

The Social Justification of Climate Change Beliefs and Environmental Communication

Abstract:

While our beliefs about crucial political issues such as climate change are shaped by a variety of psychological and socioeconomic influences, this essay argues that one source of those beliefs comes from the responsibility that climate scientists have, as domain experts on the science and policy of climate change, to protect the public from misinformation. There are many forms of fake news not all of which are intentionally conceived to deceive. Climate change is poised to devastate communities regardless of their perspective on who is responsible for the problem, or whether they believe it even exists in the first place. For protections against climate change falsehoods to be effective they must not only be endorsed by the political advocacy community which promotes ecological justice and sustainability in business and commerce. They must also be endorsed by the experts who have the insight to predict anthropological futures based on historical fact and present environmental conditions. Because climate change has become a political problem – a political question – environmental communication must rise to the challenge that a divided society presents; and environmental leaders need to confront that danger that comes from complacency towards and denial of the precipice we stand upon.

Keywords:

Philosophy of Climate Science; Socially Responsible Science; Climate Change Misinformation; Post-Truth Politics; Environmental Communication.

Introduction

Beliefs play a major role in our social lives. How political beliefs, shaped by media consumption and dialogue, are transmitted, acquired, and adopted has important implications for how we want to structure society (O'Connor and Weatherall 2019 esp.

Ch. 2: “Polarization and Conformity”; Kleinberg 2011).¹ But the ease of communication that characterizes modernity has, in some ways, been the result of the proliferation and adoption of the internet, and has led to the blurring of the boundaries between what Levy (2022) calls higher-order evidence (the justification for information that is known to be true), and evidence that passes for higher-order empirical truth. Information that imitates reputable media but is intended to deceive, is prevalent and powerful in both our online and offline cultures. The nature of this online proliferation of misinformation and the rise of fallacious, discriminatory, and hateful online communities is the subject of this paper. I start in with some groundwork on the psychology of misinformation (Roozenbeek and van der Linden 2024; Ecker et al. 2022; Greifeneder et al. 2021), surveying the “socially extended mind” thesis of Clark and Chalmers (1998), before moving on to discuss climate change communication in the context of online misinformation, hate speech, and malicious algorithmic and epistemic traps. This essay claims that scientists creating research, content, and knowledge have a duty to remain aware of the dangers that can arise for the general populating when they are trying to determine what to believe online. In addition, when scientists are working on projects with political outcomes or controversial implications, they need to be careful when promoting, disseminating, and dealing with the ramifications of their work—while still promoting absolute truth within the bounds of evidence, logic, and proof. Absolute truth and what could potentially happen, i.e., a possibility, are often confused—both online and off—particularly in political interpretations of science. Despite the often-espoused view, and criterion, that scientists need to concentrate on creating original work that makes contributions to knowledge, political entanglements can arise even within technical scientific writing. Dis- and mis-information skew and distort the outcomes of scientific research, creating overtones of moral or political implications that places scientists in positions where they are asked to take a side—leaving evidence in the rearview. In other words, often, remaining impartial is not possible.

The main contribution of this paper is to argue for the difference between technical controversy—disputes over the reality of, evidence for, and pathways out of, the crisis we face—and political controversy—often entangled with disputes over the reasons for acting which are partly based on party lines and partisan definitions of which issues are most pressing and urgent (Benegal and Scruggs 2018). While scientists, including political and social scientists, must often engage in the former—technical controversy—their role in the latter—political controversy—is less clear.

¹ Kleinberg notes that the spread of online information and opinion grows out of the networked structure of online connections. This is partly the reason why some types of community organization, including informational structures like filter bubbles and echo chambers, can be so pervasive, and so difficult to combat effectively.

This paper discusses the role of technical scientific controversy particularly as applied to political decisions made on the basis of natural, empirical, scientific findings—in our case, climate science. Frigg, Thompson, and Werndl define climate as “the distribution of certain variables (called climate variables) arising for a certain configuration (i.e. certain gas greenhouse concentrations and certain aerosol emissions) of the climate system” (Frigg, Thompson and Werndl 2015a, 953). Climate is a description of our expectation of the state of Earth’s atmospheric system at any given time, including in the future. Climate change, then, can be defined as a state of the climate system for which some, or all, of the relevant climate variables (temperature, precipitation, wind, etc.), differ between two time periods which are in conjunction with each other. Communicating the outcomes and policy implications of climate science—if far from a practice that goes beyond the scope of natural climate scientists’ jurisdiction; climate scientists are individuals who are trained in, and concern themselves primarily with, climate data collection and analysis, and so communicating objectively about the state of that science is something in which they are rigorously trained. Jurisdiction over communicating key takeaways from scientific findings is a task that should, I argue, fall within the scope of an environmental economists’ expertise, for example, and such research and subsequent policy recommendation is an inherently *values-based* vocation, I argue. In other words, it is true that scientists can be misinterpreted, it is less often the case that they are misinformed. It is also true that the public can often be misinformed—and it is a scientist’s duty to be sure that their own work is interpreted correctly by both laypeople and by decision makers who have the power to put insights into action.

My own view of climate communication—and miscommunication—is that it is a special case—a case where the defense, by scientists, of their findings is both necessary, socially useful, and crucial to policymaking. In the following section we will examine the argument regarding climate change misinformation as perceived by climate scientists who need to defend their expertise—in the pursuit of scientifically valid and accurate models of the Earth’s changing climate.

The Epistemology of Online Communities

It is undisputed that there is political controversy over the regulation and policing of social media platforms that willingly or unwillingly host compelling falsehoods about climate science, current issues and public policy, and the feasible technological solutions which might provide a path forward for our societies—a divisive dispute that indicates that good science must be consensus driven. In other words, scientists need to work closely with policymakers to enable political constituents of all ideological affiliations work towards evidence driven goals—whether that be net-zero, or simply mutual understanding and across-the-aisle cooperation on lower-stakes proposals. This work argues that the social responsibility of climate scientists, including those who study social

and political solutions derived from actionable scientific discoveries, depends on the creation of impactful and relevant environmental communication that engages with uncertainties within the existing literature as well as within the contemporary political culture and atmosphere. When we perceive the external environment, we automatically assess the reliability, or epistemic authority, of each external source of information (Baurmann 2007; Hardwig 1985).

Climate change findings that are based in data—including data about the energy composition of our carbon-fueled economies—have the potential to tell us vital information about progress made towards the green transition, as well as our real-time effects on the composition and climate of the atmosphere. These effects include data on planetary-scale tipping points and boundaries past which Earth may be unable to sustain the world’s still rapidly growing population without catastrophe. However, political concerns, including divisive misinformation campaigns bent on derailing environmental policy, have continually, since the birth of environmental politics in the 1970s, stymied efforts to bolster and reshape the world’s productive, industrial economies in the image and spirit of sustainability. To put it simply, the credibility of climate scientists and the urgency derived from most aspects of climate modeling—the science itself—has recently been overshadowed by politicized and weaponized doubt, calling into question many of the findings of climate scientists and has called into question the need and urgency of taking radical climate action. Here, I hope to define and explain the reason why climate scientists—including geologists, meteorologists, and atmospheric scientists, but also economists who hold the technocratic, yet most feasible solutions to decreasing carbon pollution—have been relegated to the sidelines of political debates, when they are the only ones who can bring real change. I also seek to answer the question of whether scientists need to worry about the contentious infighting prominently displayed on our social media platforms between those who advocate evidence-based empirical facts and virtuous moral and political values, and those who seemingly seek to deconstruct international order and democratic civility. I suggest that when it comes to communicating their findings and advocating on behalf of the truth of their findings, climate scientists have hard work to do to convince voters to incur massive near-term costs in the hopes of sparing their progeny the brunt of anthropogenic climate change (Kourany 2022).

Hilligardt (2022) and Holman and Wilholt (2022) argue that society needs a science focused on moral and political values now more than ever²—a science that not only supports unbiased and politically neutral investigation, but one that also seeks to defend the basis of social and natural knowledge production as an activity which is exempt from the charismatic sway and unyielding pressure from pundits and talking heads who seek

² To motivate this inquiry, note that Hilligardt (2022) calls the role of values in science “the new demarcation problem.”

to use science itself for their own personal gain. Some fear that such efforts have long been infecting the results and findings of many scientific studies—not only within climate science, but within the broader research community (see Kournay 2010, 68-9; Weaver 2019). Our perceived reality—distorted by motivated communication that catches us in vulnerable positions seemingly of our own design—may *not* mirror the external world in as good, or as accurate a way as we might hope because of the fact that we face down powerful advertisers, interest groups, and political campaigns—foreign and domestic—which have both money, power, and vested interest in making us think one way or another about issues such as climate change (Hameleers 2021).³ This matters to my arguments below regarding climate communication on the internet, social media, and, more generally, its ties to our social identity, because the way we deliberate, argue, agree, and compromise in the public forum defines what we believe about topical issues (Brown 2018; Estlund and Landemore 2018).

As Lewandowsky *et al.* (2012, 107) note, “if a majority believes in something that is factually incorrect, the misinformation may form the basis for political and social decisions that run counter to a society’s best interest...” It might be helpful to disambiguate misinformation from hate speech at this juncture—they are undeniably different.⁴ But a question arises whether their effects—chilling to civil dialogue, and a deterrent to pursuit of controversial topics which matter to society—are any different once public. A common solution to both is counterspeech or “inoculation”: an effort to “affirm a correct vision of the world”—to uphold and promote genuine, authentic, and positively truthful beliefs about the world rather than to ban, correct, or revise mistaken or malicious beliefs (Lepoutre 2019, 167; 2021, 102).⁵ I argue that counter-speech alone cannot solve the epistemic social problems that fall at the fault lines of factual and erroneous belief—the latter all too often induced by a) lack of understanding or empathy or b) intervention by a third party intending to create dissent.

Having political agency in democratic societies shaped by access to social and scientific information beyond the limits of human capacity to process and access such information in its entirety, means that the world becomes less “manipulable” to us; we can control what information we receive, how and whether we process that information,

³ As Clark and Chalmers note, “if we retain internal structure but change the external features, behaviour may change completely” (Clark and Chalmers 1998, 9). What Clark and Chalmers are trying to express with this line is that the external features of our complex information environment have changed so much since the rise of platform media that behavior has become easier, in a sense, to exploit and mould according to deep sovereign political and economic interests.

⁴ Hate speech is “an act of demeaning a person and doing so in virtue of that person’s group membership” (McGowan 2018, 185).

⁵ See Howard (2019). Rawls (1993) also argues that affirming a correct vision of the world in the face of dissenting speech furthers liberal values. See also Howard (2018, 220).

and how we form beliefs based on what we understand about the sources of that information.⁶ However we cannot filter out the pervasive and structural attacks on the integrity of our cognition—both to our beliefs about climate solutions and action, as well as pertaining to more general issues such as global governance and international political morality (e.g., on issues such as immigration). How we react to the information we are presented with is defined by social norms that we intentionally, or even subconsciously, exemplify in our behavior towards others (McGowan 2018). Preliminaries considered, I now bring a theory of disinformation characterized by two separate genealogical strands of nascent, but already familiar, threats to the composition of our beliefs about the world—misinformation and hate speech—to bear on the social problem that has culminated in our present ecological and meteorological crises, instantiated in the ubiquitous eponym “climate change.” I believe it is no coincidence that our struggle against climate change has seen so much division and dissent and that that division and dissent also characterizes online political discourse more generally in the era of the internet and AI driven social media algorithms.

Climate Science and Climate Misinformation: A Unique Case?

Separation from farcical theory and fantasy seem to be realistic goals for a modern science founded on evidence and in direct refutation of the myth and conspiracy so prevalent in today’s politics. My claim in this section is to distill a wide range of positions, and to demarcate a single, and, I hope defensible, position: defending the virtue of climate science and, conversely, combating the role of climate misinformation in shaping the political and social values of the movements for climate action and justice should be a primary calling of scientists *in addition* to that of advocates of science—those who are not themselves practitioners of knowledge creation and factual research. This claim suggests that the role of defending science against ignorance and conspiracy does not *solely* belong to scientists themselves.⁷ This paper seeks to answer a question posed by the conjunction of socially responsible science and climate misinformation: namely, how does the communication resultant from the creation and analysis of complex climate models affect

⁶ This is crucial to my thesis: individuals in modern societies have the right to free speech, and free speech is crucial to being able to express oneself freely. One cannot freely interact with the world, if the ways that one can manipulate that world (i.e., through speech acts) are restricted. See Howard (2019, 100).

⁷ Büter (2015), p. 20, writes that “Values do not only influence what is being investigated, but also to a certain extent how this investigation proceeds.” I treat here only in passing the effects of values on science—focusing instead on whether socially responsible scientists have claims on the political realm.

their reception by a public already jaded by the politicization of science (see Druckman 2017)?

Many scientists view their work as in service of the public good, especially those who work on climate change. I suggest that the recent movement towards socially responsible science in the scientific research community—a movement *characterized* by its normative positions on prominent policy issues—can vindicate climate scientists, whose work has been viewed by some groups as elitist or classist in nature, from having to bear criticism for adhering to or advocating for their normative political obligations or leanings. Socially responsible and socially aware science aims to give scientists and advocates, who seek to dispel conspiracy and unfounded rumors about climate change, a voice in normative and politically aware decision making. I argue that scientists' role in the political decisions which are made necessary by their findings is justified *only* to the extent that scientists can remain impartial in their substantive research output.⁸ I do not mean to argue that scientists cannot vote or voice their support of various policies. Merely that when their expertise is required that they give it in an objective fashion on a topic that they are knowledgeable about, but not go beyond the bounds of their domain of interest or expertise. The example of scientific controversies over the origins, spread, and reception of climate change misinformation, including the algorithmic technology on social media platforms which has allowed it to proliferate, point to how socially responsible climate scientists, as well as social scientists working on the environment, can, in fact, positively influence public decision making, while staying within the margins of their discipline.

The issue with climate misinformation specifically, as with most scientific communication corrupted by politically motivated censorship, oversight, or bias, is that, like any science, climate science is a process of discovery—an ongoing reporting process of findings, including findings which are based on incomplete data. This has created controversy in the past (see Painter and Ashe 2012), and the information used to generate predictions of future states of the Earth's climate—like any other empirical field—includes various sources of error.⁹ Climate science, as a profession, has a duty to the public to verify and substantiate its findings in the face of ongoing misinformation campaigns by international interest groups not only limited to oil and gas companies and nations with a wealth of fossil-fuel resources. Because climate research has been so

⁸ For the contrasting view—that values *do* have a place in mainstream science—see Weaver (2019).

⁹ Bradley and Steele (2015) detail the level and scope of uncertainty that climate modelers face. In such circumstances, scientists face choices as to how to proceed, given the limited information they have. I will argue that when climate scientists face these choices, their decisions *can* be grounded in moral, or ethical reasons for action, but I do not go so far as to say that they *should*.

ruthlessly politicized, climate policymakers must handle the ways they act on the science with care. It is too easy for hardline policies to backfire—potentially leading to entrenched policies that are unsustainable now and in the long run. Not only does climate science point out the damage done by humans to the composition of Earth’s atmosphere and ecosystems, but it also calls for action to reverse the changes that humans have induced. This idea has its foundation in common morality that is often underemphasized or crushed by campaigners wielding misinformation and hate—what we should be asking is whether we value the Earth’s environment, and if so, what we can do to preserve it.

A science in part based on shared values¹⁰ would enable more impartiality in researching and communicating the findings of climate studies specifically. Value-free science, by definition, lacks the impetus to take positions on questions of science-informed policy (Brown 2013, 68). Kourany writes that

to be sure, scientists’ values and interests can and do determine which questions they investigate and which they ignore, can and do motivate the background assumptions they accept and those they reject, can and do influence the observational or experimental data they select to study and the way they interpret those data, and so on. (Kourany 2010, 58)

While it is important for climate scientists to be aware of the ramifications of their work in the political sphere, this should not distract them from their function as truth seekers.

Misinformation surrounding science and policy, including policies derived from findings and discoveries about the Earth system made by climate scientists, threaten to disrupt the legitimate exposure to fair and balanced criticism of countless experiments and trials. When careful review by the scientific community is replaced by hate, or when researchers are trolled, doxxed, or endangered by online tsunamis of anonymous commenters with no understanding of scientific method or the professional research process, then science itself is put at peril. Climate science, in particular, is characterized by the complexity of the models involved, the number of variables in each model, and the methodological authority of the models used—climate models are some of the most technical and elaborate, but also the most accurate, that science has to offer (Martino 2003).¹¹ In the rest of this paper, I outline a variety of approaches to misinformation that have been controversial, constructive, or harmful, and point out how, and to what extent, these approaches have implications for what is known as socially responsible science. My

¹⁰ That is, values of truth, objectivity, and non-partisanship—not values of, say, conservatism or liberalism.

¹¹ See Sarewitz (2004), 394: “...significant changes in scientific conclusions could have considerable political repercussions [in the field of climate science].”

position throughout is that the problem of misinformation in climate science is an indication of public threats to the health of the field—but not in the sense that there are ongoing methodological debates; instead, what we see is a crisis of trust, and a crisis of political will to believe and follow through on expert advice. Climate change misinformation a special case; it is one where scientists *can* have an impartial role in political advocacy premised on the findings of their research.

Malicious Communication

Climate scientists themselves make different predictions about the true extent of our uncertainty about the Earth’s future climate (Steele and Werndl 2013, 631). While this could be a cause of competing claims to describe the reality of humanity’s effects on the atmosphere, I suggest that a deeper problem is the root: a politically motivated unwillingness to incur the expense of dealing with the climate change issue, combined with trepidation in the face of overwhelming path dependency and fossil fuel value lock-in. Some solutions that some climate scientists have put forth to reverse human induced climate change, such as the use of aerosols to cool atmospheric uptake of heat from the sun, have significant risks that come with their promises increase likelihood of success of averting the worst effects of climate change through geoengineering. These presentations of alternative solutions in the media have confounding and muddying effects in popular and political discourse about the best ways to move forward.

While many constituent groups, including indigenous and environmental activist leaders, have raised ethical concerns about further human impact on the biosphere, misinformation about our ability to decrease our emissions—rather than geoengineer—might play a role in the political attitude towards developing these technologies. While some people would be made better off by using geoengineering techniques, others may favor approaches which are more respectful of the atmosphere’s integrity.¹² Indeed, many fossil fuel companies have reason to advocate for geoengineering—including the use of technologies such as carbon capture, not explicitly mentioned above—to enable continued development and exploitation of fossil fuel resources without negative climatic consequences. If climate misinformation raises moral problems for motivated scientists—i.e., those working for fossil fuel companies or climate denialist political campaigns—then socially responsible science would provide a kind of antidote by requiring integrity as well as promoting more rigorous methods of inquiry, for the reason that scientists have to take into account ethical concerns—i.e., social impact—as well as the traditional scientific values of knowledge and truth (Brown 2013, 71). While it is true that some argue that values can also be a distraction to researchers who are pursuing knowledge in its

¹² For the science, see Liu et al. (2019); for the politics see Dalby (2015). See also Baskin (2019) and Corry (2017).

purest form, knowledge that is acquired via a process that acknowledges shortcomings, bias, and the potential to misuse or misinterpret findings, could serve to preemptively dispel questions surrounding the authenticity of the research itself.

The question within the theory of information acquisition and belief formation (Kleinberg 2011) that is crucial for understanding the role that scientists can play in informing the public about real political issues which affect the natural and social world, is the degree that propagation, dissemination, and uptake of misinformation and disinformation—particularly online—affect or inhibit substantive policy outcomes. Scientists have an abject responsibility—and not only social scientists, but also natural scientists—by virtue as their role as innovators, inventors, and discoverers to prevent society from succumbing to belief in false narratives surrounding potential policy solutions to the mess we are in (Hine 2023). Such false narratives, in this case, often take the forms of hate speech (Leader Maynard and Benesch 2016), or misinformation (Allcott, Gentzkow, and Yu 2019). Free speech—the ability to express both popular and unpopular opinions—is one of the pillars of democratic justice for peoples and societies that are free and equal. In democratic societies, no one exercises control over the expression of individuals’ personal and social identities (Kramer 2021). Thus, it is not clear to what extent such corrupting and socially degrading communication campaigns can be prosecuted to the extent that they cause real-world harms and damages.

The reason that hate speech and misinformation are interesting, though, is because they are often seen as malignant, symptomatic of social disorder, and as unnecessary and even antithetical to the proper functioning of democracy.¹³ The question that scientists have to ask themselves, then, is whether, without intervention and advocacy in service of scientific truth—i.e., on behalf of the integrity of important work—prevailing political sentiments and trajectories would lead to a world where pressing ecological and environmental issues would not be solved. Without intervention to impede socially degrading and communally destructive communication, centered around reality distorting falsehoods, would our societies be any less well off? Do individuals who know the truth have a duty to advocate for it, or is it enough that truth is known? For example, perhaps knowing about climate change is enough to provoke social change on an individual level, notwithstanding efforts to block or disrupt pursuit and political action on scientific facts through misinformation campaigns at the population or community level.

Society needs to ensure that morally grounded speech acts *against* those who propagate malicious speech¹⁴ have a greater influence and reach than those malicious acts

¹³ These types of speech are often based on an epistemic standpoint of ignorance. See Lepoutre (2019).

¹⁴ As I define them, both hate speech and disinformation are intentionally malicious—but not, crucially, misinformation.

themselves. This requires a combination of engineering, advocacy, and regulation. These types of counteraction can be made more prominent within our social mediums and systems of belief. The next two sections contain arguments to support my claim that carefully countering hateful and false beliefs directed towards climate scientists and social scientists would make society healthier. They are organized around the two predominant methods bad actors use to deconstruct and discredit real science and evidence informed policymaking—hate speech and misinformation.

Hate Speech

On the ideological battlefield that characterizes much of Western politics, mistaken perceptions of truth not only create and sustain distortions in individuals' abilities to access information, but they also define individuals' susceptibility to propagate and take up hateful beliefs. Such beliefs, I argue are characterized not only by belief in rudimentary conspiracy theories, but they are also defined by a variety of methods by which propagators threaten violence against established individuals, organizations, institutions and purveyors of mainstream ideas (which are not conspiracies). Online epistemic environments deeply influence the endorsement of different categories of beliefs (Nguyen 2018). Thus, whether one is an active Twitter user, Facebook user, or frequents the Financial Times homepage or Reddit, defines the salience—and the malignity—of the information one has access to (McDonald 2021). The societal harms of permitting the consumption and espousal of hateful ideologies, beliefs, and speech acts depends on both the circumstances of, and the public's general reaction to, the act itself (Howard 2019, 102).

It is clear that hate speech is intended to “spark public disorder and dissent”; creating environments where respectful social discourse is replaced by discrimination and contempt, and is meant to incite violence against groups which are the subject of that hate.¹⁵ I want to point out that the epistemic basis of the spread of hateful communication doesn't have to be explicit: it can seem incredibly benign, but this façade can mask malevolent and even deadly campaigns bent on disrupting and derailing the social order and procedures of democratic justice (Parekh 2006, 214).

Our perceptions of reality are mediated through the information we have access to. Our exposure to hate speech can be exacerbated through epistemically closed systems, i.e., epistemic bubbles (Nguyen 2018).¹⁶ As Clark and Chalmers (1998, 18) argue, we rely

¹⁵ Larson (2020), 306. Note, though, that Parekh (2006), 214, argues that hate speech does not necessarily result in individual alienation, or a breakdown in the social order.

¹⁶ As Alexander (unpublished manuscript, 245) writes “[a]n epistemically closed system is one which has certain beliefs and values such that, regardless of the evidence available, the attitude of the person towards those beliefs and values won't change.”

heavily on external sources for moderating our inner psychology, in addition to the structure of our belief systems. If those sources are corrupted, hijacked, or manipulated, we lose touch with our social network and fall deeper into obscurity, lashing out at those who we perceive to have placed us in such a situation. This, I suggest, defines the origins of hate speech—particularly hate speech that is baseless and blind. There is an important difference between manipulated beliefs—often a symptom of being the target of disinformation and hate speech—and attempting to manipulate beliefs—often the goal of online trolls, hackers, and conspiracy theorists.

The integrity of our reasoning and beliefs can be critically damaged when we are exposed to hateful speech because of its corrosive nature on civil discourse (Scanlon 1972). This matters for climate scientists because professional researchers must navigate between fending off disinformation attacks and hateful threats, as well as resisting the temptation to engage in manipulative content creation themselves in hopes of twisting the discourse in disingenuous ways that are not based on evidence. While this latter case is extreme, but in the face of a hostile information environment, it is certainly possible for any effort short of extremity can feel hopeless. I contend that the harms associated with exposure to intolerant and hateful acts can be ameliorated by appeal to counterspeech as a tool to be used in occasions where options for civil discourse have been exhausted. This proposal will work best, I think, when it is employed by civil society institutions, and not individuals, because individuals—including climate scientists under attack—are more prone to anger, bias, and mistakes than professional organizations which are also equipped to take legal action against hate groups, if necessary. Mainstream dialogue that originates in the international community is more difficult to distort through hate than individual opinions and perceptions. This is partially because of reputation, and also partly because of institutional resources that ingrain a sense of the truth or falsity of factual information within official documents. I address this issue with regards to dis- and misinformation in the following section.

Misinformation and Disinformation

False information—intentionally conceived to disorient, or simply erroneous--disrupts the coupling between our internal beliefs and external reality.¹⁷ Exposure to misinformation online can lead to the entrenchment of inaccurate beliefs which harm the social, normative, and epistemic status of individuals who hold them. The danger of both mis- and disinformation is that it can undermine authorities and other trusted sources of

¹⁷ There are different varieties of false information, including *disinformation* and *misinformation*. I mostly focus on false information that is intended to deceive—disinformation--see Lazer *et al.* (2018) for definitions that encompass the separation.

information.¹⁸ Of course, as Clark and Chalmers note, both true and false beliefs are a result of the social psychological constitution of a person and the credibility of their epistemic sources.¹⁹ Thus, the human mind both creates and assesses systems of belief, including systems that concern facts that deal with natural science and its policy implications (Bardon 2020)—the main sort of misleading communication that interests us here is climate change disinformation (see, generally, Hansen and Cox 2022). Because “consensus can serve to solidify and maintain belief in misinformation” (Lewandowsky *et al.* 2012, 113), traditional tools employed by psychologists and technologists, for example at Facebook and Twitter, to combat climate misinformation, and political misinformation more generally, and false beliefs have had mixed results (Lazer *et al.* 2018; Spiekermann 2020).²⁰

I suggest that for some groups, adherence to false ideologies defines their social identities. For example, US republicans are ideologically defined by their skeptical stance towards climate action and science more generally—as a separate example, take conservatives’ anti-masking/anti-social distancing campaigns during the 2020-21 COVID-19 pandemic. Thus, efforts to alter certain groups’ beliefs may backfire because of the ideological premises in which their culture is grounded, this is clear outside of climate change controversies, too, for example religious believers are often close adherents of their faith even in the face of contradicting evidence (Laborde 2017). Psychologically, countering the spread of false information is difficult because of the diversity of socially acceptable views and the myriad interpretations of the truth.

The debate surrounding the role of climate scientists in actual decision making regarding the results of both physical and social research, centers on the question: what authority do theoretical modelers have to dictate the political interpretation of their models (in the case of climate science), and do climate modelers and environmental economists have a duty to prepare data and communicate results in such a way that output and recommendations stand up to scrutiny, both from the peer review community as well as the general public? It should be clear that the answer to the second half of the question is yes; physical and social climate scientists have a duty to propose models that are mathematically, methodologically, and experimentally or observationally valid. But

¹⁸ Larson (2020), 306 writes: “Where official information sources are perceived as untrustworthy, the climate is set for the viral spread of unfounded speculation.” Indeed, as Lepoutre (2019, 163) notes, state-sanctioned communication often has more influential standing than information from other (non-political) sources.

¹⁹ As O’Connor and Weatherall (2019, 80-81) note, one’s membership in a social network can define what is epistemically authoritative and whether one opts to conform to group-held beliefs and norms—whether factual or not.

²⁰ I do not address whether it is the role of the state to *decide* if citizens’ freedom of expression is threatened by misinformation (Scanlon 1972, 217).

the question of what *authority* scientists have to intervene in public discourse when they perceive their research being used in an unethical or immoral way is much more fraught, as we have seen.

Scientific Values and Post-Truth Politics

The question, pertaining to the validity and receptivity of hard evidence in climate science by the general public, can be summarized thus: “If the science is insufficiently certain to dictate a shared commitment to a particular line of action, from where do these commitments spring?” (Sarewitz 2004, 386). Indeed, as we find in Steele and Werndl, there is still ongoing debate about the methods that scientists, and especially climate scientists, use. As Heather Douglas writes, we need to answer questions regarding:

Which interests are relevant and why? Why is the exposure of interests important to the integrity of science? How does this fit with the ideal of value-free science, in which one’s interests are not to interfere with the interpretation of evidence? (Douglas 2009, 19).

I suggest that the answers to these questions can come also from political actors and advocates of science in the media, private industry, and civil society, and not only scientists themselves, as it is the public, and public interests, that engage with the political implications of the findings of scientists (Kournay 2022, 240). As E. O. Wilson (1998, 101) notes, “science, like art, and as always though history, follows patronage.” By demarcating the responsibilities of political actors in the public sector from the scientific community and from the private sector, including civil society organizations, socially responsible science enables scientists a clearer view of the landscape of inquiry and more tools to counter attacks on the integrity of their profession. In the case of disinformation and misinformation, the defense of the findings of researchers by the researchers themselves can provide a powerful antidote to the attacks of critics—and those researchers may be in the best position to provide such a defense.

Peer review confirmation of atmospheric climate change models and their parameters, as well as econometric studies which promise to provide a technocratic roadmap to a just transition (Castle and Hendry 2020), serve as explanatory and methodological challenges for climate scientists and social scientists of climate change who wish to steer policy towards ecological solutions (Frigg, Thompson, and Werndl 2015b, 967). What basis does the public have for believing the accuracy of climate model predictions, or the predictions of economists who propose various pathways to net-zero? For scientists and policymakers to engage with this question, experts in their various domains must step out of the confines of their disciplinary focus—a proposal I argue enables scientists’ to more fully pursue their mission of the search for knowledge based

on evidence and reason. Reason comes from an understanding of the world, not from a distortion of reality fueled by actors bent on deconstructing the civilized public forum. Science and reason may provide the best antidote to the distortion caused by polarized political conflict, disagreement, and mutual animosity. But climate science, as an interdisciplinary subfield of meteorology, geology, and environmental economics, among other domains, also has other worries. Arguably, on the basis of historical evidence, data, and observation, our climate models are not necessarily accurate predictors of future climate and we cannot tell whether we should thus be confident that they are useful tools in making policy decisions related to climate change.²¹ In other words, not only is there uncertainty in regards to climate scientists future predictions, this uncertainty is driving radically conflicting views about who is right and who is wrong. Climate scientists have, in recent years, thus faced a crisis of credibility. What happens when evidence-based research and purely political considerations—considerations that are based upon choice between use of finite resources (see Boyce 2021)—are at odds with each other?²²

To move closer to a conclusion, some authors deny the primacy of scientific evidence over political values (Kourany 2010; Intemann 2020; 2015). Should scientists be allowed the leeway and freedom to dictate politicians' policy choices unimpeded? This hasn't worked out so well recently—scientists have been questioned and persecuted because of their perceived political bias. Despite this, there are others who believe that values are more subjective than facts, and so should have less weight in climate science and policy than empirical concerns related to the positive—apolitical and methodological—research of environmental scientists (Douglas 2009). I suggest that the connection between misinformation in climate models and socially responsible science rests on the duty of climate scientists to protect the credibility of their findings. It is not, as some have supposed, to criticize the methods of climate modeling as incomplete, ad hoc, or inaccurate.²³ In fact, the debate over climate change misinformation shows that climate scientists are concerned, and rightly so, with the validity of their models (Lloyd 2010, 973) and with their models' predictive power. The need for increased social responsibility that goes along with the political implications of scientists' findings, while pertinent to the results of the work climate experts do, should be moderated by a coalition of stakeholders who know the truth and are able to act on it. These stakeholders could be

²¹ See Stainforth, *et al.* (2007a) for an explanation of this argument, on p. 2156: "We have no hope of confirming the reliability of a predicting system, so confident statements about future climate will be more qualitative than one might wish, and conditional on a number of significant assumptions." See also Lloyd (2010).

²² See Brown (2013, 68): *whose* values play a role in our scientific inquiry, and what the *source* and *status* of those values are, are all relevant questions, as Brown points out.

²³ This is not to say that climate science doesn't have its own uncertainties; I've made that point plain, I hope. See Frame *et al.* (2007).

NGOs, news media, politicians, intergovernmental bodies, sovereign nation states, or citizens' groups. Thus, I argue that misinformation and disinformation about climate change is a special case, unique to the field of environmental science, and a few other historical and more political disciplinary examples, where scientists' academic integrity and ascription to widely accepted research ethics, including the scientific method itself, is called into question.

Climate change, for natural scientists or policy experts, is an exception to the (heavily criticized) value free ideal. Scientists need to be cognizant of the public's interest in the implications of their work; this can clearly be helpful in deciding both which research questions to pursue and how to structure climate research to avoid becoming entangled in reputational and sometimes life endangering controversy about whether one's results are established through a methodology which is based on consensus. In other words, scientists who are aware of the political issues are more able to navigate post-truth environments where words are twisted, and stories are fabricated—increasingly to promote vested interests who are a threat to climate solutions.

One objection to potential political interventions made by scientists is the principle of lexical priority. The *principle of lexical priority* is an example which holds that there is only an evidential, factual, basis for scientific beliefs, and that value judgements have no place in the work of a scientist or their writings (Brown 2013, 70; Brown 2020; Büter 2015). To briefly expand on this objection, it holds that appraisal of theories should be value-free (Büter 2015, 18).²⁴ According to this objection, it is *not* the job of scientists to convene judgement on ethical, moral, or political questions. Scientists can and should focus on experimentation, innovation, and invention—bringing new technologies and scientific techniques to the table—but their work does not give them normative authority. I have argued that the debate is more nuanced than this and that scientists must be able to discern when to bring other professional authorities (such as media personalities, journalists, social scientists such as economists, and politicians from all ideological backgrounds) into the discussion.

Conclusion

The main difference between disinformation and hate speech is that disinformation engineered to be misleading and subtly false, while hate speech is intended to incite violence or conflict against its target—even when that target is a professional scientist--and intentionally degrades the humanity of the intended target and flouts the rule of law

²⁴ Kournay (2010), p. 101, discusses whether “the ideal of socially responsible science thereby violate[s] scientists' rights to freedom of research.” While interesting, this objection will not be my focus in this section.

concerning acceptable public discourse (Parekh 2006).²⁵ Let us recap my thesis: when one's external epistemic environment is infected with hate speech, or when one becomes the target of a disinformation campaign, *passively* truthful and benevolent public speech is not always enough to allow groups or individuals to escape from cycles of contemptible forms of communication (Fraser 2023). Instead, when one's sources of belief have been corrupted, what is necessary is a form of speech that is both more persuasive and more inclusive than the alternative, and which *actively* perpetuates both true and beneficent narratives presented by influential members of the general community. We must push counterspeech to its limits because its enemies will constantly adapt.

While individuals should be entitled to a diversity of critical perspectives that serve to inform them about society and the world at large, there are efforts being made to preserve a standard of moral and measured discourse within the public spaces that we all inhabit. Thus, the role of counterspeech to combat various forms of undesirable communication is both preemptory and educative in the sense that it serves to inform the general public what is true and what is not, what is a legitimate political view and what is not, and what are acceptable forms of public and private conduct (Lewandowsky *et al.* 2012, 115; Lepoutre 2019; Howard 2019; McGowan 2018). Actions which establish the authority of certain honest, reliable, and authoritative voices within society, and at the same time educate individuals about what actors are *not* reliable or legitimate sources of information, regulate collective behavior and the quality of the choices that are available to individuals and groups (Granovetter 1978). They also go some distance to creating public spaces where confusion and hate are effectively mitigated.

Scientists' authority over the objects of their research can and should give them—under the right circumstances, as in the case of disinformation and politically engineered propaganda that is intended to sow discord in the face of scientific reality—normative rights over the social dialogue concerning the results of that research. For climate scientists, the discovery of the critical state of the Earth's climate is the major outcome of an accumulation of scientific work over the last 50 years. That climate scientists push to convey the geopolitical, environmental, and humanitarian implications of their work can be a feature of their science, as long as social responsibility remains focused on creating good science. Finally, when climate scientists argue over which models are useful, correct, or valid, they are creating a dialogue which should be interpreted by the public as being an indication of a healthy field of discovery and inquiry.

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²⁵ See Lepoutre (2019, 165) who argues that the “salience” of hate speech is an injustice not only to the receiver of hateful communication, but also to society.

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