidence is at risk of being ignored, disparaged, and disregarded. We see appointments by the president elect to the Environmental Protection Agency of a man, Scott Pruitt, who actively disparages climate science. [crowd boos] We see the appointment and nomination of Rex Tillerson, the CEO of Exxon Mobil [crowd boos, "my god"], to the Secretary of State, a man who has led a company that has for decades disinforming on climate science in order to avoid regulation. And we see the President Elect himself, President Elect Trump, just on Sunday, say that nobody knows if climate change is real.

Science and evidence is at risk, and it's up to us to ensure that it's protected and that federal scientists doing their work are protected, and that we hold the incoming administration accountable for protecting science and maintaining science based policies. It really is up to us.

So what can we do? Well we do have to fight back, we do have to watchdog, and there are a lot of things you can do, a lot of organizations you can join. I wanna just tell you a few things about the Union of Concerned Scientists and the things that we're doing. We have an open letter to the Trump Administration and the incoming congress calling on them to stand up for science and maintain science based policies to protect federal scientists. It's been signed by about 3000 scientists, Nobel laureates, to scientists across the country, every state in the Union. If you're a scientist we call on you to join us to sign that statement. I've been in conversations with federal

scientists over that past month since the election, across agencies who are deeply discouraged about their own wellbeing, their own ability to do their science. We've just seen a questionnaire, deeply intrusive, going through the Department of Energy, calling on the Department of Energy to name individual scientists who've been working on climate change in the DOE. We need to stand up to that kind of offensive, McCarthyite actions. I'm very pleased to have learned today that the Obama Administration, that's still in power, that the Department of Energy have refused to turn over names. Standing up for science as we all need to do.

Many federal scientists I've talked with have talked about polishing up their resumes, looking for something else to do, looking for ways to duck and cover. It's a totally understandable response, but it's not the right response. We need scientists and federal agencies and across the country to keep doing their work and to let them know we have their backs. And UCS in particular is gonna work to make sure that we're watchdogging misinformation in this administration. This is a movie that we've seen in part before during the George W. Bush Administration. This may be the opening scenes of what may be a sequel on steroids, we just don't know yet. But we've got to be paying attention, we've got to be holding the administration accountable, and for example UCS is gonna be working to establish a portal by which scientists anonymously and confidentially working in federal agencies can report misinformation to us and we can help forestall the worst outcomes of efforts to derail scientific integrity. So I invite you to join with us, join with any organization that's standing up for science. Find ways in your own communities, in your own states across the country to ensure that science and evidence is not dismissed, disparaged, or ignored in the next four, hopefully only four, years. Thank you very much.

10:36 Beka Econopolous

Thank you Peter. Our next speaker is Leila Salazar the executive director of Amazon Watch.

10:50 Leila Salazar – Amazon Watch

Hi everyone. Thank you so much for being out here to stand up for science and to stand up for our communities. Cuz that is really what we're out here for. We're out here to stand behind the truth. We're not denying the truth. That science is real. Climate change is real. Just ask any of the communities that are on the frontlines. Just ask anyone who's out there at Standing Rock. Just ask anyone who is in Flint, Michigan. Ask anyone who is out there in Richmond, California or El Segundo, California where the Chevron refinery spews toxics every day. Climate change is real. It's human induced. We can't go back. So, what we need to do is keep fossil fuels in the ground and the scientists have told us this. The scientists have said that in order to avert climate chaos we have to keep at least 80% of fossil fuels in the ground. Indigenous people that we work with across the Amazon agree and they've been doing that for over 25 years. We've seen indigenous people across the Amazon keep oil companies, keep militaries, keep governments out of their territories. I particularly think of the people, the very brave, courageous, heroic people that I have the honor to work with from Sarayaku. The Kichwa people from Sarayaku in the heart of the Ecuadorian Amazon. They have kept oil companies off their land for nearly 30 years. And they did this before they knew that all the scientific evidence, before the scientist have confirmed that we need to keep 80% of the fossil fuels in the ground.

The point of this is to say that indigenous people have the knowledge too. And what gives me hope right now is that the scientific knowledge and the indigenous knowledge is coming

together. And it has been coming together. I have had the honor to travel to many international climate conferences with indigenous leaders. And as we come together with climate leaders and climate scientists from around the world, we're actually saying the same thing. And yes of course it bums us out to think that this new elected government can take that all away. But we're not gonna let them take that away right? We need to stand with those who are defending our water, those who are defending our rainforests, those who are defending our communities, from standing rock to Sarayaku.

Recently I was with Patricia Walinga and Nina Walinga and [indecipherable] from Columbia at the IUCN. And we were promoting for the protection of sacred areas. Sacred areas like the rainforests, the most biological place on the planet, biologically diverse place on the planet. And one of the things that we kept repeating and I kept hearing and people kept cheering about was a indigenous people are 4% of the population. Their lands are 20% of the land on Earth but within that land there's 80% of the biological diversity on this planet we call Earth. So I hold on to that and I hold on to that and know that we're going on the right path to stand with science, to stand with indigenous and frontline communities who are defending our water, who are defending our rainforests, who are defending our communities for all of us. So I wanna actually lead us in a chant, because that's what we do. **OUR COMMUNITIES ARE UNDER ATTACK. WHAT DO WE DO? STAND UP, FIGHT BACK!** (x2). **SCIENCE AND RESEARCH IS UNDER ATTACK. WHAT DO WE DO? STAND UP FIGHT BACK!** (x2) Yes! Let's keep fossil fuels in the ground. Let's stand up!

15:10 Beka Econopolous

Thank you Layla. Now we're gonna hear from David Karbumnakof. He's Aleut, an Alaskan native, and organizer with the Idle No More and Digital Smoke Signals.

15:26 David Karbumnakof[sp?]

I've also recently applied to a PhD candidacy at UC Berkley so if there's anyone here on the selection committee I hope you are favorably impressed by this [indecipherable]. I was wondering when I might get one but we're working hard and that group studies energy and climate from an interdisciplinary perspective. I think it's the best research group to be able to pursue. Looking at the 12 and more, almost hundred imminently threatened communities in Alaska that have to relocate from climate change due to coastal erosion, thawing permafrost, and the direct results of human anthropomorphized induced climate change. And yet no federal agency wants to take lead on this. No federal agency feels it's their responsibility to find new site locations for communities that are being displaced. And some of these communities have been in this situation for 30 - 40 years, even longer. Some since the 70's have been saying we need to relocate, it's not safe for us. Where the US government came and built boarding schools at the easiest location for a barge to drop off building materials to start colonizing the mines of indigenous people, and taking away the language and the cultures which also has basis in indigenous science. And if we go back to what we call the original instructions, which is now talked about in science terminology as sustainability, if you break the original instructions, if you desecrate the sacred systems of life that support life, you are being unsustainable. And it is simply the same thing using different terminology, using slightly different epistemologies, but the result is the same as that if we destroy our life support systems here, and we're the only generation so far yet to be existing in humanity that has the responsibility to stand up and say no

we will give a sustainable, a life and earth that can carry on for future generation to the next generations. If we fail in doing that, how selfish will we be? We will be the most selfish generation ever, and that is a legacy I do not want to leave. So I am happy to be here.

I want to recount a very short story of how indigenous knowledge and science I believe are compatible and can work together and that is in our creation story of the Unangan people that humans were not humans in the beginning, we were comrades, we were something like a mythical bird. We were flying around in the heavens and we saw the volcanoes erupting that were making the Aleutian Islands that were gonna be our part of creation. And we saw the most beautiful creature, the Aleut woman was there at the mouth of the volcano. And we flew up to the creator and pled with him and begged with him, please, please make us to be with her. He says I can only do it for eternity. That's all we want, we want to be with her forever. And so as we came out of the heavens, we came out in our ikyaks, which is our kayaks, our skin boats, they were spiritual transdimensional vessels. Those boats only handful of people know how to make them today. There's a nice artifact that you can see at UC Berkley's Hearst museum. It was taken from Atka in the 1960's without permission. I just was there doing a culture camp, they weren't happy about it. But I want to see that now that digital fabrication has advanced to where we can take biometric measurements our arms, how long they are, how they proportionally represent us to that boat, and that we can make digitally fabricated traditional boats in the way that our ancestors did. And build a relationship both with cutting edge technology and with traditional and indigenous knowledge. And I think that that is the way forward and I would hope that the Maori have made a good example of having a goal of 1000 PhDs, so I would hope to all the scientists here that you find scholarships, you find indigenous people to recruit, to mentor and

educate up to the sciences through terminal degrees so that we can be creating the new wave of knowledge to make sure that this type of catastrophe never happens again on the political and social systems here.

19:52 Beka Econopolous

Our next speaker is Andre Soto a community organizer with Communities for a Better Environment.

20:01 Andre Soto

Good afternoon everybody and it's really a pleasure to be here with all the scientists, particularly coming from Communities for a Better Environment. I'm the Richmond organizer and we utilize what is called the Triad model. We combine community organizing with science and with lawyers. And that's how we go about protecting the health and safety of people in the frontline communities. That's how we go about protecting the workers who work in industries that are producing the chemicals that are killing us and destroying the planet. And so as I was thinking about this gathering, a couple things came to mind. First is the politicization of science is nothing new. As long as there's been science, there's been politicization, maybe they came up together. But it reminded me of the fact that back in the 1990's I was working on the issue of gun control, where we were having more than 30,000 people a year die from firearms. And the CDC was funding injury prevention research centers. One was over here at SF General, through the Trauma Foundation. And we produced a document, a six-page document that just told the facts about gun violence and women. Within 2 weeks a republican congressman was waiving it around in front of the committee and the congress, the republican controlled congress under

Newt Gingrich, called the CDC either you stop doing research on gun death and injury, or you will have your entire injury prevention budget eliminated. And guess what they did? They quit researching guns, and to this day, today, there is no national database on gun death and injury because of the politicization of science.

And we know that that's what gonna be happening with this new administration. And just as Layla was suggesting, I think one of the things I want to recommend because growing up a Chicano in Richmond California, not only where we have Chevron, but we have police violence because the culture of suppression is part of the strategy of industry when they want to get away with polluting communities like Richmond. They want us fighting each other rather than uniting and targeting them. Well we came back with an idea call the Richmond Progressive Alliance and we've taken over the city council this last election. We now have 5 out of 7 council members. And we're gonna do great things. It took us 14 years to do it, but we're doing it from the grassroots up. But where we started at, it started with police violence and me and my family and a lot of other Chicanos on Cinco de Mayo were the victims of Richmond police violence in 2002. Our thought was resistance.

We are a resistance movement. And that's what I want all of you to think about. And so I want you to all shout one time. Resistance, ready. RESISTANCE! Now I want you to shout it three times in a row because that's gonna make you feel good and that's what you're gonna need to do to take on this fight during the Trump administration. Ready? 1, 2, 3, RESISTANCE RESISTANCE RESISTANCE! Thank you very much.

23:59 Beka Econopolous

There's just a couple more speakers. I'm gonna introduce Dr. Michael Mann. He's a climate scientist and the director of the Earth Systems Science Center at Penn State University.

24:16 Michael Mann – Penn State University

I have to say that when I hear that expression, the Trump administration, I myself find myself in a bit of denial as do many of us I think. And to hear that there has been politicization of science, I'm shocked. Shocked to learn that that's the case. Well my coauthor Tom Toles and I stated in our recent book "The Madhouse Effect" which was published just prior to the election, the following "If we are to avert the worst impacts of climate change, we will have to act in the next few years. We will need both the president and the congress on board if we are going to work with other nations of the world to achieve the sorts of carbon reductions necessary to achieve this goal." Well an election happened since then, and where the result was not the one many of us would liked to see, the battle goes on, it must go on. Now more than ever is critical that scientists step forward and make their voices heard. Not just for the sake of scientific research, but for the sake of the entire planet. Quoting from the very end of the book. "So we have our work before us, we have our task. We have the oceans to persevere. We have the rainforests to protect. We have farmlands and coasts to defend. We have the panoply of spectacular species with which we evolved to shepherd. This is our home. It's time to start acting like it. Thank you.

26:01 Beka Econopolous

Next we have Kim Cobb who's a professor in the school of Earth and Atmospheric Sciences and Georgia Institute of Technology.

26:13 Kim Cobb – Georgia Institute of Technology

Thanks a lot. It is an honor to be here. I find it an unlikely spot. If you told me I'd be here 5 years ago, I wouldn't have believed you. I don't think any of us believed we would actually be standing here talking about our planet in the ways that we are today 4 years ago. It's been a very humbling year for climate scientists. We have watched the temperatures soar to new heights. It's been a very tough year for me personally, having scuba dived on the reef in the far reaches of the tropical pacific. And watching 85% of that reef die between one of my trips and the next over 6 months. A humbling and gravely disturbing experience to go through. As I was in last summer's research expedition, last month, I got the news while I was in the field (that's for you scientists out there) I was scuba diving the tropical pacific when it went down. Wow. Now I didn't have much wherewithal at the time, definitely didn't have the bandwidth to process that. Once my samples got back to my lab safely, and the people that I was in charge of got back to my lab safely a couple weeks later, it sunk in and it was a shock. It struck me to my core. It was an unthinkable think that happened when I was away. And it's been difficult to recover from that and yet the nightmare continues. And it keeps getting worse every day.

And yet how many people do we have in here from AGU we probably have several hundred, and I thank you so much for being here. Thank. You. Thank you. But how many thousands of our peers are still in poster halls and lunches with their buddies, prepping talks in their hotel rooms? Too many. We have for too long as scientists rested on the assumption that by providing indisputable facts and great data that we're providing enough of an attack against, to counter the forces against science. And obviously that strategy has failed miserably. What we need right now is all of the scientists who care so deeply about their work, about facts and data and truths, to

shake off the fear that holds them back from engaging in this space. Not thinking about it as a political problem, but thinking about it in defense of science. Thank you. So I say whatever is holding you back if you're a scientist, what are you waiting for? What is the nightmare scenario that will get you out of your hotel rooms, out of Moscone South, out of those nice lunch chairs with your buddies. What will have to happen folks? Cuz it's happening. It's time. It's past time. Please join us. Please let our voices speak together. If we do speak together, I'm confident we can change the course of history. Thank you.

30:00 Beka Econopolous

So we have a very special final speaker. I wanna introduces James Coleman who's a student at South San Francisco High School and a fellow with the Alliance for Climate Education. And he's gonna give you a message from and for the future.

30:24 James Coleman

Hello. As a current senior in high school I'm proud to say that I am an aspiring scientist and climate activist. We all have lines we draw that once crossed we cannot stay silent any longer. For me it was learning about the protests at Standing Rock. For thousands of indigenous peoples and their allies have gathered to defend their sole source of water from oil contamination. In response to peaceful demonstrations from water protectors, oil pipeline militia and police have retaliated with pepper spray, rubber bullets, mace, and water hoses. These are human rights violations happening right before our eyes.

When I found out about Standing Rock, I knew I couldn't be silent any longer. I'm not a politician, I'm not a public speaker, I'm not even a high school graduate yet. But I am a human being whose moral line has been drawn and breached. And through this I have been called to action. I joined the Alliance for Climate Education as a fellow in August and here I am today speaking out in front of a crowd for the very first time, nervous, but ever determined to push for climate justice. What I'm saying is this, what is your line? Is it when our neighbors access to clean water is under threat? Is it when our children can no longer experience the ecological beauty we take for granted today? Is it when the research you've conducted is disregarded as a hoax? Or when every piece of evidence, factual, concrete proof that you've uncovered is thrown away just because it doesn't fit a corporate fossil fuel agenda? I'm here to say that these lines have been breached. And although it may feel scary and foreign to speak out, speak out we must!

Countless people, including youth like me, are being misled about the threats of climate change every day. It is our collective responsibility, each and every single one of us, to inform the public about the undeniable truth about climate change. So that my generation has a chance at a safe climate future. It is our responsibility to debunk the belief that oil pipelines are a necessity. It is our responsibility to defend scientific integrity. It is our responsibility to hold our government accountable in prioritizing climate justice above corporate interests. And it is our responsibility to never let our lines be crossed without a fight. This isn't something that we can hold off until tomorrow or do the night before. This is an issue of now. Thank you.

33:46 Beka Econopolous

Thank you to all of our speakers. Thank you to everyone for coming out. We're gonna close with a few final words. Brant from Climate Truth...

Brant -Climate Truth

I just wanted to thank everybody one more time. Again climatetruth.org put this together today together with the Natural History Museum to show that when we act collectively, we are strong. And so visit us online, climatetruth.org where you can sign up if you like what you heard today. You can participate in the future. If you didn't like what you heard today, give us a call, and we'll work it out. Thank you to all of the scientists that participated, all of our speakers today, all of you that came here. Take what you feel now back into that building with you. Tell your friends, bring them out into the street, and let's make some changes. And with that I'll give it back to Beka to wrap up.

34:39 Beka Econopolous

Thank you. And if you'd like to learn more about us. thenaturalhistorymuseum.org. I just wanna close by saying this isn't just about climate science. It's about the fate of evidence-based policies. It's about solidarity for communities that are hit hardest by climate impacts and fossil fuels. And it's about taking a moral stand against the war on science. So I thought maybe we could close with a couple of chants. WATER IS LIFE! (X2) PROTECT OUR COMMUNITIES! STAND UP FOR SCIENCE! (X2). OUT OF THE LABS AND INTO THE STREETS! THANK YOU!

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