CHAPTER 7

Understanding the Political and Psychological Roots of Climate Misinformation and Its Impact on Public Opinion

LEAD AUTHORS: DOMINIK A. STECUŁA AND JOHN COOK
CONTRIBUTING AUTHORS: ARUNIMA KRISHNA, ADRIAN DOMINIK WÓJCIK, JEAN CARLOS HOCHSPRUNG MIGUEL, MATTHEW HORNSEY, AND SALIL BENEGAL

INTRODUCTION: UNDERSTANDING THE CAUSES AND CONSEQUENCES OF CLIMATE MISINFORMATION

Journalists, academics, and politicians have devoted considerable attention to misinformation since at least 2016, when false information about the US presidential election and the UK Brexit campaign spread rapidly through social media. These developments highlighted how quickly and effectively false information can be disseminated through our digital information ecosystem and the consequences of that spread. Given the urgency of effectively addressing climate change, preventing and addressing misinformation about climate-related issues has become an urgent task.

Misinformation can be defined as false and misleading information, most often spread without the intention to deceive. Disinformation is false and misleading information spread on purpose.[1] Given that intention is very difficult to assess, we use "misinformation" to refer to any falsehoods about climate change, whether or not they are spread with an intent to harm. Misinformation matters because it can influence attitudes and behavior of both the public and political elites. Public opinion is of particular importance in democratic

Dominik A. Stecuła et al., *Understanding the Political and Psychological Roots of Climate Misinformation and Its Impact on Public Opinion*. In: *Climate Obstruction*. Edited by: J. Timmons Roberts, Carlos R. S. Milani, Jennifer Jacquet, and Christian Downie, Oxford University Press.
DOI: 10.1093/oso/9780197787144.003.0007

societies because it provides a link between what the people want, their electoral behavior, and what politicians do on their behalf. The idea of democratic representation is therefore predicated on knowing and understanding public opinion. Misinformation, as part of broader information disorder, can distort and manipulate public opinion on a given issue, affecting not only beliefs and attitudes, but also voting and policy. Misinformation tends to flourish during elections and other events that increase the salience of politics and political action, especially in countries like the United States where political polarization is high, peoples' identities are shaped by partisan attachments, and many Americans process information through a political lens.

Global warming and climate change have been the subject of well-funded misinformation campaigns to cast doubt on climate science and scientists and subsequently to delay climate action.[2] These campaigns have historically been funded by conservative foundations as well as fossil fuel industry and other interest groups with the goal of denying scientific findings regarding human-caused climate change and downplaying the need for mitigation and otherwise addressing the problem.[3]

These campaigns have been found to be at least somewhat effective in making people question the existence of human-caused climate change, especially in the United States.[4] It is unsurprising, then, that the United States is home to the highest proportion of climate deniers and skeptics in the world.[5] There is thus an urgent need for investigations into effective communication strategies to help combat climate change misinformation campaigns, especially in the ever-changing information environment where social media play an increasingly significant role. In the United States, for example, just over one-quarter of Americans got news from social media in 2013. But by 2023, almost half of the population did. In Peru, Thailand, and Kenya, for example, about one-third of the population of each country gets their news on TikTok.[6] In this social media-centric world, where the role of the traditional gatekeepers has been replaced by an algorithm tailored toward virality, it is especially important to understand the dynamics of climate misinformation and its impact on public opinion.

In this chapter, we focus on how public opinion is shaped by misinformation about climate change. Historically, research on this topic has focused explicitly on climate denial, but recently, the umbrella term "climate obstruction" has emerged, highlighting aspects of these efforts beyond explicit climate denial. Although most of the work we have reviewed does not discuss climate obstruction per se, it is still highly relevant because it identifies the core psychological and ideological drivers of public opinion formation and the ways in which public opinion tends to be formed.

Much of this work to date has focused on the United States; thus, many of the examples we cite are from that nation. We do, however, try to capture as broad a view as possible, noting important examples from the Global South.

Box 7.1 on Bolsonaro's Brazil offers a case study of some of the dynamics we discuss in this chapter.

We first discuss the political, ideological, and psychological underpinnings that drive public opinion formation on important societal issues. We outline why people tend to believe what they believe, particularly when it comes to climate change, and demonstrate how and why climate obstruction strategies can be successful. We discuss not only the historical use of climate denial as obstruction, but also show how messages rooted in explicit climate denial have evolved to focus on attacking climate mitigation efforts. We then discuss climate misinformation specifically, centering our analysis on the five key climate beliefs and five key climate disbeliefs, again emphasizing the shift from obstruction via explicit climate denial rhetoric to attacks on mitigation efforts. We ground this discussion in the FLICC framework (which uses *f*ake experts, *l*ogical fallacies, *i*mpossible expectations, *c*onspiracy theories, and *c*herry picking), describing common techniques used in disseminating climate misinformation. We then discuss the concrete impacts of climate misinformation in terms of forming climate beliefs as well as the broader, systemic consequences that make it difficult to act politically and socially to address climate change. We conclude by discussing how the climate misinformation problem can be addressed through communication and education-based interventions.

DRIVERS OF PUBLIC OPINION ABOUT CLIMATE CHANGE

Despite the prevailing scientific consensus on climate change, certain segments of society disbelieve it, denying the mere existence of climate change or its anthropogenic origin.[7,8] Remarkably, these opinions are occasionally expressed by individuals of esteemed scientific reputation (including Nobel Prize laureates), particularly when their expertise does not encompass the discipline of climatology.[9] Thus, even possessing scientific expertise does not shield individuals from climate change misinformation.

That reality may be partially explained by communication study models such as the elaboration likelihood model (ELM) of attitude change.[10] The model assumes that people are motivated to hold correct attitudes and opinions. However, this tendency is at odds with the limited cognitive resources of an average citizen,[11] as the depth of thought possible depends on individual traits and situational factors. One should be able to think deeply about an issue when one is motivated and can process the information at hand—a situation in which new information will be evaluated based on its merits. This ideal scenario is rarely the case for climate change. Although climate change potentially affects a significant portion of Earth's population, thus motivating individuals to seek relevant information, they often do not have the skills

or other information to process it correctly and in an unbiased way. Therefore, ELM would predict that climate change information will be processed shallowly, with recipients focusing not so much on the arguments' accuracy but on peripheral features such as the information's source or the emotions it evokes.

Public opinion can be shaped by a variety of factors, depending on the person and the topic. People respond to different arguments based on personal experiences, issue salience, knowledge of the issue, values, partisanship, and a multitude of other forces. In this chapter, we will pay particularly close attention to the impact of elite cues, ideology, the news media, and other relevant factors that scholarship has found play a role in climate opinion formation.

The forces that shape public opinion can be broadly characterized as bottom-up and top-down. One perspective on dissemination of climate change misinformation is that it operates in a bottom-up fashion, originating in the minds of individuals and then spreading through their social networks. Bottom-up misinformation typically arises from genuinely held beliefs rather than an intent to deceive, which can be the product of psychological biases such as confirmation bias, causing people to cherry-pick information that confirms their existing beliefs.[12] An alternative view is that climate change misinformation spreads from the top down: here, vested interests—such as the fossil fuel industry and their affiliated political elites—engage in messaging on climate change that influences the public. Importantly, these top-down and bottom-up approaches are not mutually exclusive.[13]

Public Opinion on Climate Change

The top-down process by which climate misinformation is spread gained widespread prominence with the publication of the book *Merchants of Doubt* by the historians Naomi Oreskes and Erik Conway,[14] although other scholars have also described such processes.[15] The authors argued that the US climate skepticism movement was originally spearheaded by three high-profile American physicists with strong anti-socialist views. Although they represented a small minority within the scientific community, their voices were magnified by the support of various climate change countermovement organizations (e.g., think tanks and other advocacy organizations). In the early 2000s, an analysis of ninety-one such organizations revealed annual funding of just over $900 million, much of it tied to the fossil fuel industry.[16,17] The pro-business, anti-government rhetoric spread by these organizations resonated mostly among US Republicans and were featured prominently in targeted advertisements and business-oriented publications. That messaging was further amplified by conservative media in the United States. The result was an integrated campaign of misinformation.

Climate change became a more salient issue as scholars produced more research about global warming and its consequences. As it entered both political and cultural discourse, polling on it became more commonplace and scholars began to investigate factors driving climate attitudes. Public opinion on climate change in the United States in the 1980s and early 1990s reflected a largely uninformed populace that was generally unaware of the scientific consensus on climate change or the greenhouse effect and had heard little about the issue in news media or from political elites.[18,19] By the late 1990s and early 2000s, polling data indicated that substantial segments of the American public held misinformed rather than uninformed views about the existence of climate change, its causes, and its risks. Moreover, these views were most common among Republican voters, who by the mid-2000s have been far more likely than Democrats to reject the scientific consensus on climate change and oppose action on mitigative emissions-reducing policies.[20,21]

Ideology

By the mid-2000s, the major predictor of climate change opinion among Americans was partisan identification—Democrats accepted scientific consensus whereas Republicans largely did not—and this political polarization was particularly pronounced among highly educated respondents, who generally tend to be more attuned to their respective party positions on issues.[22,23,24] These were the decades during which climate science was drawn into culture wars that describe and prescribe what it means to be left or right in one's politics.

Americans aligned with the Republican party are considerably more skeptical of climate science today than they were in the 1990s. This left–right divide in attitudes toward climate change has been identified in several other countries (although not as starkly as in the United States).[25] Some scholars have identified ideology, values, and general worldviews as the root causes of this polarization of climate attitudes along political lines.[26,27] Their approaches tend to be rooted in psychological research on motivated reasoning[28,29] that suggests people are motivated to reject messages from scientists and experts if they do not conform to their values and identities and even to seek information from contrarian sources to find supporting evidence for these values and identities.[30,31]

A core aspect of political conservatism, for example, is suspicion of "big government," and resistance to regulation of individuals and markets.[32] In the case of climate change, the policy implications of global warming are not compatible with a laissez-faire philosophy.[33,34] Those with an implicit moral suspicion of government regulation therefore find climate science inconvenient because

the solutions to climate change frequently imply government intervention. Thus for some conservatives, it might be cognitively easier to reject climate science than to accept its proposed solutions. Indeed, meta-analyses suggest that free-market ideology is one of the biggest predictors of climate denial, suggesting an ideological underpinning to the political divide over climate change (see Chapter 5).[35]

Over time, ideologically driven beliefs about climate change among members of a group can become a collective identity overlaid with moral and political significance. That climate science has become a contested intergroup issue is concerning because it can lead to self-reinforcing and difficult-to-break cycles of intergroup polarization that can hinder action.[36,37]

However, it is difficult to explain the political divide in willingness to believe misinformation about climate change as being driven exclusively by bottom-up ideological concerns. Many Americans are not ideologically consistent, failing to understand "what goes with what" politically and holding views that strong ideologues may view as contradictory.[38,39] A powerful example of this phenomenon in the context of climate change is that market-friendly ways to reduce carbon emissions, such as via carbon pricing and carbon taxes, are considerably less popular among Republicans than among Democrats.[40] Furthermore, ideological explanations struggle to account for the fact that conservatives and Republicans once held views on climate change very similar to those of liberals and Democrats.[41]

Finally, the left–right divide in beliefs about climate change is not universal. There is nothing inherently conservative about climate denial, and in fact, for many years the Republican party has been an outlier on climate change among conservative parties in Western democracies.[42] A more precise typology suggests that in nations where the economy is heavily dependent on fossil fuels (e.g., the United States, Australia, Brazil), belief in climate change tends to be politically polarized, but in nations in which the economy is less dependent on fossil fuels, the left–right divide is weaker or nonexistent.[43] In Germany, for example, mainstream parties across the political spectrum subscribe to the scientific consensus on climate and have become global leaders in the transition from fossil fuels to renewables (albeit this unity has recently been challenged by the growth of the far-right AfD party).[44] That political polarization is most pronounced in nations that have the most to lose economically from the energy transition away from fossil fuels suggests that polarization around climate change is not only a result of bottom-up ideological considerations, but also is shaped by top-down campaigns from economic vested interests and political opportunists. In other words, economic interests invested in protecting the status quo play an important role in shaping public opinion on climate change and ultimately fostering society-wide polarization on the issue.

Elite Cues

In seeking to explain how polarization on climate change has shifted over time and across nations, some have focused on the notion of elite cues: that people's beliefs about climate change are influenced by the messages conveyed by senior or high-profile figures within their political communities. For example, aggregates of US polls conducted in the 2000s showed that climate change concern was influenced by top-down messaging (e.g., Congressional press releases from Republicans and Democrats or messages about climate change from political actors transmitted via the mass media) and that these messages were more influential than scientific communication published in academic journals—or even than people's own observations of climate change effects.[45,46] In Australia, polling data over ten years showed that climate skepticism varied reliably as a function of political support for conservative political parties.[47] Furthermore, experiments have shown that when assessing climate policies, people rely on their source of information rather than on the specific content of the policy—thus confirming the so-called party over policy effect.[48] Both Democrats and Republicans tended to more strongly support specific environmental solutions (such as cap-and-trade or carbon tax policies) when they were told that the policy was proposed by representatives of their own party.[49]

Elite cues, like messages from trusted political leaders, play an important role in shaping public opinion about climate change, following top-down models of attitude formation. Public opinion research has consistently shown that public opinion follows the opinions of political leaders, and climate change is no different.[50,51] As noted, during the 1970s in the United States, Republican and Democratic political elites shared similar views on environmental issues and were able to pass many environmental bills with bipartisan agreement—in several cases with near-consensus or supermajorities.[52,53] But politicians from both parties diverged on this issue over time.

Elite divergence on climate change after the Kyoto Protocol saw an asymmetric shift in which Republican politicians began explicitly to deny the existence of climate change, question the validity or consensus of scientific findings supporting it, or claimed that climate change was natural and not affected by human activity.[54] Concurrently, segments of an uninformed public that had heard little about the issue became misinformed as Republican voters turned to trusted in-group elites as sources of information.[55,56] In cases where Republican elites have changed course or presented pro-climate change stances, Republican voters have seemed to show more alignment with the scientific consensus on climate change or increased their support for climate policies.[57,58] However, such cases have been rare or politically costly for Republicans who take such stances: for example, after advocating a bipartisan carbon

tax, former Representative Bob Inglis was defeated in the 2010 primary for his seat in the US House of Representatives . Elite cues have also been found to shape public opinion about climate change outside of the US context, for example in the European Union.[59]

In addition to in-group elite messaging effects, out-group cue-taking (responding to messages from opponents) has contributed to the spread of skepticism and misinformation about climate change among Republican voters. Since the 2000s, while Republican elites have largely denied or undermined facts about climate change, Democratic elites have emphasized climate change as central to their policy agenda. As prominent Democratic elites—most notably former Vice President Al Gore and other Congress members such as Senator Bernie Sanders and Representative Alexandria Ocasio-Cortez—have increasingly supported the validity of climate science, the urgency of climate change, and mitigative policy solutions, there has been a backlash from Republicans (particularly those who are better educated or more attentive to news media), who have sought to distance themselves from the views of the opposing party.[60]

The effects of such elite messaging and mass-media framing are greatest in the United States, where scholars have identified large and persistent gaps between supporters of the Republican and Democratic parties in their views about climate change. In other countries and regions that do not see the same extent of polarization among elites on climate change, partisan gaps among the public on climate misinformation belief and endorsement are smaller. However, left–right ideological divisions are still evident in much of Western Europe, where conservatives/respondents who hold strong right-wing worldviews are much more likely to dispute climate science or endorse other misinformation.[61]

News Media

The news media play an important role across any society in informing the public about issues that matter. Especially on scientific issues that are difficult to understand, the media are an important mechanism through which knowledge passes on to the public, given that most members of the public do not read peer-reviewed academic journals. Of course, the public can and does experience the effects of climate change, but the links between extreme weather events and other climate effects need to be pointed out for people to understand the connection.

How the news media cover the issue of climate change is therefore very important. But news organizations have not always provided high-quality coverage of climate that draws these connections. Early work on this topic has shown that the positions of the "merchants of doubt," the networks of

fossil fuel advocacy groups and conservative think tanks, garnered traction in the news media. These groups used their political clout to support contrarian scientists in casting doubt on climate change in both their research and in the media.[62,63,64,65] Because of the importance of being seen as unbiased, many journalists were inadvertently complicit in amplifying these contrarian voices in news stories about climate change by providing "balanced" coverage to satisfy professional journalistic norms that give equal weight to various sides of an issue.[66,67] More recent analysis suggests, however, that coverage of climate change has improved since these studies first appeared.[68] At the same time, explicitly conservative news outlets frequently spread messages from these groups in order to undermine the public's confidence in climate science.[69]

More recent work, however, highlights that when the coverage of climate change became the most salient (after the release of the 2006 documentary *An Inconvenient Truth*), coverage of the merchants of doubt wasn't particularly robust. Instead, the American media became increasingly partisan. The news media in the United States focused primarily on Democratic messages on climate change, which tended to be consistently pro–climate science. At the same time, Republican climate messages have been less voluminous and more ambiguous until recently (with more straightforward climate skepticism and denial surfacing after the emergence of the Tea Party, a populist right-wing movement within the Republican Party, in 2009). This research suggests that the news media amplified partisan cues, and in the polarized context of American politics, Republican voters took cues from Democratic elites to reject climate science (see Chapter 6).[70]

A synthesis of the above perspectives suggests that in the spread of misinformation is a collaboration between vested interests at both the individual and collective levels.[71] On the one hand, science has been manipulated by forces that have coached and convinced some conservatives that there is no consensus around climate science (or the solutions to climate change). On the other hand, these misinformation campaigns would likely not be successful if individuals were not motivated to believe them. Individuals also have vested interests—whether they be economic, ideological, or identitarian—that make them prefer certain messages over other messages.

The pernicious influence of misinformation on climate change attitudes, combined with willingness of some societal actors to spread it, creates obstacles that stall climate action. Of course, majority support for a specific policy is no guarantee that said policy will be implemented by the government (see, for example, the lack of policy action on gun control in the United States despite overwhelming support among the American public for policies such as universal background checks). But when coupled with pressure on politicians to act, public support is an important mechanism through which political change can be achieved in democratic societies.

To design effective communication campaigns, understanding the varied audiences for one's message is crucial. Communication scholars and practitioners have long advocated for the development and use of public-segmentation strategies that help classify the broader population into similarly minded groups.[72,73]

Thus, the creation of the typology of disinformation-susceptible publics may be an important step in helping to address climate change misinformation.[74] The typology is a theoretically grounded classification of the broader population into one of four groups: those who are (1) disinformation-immune, (2) disinformation-vulnerable, (3) disinformation-receptive, and (4) disinformation-amplifiers. Drawing on the situational theory of problem solving, scholars have proposed and tested the typology of disinformation-susceptible publics on the issue of climate change.[75]

The central feature of the typology of disinformation-susceptible publics is that individuals who are highly motivated about an issue, hold extreme attitudes about it, and are knowledge-deficient about it (i.e., have previously accepted false information about the topic) can be classified as lacuna publics or disinformation-amplifying publics.[76] Disinformation-amplifiers are conceptualized not only to accept misinformation messages but also to actively amplify and share them with others. Although disinformation-amplifiers are typically very small in number, they tend to be the loudest voices about an issue around which they are motivated.[77] Any efforts to convince disinformation-amplifiers otherwise will likely not be successful. On the other end of the spectrum are disinformation-immune publics, or those who are neither knowledge deficient nor hold extreme attitudes about a topic, in this case climate change. Disinformation-immune publics may benefit most from prophylactic, or preemptive, "inoculations" to forearm them against future climate change misinformation efforts.[78]

Much of the population, however, tends to fall into the categories of disinformation-vulnerable and disinformation-receptive. Disinformation-receptive publics comprise individuals who are knowledge-deficient about an issue and display either high levels of motivation or extreme issue attitudes around it, making them highly susceptible to misinformation. Disinformation-vulnerable publics are conceptualized to be at moderate risk of accepting misinformation and may be the focal point for communication campaigns designed to reduce the negative effects of climate change misinformation. Thus, the typology of disinformation-susceptible publics may provide climate communicators with a starting point to help design interventions to address climate change misinformation. Indeed, it has been noted that "a well-constructed typology can advance other aims of science including prediction, explanation, and understanding, and can offer practitioners insight into how to craft

more effective public communication," and the typology of disinformation-susceptible publics has the potential of fulfilling this promise.

Several recent studies also identify other individual-level belief systems and biases that appear to complement and amplify the effects of other factors previously discussed. Anti-intellectualism—or a generalized mistrust of scientific experts—plays an important role in fostering belief in misinformation about climate change. While mistrust of scientific experts is not new and has been well documented across various American political eras,[79,80] anti-intellectual attitudes have become more prevalent among the general public as these views have converged with more populist sentiments[81] and the emergence of populist leaders/political figures in countries such as the United States or Brazil, during the past decade.[82] These populist attitudes are typically associated with a distrust or rejection of scientific experts, and individuals who hold such worldviews also show a greater tendency to seek or disseminate information from nonexperts on climate change and other scientific issues.[83,84,85] These processes may be further amplified by populist rhetoric, which exists across ideological and partisan lines and is prevalent in multiple country contexts.[86] Of course, sometimes mistrust of scientists' statements can be justified, as in the case of eugenics. However, when a consensus is reached through the application of the scientific method, as is the case with climate change, the weight of evidence is squarely on the side of science.[87]

Attitudes about race and gender also shape public views about climate change, motivating both explicit denial of climate change and opposition to mitigation efforts. Multiple processes appear to play a role in this phenomenon. Within the United States, race may have become more strongly associated with climate change through a "spillover effect" during the Obama presidency for voters who frequently viewed Obama and his policy agenda through a racialized lens[88] and through increased awareness or consideration of environmental justice issues in climate action.[89] Gendered differences have also become more salient in a range of country and regional contexts via both conservative elite and media messages that have disproportionately attacked women climate advocates such as Greta Thunberg[90] and amplified gender disparities in the perceived costs of climate mitigation in wealthier nations like the United States or the United Kingdom.[91]

These biases have been amplified by individuals who perceive climate action as a threat to existing capitalist, racial, and gendered hierarchies, and by far-right populist movements in several countries that have also emphasized anti-egalitarian views while dismissing climate change.[92,93,94] Consequently, a range of studies now documents a growing association between individuals' racialized and gendered biases and belief in varying types of misinformation about climate change. While they have become increasingly associated with far-right political parties and populist elites in the United States, Brazil, and parts of Western Europe, such as Spain,[95,96] these biases are evident

across partisan and ideological divides and may help explain the prevalence or persistence of climate misinformation in a range of country contexts.

Another dimension of public responses to climate change is explicated in research that explored three types of climate denial: (1) literal (rejection of the existence of climate change), (2) interpretive (downplaying its severity or anthropogenic causes), and (3) implicatory (accepting the basic facts of climate change but ignoring their implications).[97] While literal and interpretive denial involve rejecting the reality of human-caused global warming and the corresponding impacts,[98] implicatory denial describes more subtle psychological responses such as a disconnection between environmental behavior (or lack thereof) and its implications for climate change.

Climate considerations, in other words, interact with many other cultural and political identities and commitments that all citizens have. Ultimately, effectively communicating climate messages to the public and policymakers requires framing that information skillfully in order to consider audience beliefs and identities that might potentially interfere with accepting accurate scientific information.

CLIMATE MISINFORMATION ARGUMENTS

Surveys of climate attitudes have identified five key beliefs about climate change: (1) global warming is real, (2) it is human-caused, (3) experts agree on these two first points, (4) climate impacts are harmful, and (5) there is hope that we can avoid the worst impacts of climate change.[99] Of particular note is the perceived scientific consensus, which has been identified as a gateway belief influencing the other key climate beliefs.[100] However, these positively framed beliefs are mirrored by negatively framed misinformation arguments. As noted in the previous section, a recently developed taxonomy of contrarian claims about climate change has revealed that climate misinformation can be grouped into five main categories, paraphrased as: (1) global warming isn't real, (2) it isn't human-caused, (3) climate impacts aren't bad, (4) climate solutions won't work, and (5) experts are unreliable. These five themes have been described as the five key climate disbeliefs.

The researchers found that from 2000 to 2020, contrarian arguments showed a long-term transition from science-based to solutions-based misinformation. The newer forms negate not so much the existence of climate change, but rather the necessity of swift and decisive action.[101,102,103] This new trend goes under many names: climate delayism, response skepticism,[104] or secondary obstruction.[105] All of those terms describe a new form of climate change misinformation intended to challenge the efficacy of action to address the problem. It comprises four major arguments: denying that climate change may be solved, emphasizing the downsides of mitigating actions, redirecting

responsibility for climate change to others, and advocating nontransformative solutions. This new form of climate change misinformation may be challenging to neutralize, as it is often used to "greenwash" the actions of GHG emitters, such as by conducting pro-environmental campaigns while withdrawing from the European Green Deal.[106,107] (Greenwashing is a strategy of misleading public opinion to present entities in a deceptively positive light in terms of their actions on behalf of the environment.) The fifth category of climate misinformation—attacking scientists—is particularly prominent on social media, with 60% of climate misinformation tweets on Twitter/X containing conspiracy theories or ad-hominem attacks on climate actors.[108]

The five climate disbeliefs are content-based in that they describe the content of contrarian arguments. Another important lens through which to understand climate misinformation is the technique-based or logic-based approach, which seeks to understand the misleading rhetorical techniques and reasoning fallacies used in spreading misinformation. A useful tool for understanding this approach is the FLICC framework, which describes five techniques of science denial: (1) *f*ake experts, (2) *l*ogical fallacies, (3) *i*mpossible expectations, (4) *c*herry picking, and (5) *c*onspiracy theories.[109] While these techniques can be deployed as intentional strategies to deceive, they can also result from genuinely held psychological biases. For example, people tend to ascribe greater expertise to those they agree with, which can result in reliance on spokespeople with no expertise or whose expertise is in a nonrelevant domain.[110] People's susceptibility to immediate cues such as warmer or cooler local temperatures make them vulnerable to anecdotal arguments.[111] The difficulty in distinguishing genuinely believed misinformation from intentionally deceptive disinformation means that care must be taken when attributing deceptive motives to misinformation sources.

NEGATIVE IMPACTS OF CLIMATE MISINFORMATION

Climate misinformation is associated with specific negative impacts on public opinion about climate change. Just a few misleading statistics can lower people's acceptance of the reality of climate change.[112] Misinformation casting doubt on the scientific consensus on human-caused climate change—a gateway belief—has been found not only to reduce the degree of consensus someone perceives but also to negatively affect other climate attitudes such as acceptance of the reality of human-caused global warming and support for climate action.[113]

Misinformation has also been found to cancel out attempts to communicate accurate information. When participants received information about the 97% scientific consensus on human-caused climate change along with misinformation casting doubt on the consensus, there was no significant

change in the participants' perception of consensus, showing that the consensus message was neutralized by the misinformation. Similarly, when positive frames urging action on climate change appeared alongside a denialist counterframe, belief in the reality of anthropogenic climate change as well as support for reducing carbon emissions decreased.[114] However, the conditions under which factual information is canceled out by misinformation are contextual—one experiment found a canceling effect when misinformation was encountered after the factual message was received, but the factual message was effective if it came after the misinformation was received.[115]

The impact of climate change misinformation isn't limited to the beliefs and attitudes of individuals. For example, misinformation can have detrimental effects on the scientific community itself, by "seeping" non–knowledge-based considerations into scientific research and debates.[116] Similarly, most of the public who are concerned or alarmed about climate change fail to talk about the issue with friends and family.[117] The predominant driver of self-silencing about climate change is pluralistic ignorance—the misconception that most people don't care about climate change.[118] Unfortunately, this process results in a self-reinforcing "spiral of silence,"[119] a consequential outcome given that building social momentum is an important component for building overall momentum for collective action on climate change.[120]

Box 7.1: CASE STUDY: BOLSONARISM IN BRAZIL

Much of this chapter has been built on scholarship findings from the Global North, and particularly the United States. Future work should expand the focus of this research into different political and cultural contexts, especially in the Global South. In this section, we provide a case study of the spread of climate misinformation as a form of obstruction in Brazil under the Bolsonaro administration.

Bolsonarism refers to the political ideology and movement associated with Jair Bolsonaro, who served as president of Brazil for four years (2019 to 2023). Climate denialism in the country during this period did not merely consist of orchestrated disinformation campaigns by Bolsonarist groups on social media platforms. Instead, it can be better understood as a heterogeneous set of practices and discourses. Those networks extended from the digital environment to formal spaces occupied by government authorities in ministries, representatives in the Legislative branch, and reached the groups that took to the streets to defend the government. These actions fundamentally shaped the politics of what many have called the "post-truth" as an authoritarian project of producing ignorance.

Bolsonaro was supported by a coalition of parties and organizations that unified more traditional conservatives, anti-establishment groups,

ultranationalists, anti-environment groups, and pro-military sectors. Bolsonaro took advantage of a feature of populism, namely that it is tied to neither the left or the right end of the political spectrum, but instead is motivated by mistrust of "elites" and the superiority of "the people."[121] Misinformation in the Bolsonaro government was also disseminated through "digital populism"—a way of building charismatic power and mobilizing the masses through the circulation of misleading memes and narratives that included climate change misinformation linking it disapprovingly with globalist left-wing ideologies.[122] Climate change denialism found broad acceptance within that worldview, and Bolsonaro's coalition granted it credibility and ultimately made it a part of the government's official discourse and policy on environmental issues.

One researcher has argued that the climate denialism apparatus did not emerge in Brazil with Bolsonarism, but rather found new conditions for growth and the exercise of power within this political movement.[123] Climate denialism first appeared in Brazil in 2007, presenting itself as a conservative discourse in response to the growing concern about climate change as a result of the Intergovernmental Panel on Climate Change's (IPCC) *Fourth Assessment Report* establishing climate change as a scientific fact, the release of Al Gore's documentary *An Inconvenient Truth*, and the first national study by the National Institute for Space Research, which had led to a nationwide effort to promote the development of climate policies. Despite the extensive dissemination of scientific findings in the media, some Brazilian newspapers provided a platform for a minority with opposing opinions that challenged the scientific evidence and promoted climate denialism.

In May 2007, writer Olavo de Carvalho published an article in the *Diário do Comércio* newspaper titled "Science or Charade?" in which he criticized Al Gore's film. In one of the earliest records of climate misinformation in the national media, Carvalho asserted that it was all a "hoax" and associated climate change with "leftist activism" infiltrating international organizations.[124] In 2009, during the political process of reformulating the Brazilian Forest Code, climate denialists José Carlos de Almeida Azevedo (of the University of Brasilia)and Luis Baldicero Molion (of the Federal University of Alagoas) participated as researchers in public hearings organized to discuss whether climate change was related to deforestation and should be considered in debates about the new Forest Code. On that occasion, de Almeida Azevedo, a physicist, addressed the issue, stating that it is "impossible to predict, let alone alter anything related to the climate"; that instead of warming, we are heading for a "new ice age";[125] and that "the Earth's climate is governed by the Sun," therefore, "carbon has no influence on these astronomical phenomena." He also stated that "climate legislation will affect the country" and that

Continued

"what matters to Brazil is what is done here, not what the English or anyone else will tell us to do." In essence, his argument was that the issue of global warming was actually a geopolitical and economic matter filled with scientifically baseless information.

Another line of climate denialism in Brazil pertained to the formation of Christian-conservative political ideology, widespread during the Bolsonaro regime, that encouraged resistance to scientific information. One author has noted that this created a complex situation given that different Christian traditions held different views on politics and the environment.[126] Brazilian authors of denialist books have argued that the IPCC is a political-economic platform that uses scientific fraud for the implementation of what the authors call a "new global order."[127,128,129] According to these authors, the formation of this new global order is expressed in the form of a "trade war" between industrialized countries and less developed countries.

Another mechanism through which Bolsonarism spurred the growth of climate misinformation was the installation of climate denialists in strategic ministries for climate policy, including the Ministry of Foreign Affairs (Itamaraty) and the Ministry of the Environment. As some of his initial administrative actions, the minister of the environment closed the Secretariat of Climate Change and Forests and, in a joint decision with Itamaraty, withdrew Brazil's offer to host the UN Climate Change Conference (COP25) in December 2019. The former foreign minister, Ernesto Araújo, publicly supported a theory of "left-wing globalism" during his tenure and referred to climate change as a global conspiracy he called "climatism."[130]

Events in Brazil from July 2019 through COP25 later that year highlight how climate change denialism is not just a discourse or misinformation strategy but can guide institutionalized practices that undermine environmental policy and science. After Itamaraty sent a diplomat to participate in a conference with climate denialists organized by the Heartland Institute think tank in Washington, D.C., a telegram circulated within the ministry stating "they are putting our way of life at risk. The debate is not about climate change or carbon dioxide. It's not about climate or science. It's about socialism versus capitalism." Then, at COP25, the Brazilian delegation was small, hesitant, and without a clear mission.[131] Unlike at previous meetings, Brazil aligned itself with countries including the United States, Australia, and Saudi Arabia in an attempt to obstruct negotiations. With this decision, the Brazilian delegation declined to continue its position of leadership among developing countries and to demand ambitious CO_2 emissions reduction targets from developed countries.[132]

As demonstrated, the phenomenon of climate denialism in Brazil under Bolsonaro cannot be reduced to "misinformation" or "ignorance." And its consequences are not limited to opinions and attitudes. Under Bolsenaro, deforestation of the Amazon reached a record high, and funding for environmental enforcement was cut.[133] In this context, understanding the complexity and underlying motivations of climate denialism is crucial for promoting an informed and effective debate on environmental issues across the Global South and addressing the challenges posed by an informational and political landscape mired in misinformation.

COMMUNICATION AND EDUCATION-BASED INTERVENTIONS TO COUNTER MISINFORMATION

Research on climate misinformation and how it shapes public opinion has focused on mapping said misinformation and showing the linkage between it and public views on climate change. But there has also been growing interdisciplinary work on fighting climate misinformation.

One option for resisting climate misinformation is to use communication strategies that reduce the motivation for conservatives to embrace it. In nations where the debate on climate action is highly politicized, this means making a conservative-friendly case for such action. The literature reveals several examples of how this can work. For example, if one states that we can respond to climate change using free-market-friendly techniques, then Republicans are less likely to reject the science.[134] If one frames mitigating climate change as something that can help promote "green" technologies, then skeptics are likely to display more pro-environmental intentions than if one just presented the evidence that climate change is real.[135]

Other studies show that when messages about mitigating climate change are framed as a matter of obeying authority or demonstrating patriotism, then conservatives are more likely to think in pro-climate ways than if more traditional messages are used.[136,137] A field study examined the effectiveness of a one-month campaign that used spokespeople who referred to action on climate change as consistent with their conservative values. The campaign increased Republicans' understanding of the existence and causes of climate change by several percentage points.[138] These examples use what is described as "jiu jitsu persuasion"—presenting scientific messages in ways that are congenial to people's underlying motivations and using those identities to capture their attention and leverage change.[139]

Corrective or debunking efforts may also be more effective when the messenger shares a political identity with the targeted audience. Experiments with American survey samples have shown that Republican Party sources may be

more effective in correcting climate denialism and increasing overall environmental concern among other Republicans than other political or scientific sources.[140] However, other studies show corrective effects may also be relatively limited in their ability to shape policy preferences: such respondents may be more likely to agree with scientific facts about climate change after being presented with fact-checking, but do not correspondingly update their preferences for mitigative policies.[141]

Finally, simple solutions that promote individual resistance to climate change misinformation may not be sufficient to mitigate the pernicious effects of misinformation on public opinion. Institutional actors such as the fossil fuel industry or conservative think tanks run anti-climate change-related campaigns.[142] Additionally, the funding for anti-environmental campaigns is extensive. The fossil fuel industry is estimated to allocate ten times more funds to lobbying than pro-environmental activists and renewable energy representatives combined.[143]

Therefore, combating climate change misinformation requires focusing on two tasks: (1) enhancing individual immunity to misinformation, and (2) instituting systemic changes that make it harder for misinformation to spread and thrive.[144] These tasks are especially urgent given that fossil fuel companies often engage in actions promoting individual pro-environmental behaviors even as they resist more systemic forms of change in, for example, the law or financial regulations (see Chapters 2 and 3).[145] Even when we accept the inoculation metaphors, people need to be convinced to get inoculated.

CONCLUSION

In this chapter, we first discussed the various forces that shape public opinion on climate change to provide a broad perspective that could help elucidate why public opinion on climate change might be vulnerable to different forms of misinformation. As such, we have focused on the psychological and political dynamics researchers have identified as major forces affecting beliefs and opinions about climate change, such as elite cues, the importance of the news media, and political ideology. We discussed the history of explicit climate denial as a major focus of obstruction and how these messages have evolved to focus on attacking climate mitigation efforts.

Moving on to discussing climate change misinformation specifically, we rooted our analysis in the five key climate beliefs and how misinformation can be summarized by five key climate disbeliefs, again emphasizing the shift from explicit climate denial rhetoric to attacks on mitigation efforts. We complemented this discussion with the FLICC framework, describing misinformation techniques. We then moved on to discussing concrete effects of climate misinformation in terms of climate beliefs, but also broader,

systemic consequences that make it difficult to act politically and socially to address climate change. Finally, we concluded by discussing how the climate misinformation problem can be addressed through communication and education-based interventions.

Much of the research on which we have relied in this chapter comes from the WEIRD countries: *w*estern, *e*ducated, *i*ndustrial, *r*ich, *d*emocracies.[146] That reality likely limits the generalizability of these findings to other cultural and political contexts. In order to address this caveat, we presented the case study of Brazil, which has parallels with the United States (in terms of the rise of right-wing populism), but also show considerable differences.

There is still much to be done in researching issues pertaining to climate misinformation and obstruction, as well as the ways in which these societal problems can be addressed and alleviated. As we noted throughout the chapter, future research needs to focus on non-WEIRD countries, including replicating existing studies and typologies in the cultural and political contexts of the Global South. More explicit examination of greenwashing strategies as a form of misinformation should also be the focus of future work.

Another area for future scholarship is the rapid changes to the information environment including the increasing use of social media as a major source of information. Such research will be particularly important in countries that primarily rely on messaging apps such as WhatsApp, which are not the focus of US researchers because the platform is not as widely used in America as in other countries. Relatedly, artificial intelligence (AI) and large language models (LLMs) will likely continue to play an ever-growing role in generating and exacerbating misinformation. Future work should investigate how these tools affect the problem of climate misinformation, as well as the ways in which they might be used as a tool for understanding and responding to misinformation.

Finally, purveyors of climate misinformation increasingly place a strong emphasis on ad-hominem attacks and rely on conspiracy theories, but these methods are understudied in the climate misinformation literature. Future work should draw on insights from the robust literature on conspiratorial ideation and character attacks.

The suggestions in this chapter, along with its explication of the roots and nature of climate change misinformation as a form of obstruction—especially the deeper psychological and political dynamics that allow this phenomenon to affect public opinion—will, we hope, provide a starting point for societies to resist it.

NOTES

1. S. Altay, M. Berriche, and A. Acerbi, "Misinformation on Misinformation: Conceptual and Methodological Challenges," *Social Media+ Society* 9, no. 1 (2023): 20563051221150412.

2. N. Oreskes and E. M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming* (Bloomsbury, 2011).
3. R. J. Brulle and J. T. Roberts, "Climate Misinformation Campaigns and Public Sociology," *Contexts* 16, no. 1 (2017): 78–79.
4. A. Krishna, "Understanding the Differences Between Climate Change Deniers and Believers' Knowledge, Media Use, and Trust in Related Information Sources," *Public Relations Review* 47, no. 1 (2021): 1–8.
5. B. Teiturier and S. Duhautois, "Climate Change: Citizens Are Worried But Torn Between a Need to Act and a Rejection of Constraints," Ipsos, 2020, https://www.ipsos.com/en/climate-change-citizens-are-worried-torn-between-need-act-and-rejection-constraints.
6. Digital News Report, Reuters Institute for the Study of Journalism, 2023, https://reutersinstitute.politics.ox.ac.uk/digital-news-report/2023.
7. A. Leiserowitz, C. Roser-Renouf, J. Marlon, and E. Maibach, "Global Warming's Six Americas: A Review and Recommendations for Climate Change Communication," *Current Opinion in Behavioral Sciences* 42 (2021): 97–103.
8. B. Tranter and K. Booth, "Scepticism in a Changing Climate: A Cross-National Study," *Global Environmental Change* 33 (2015): 154–164.
9. M. Impelli, "Nobel Prize Winner Who Doesn't Believe Climate Crisis Has Speech Canceled," *Newsweek*, July 24, 2023, https://www.newsweek.com/nobel-prize-winner-who-doesnt-believe-climate-crisis-has-speech-canceled-1815020.
10. R. E. Petty and J. T. Cacioppo, "The Elaboration Likelihood Model of Persuasion," *Advances in Experimental Social Psychology* 19 (1986): 123–205.
11. K. E. Stanovich, *What Intelligence Tests Miss: The Psychology of Rational Thought* (Yale University Press, 2009).
12. J. Cook, "Deconstructing Climate Science Denial," in *Edward Elgar Research Handbook in Communicating Climate Change*, ed. D. Holmes and L. M. Richardson (Edward Elgar Publishing, 2020), 62–78.
13. R. J. Brulle, J. Carmichael, J., and Jenkins, "Shifting Public Opinion on Climate Change: An Empirical Assessment of Factors Influencing Concern Over Climate Change in the US, 2002–2010," *Climatic Change* 114, no. 2 (2012): 169–188.
14. Oreskes and Conway, *Merchants of Doubt*.
15. S. Rampton and J. Stauber, *Trust Us, We're Experts PA: How Industry Manipulates Science and Gambles with Your Future* (Penguin, 2002).
16. R. J. Brulle, "Institutionalizing Delay: Foundation Funding and the Creation of U.S. Climate Change Counter-Movement Organizations," *Climatic Change* 122, no. 4 (2014): 681–694.
17. R. J. Brulle, G. Hall, L. Loy, and K. Schell-Smith, "Obstructing Action: Foundation Funding and US Climate Change Counter-Movement Organizations," *Climatic Change* 166, no. 1 (2021): 17.
18. K. Bowman, E. O'Neil, and H. Sims, *Polls on the Environment, Energy, Global Warming and Nuclear Power* (American Enterprise Institute, 2016).
19. P. J. Egan and M. Mullin, "Climate Change: US Public Opinion," *Annual Review of Political Science* 20 (2017): 209–227.
20. A. M. McCright and R. E. Dunlap, "The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001–2010," *Sociological Quarterly* 52 (2011): 155–194.

21. E. Merkley and D. A. Stecula, "Party Cues in the News: Democratic Elites, Republican Backlash, and the Dynamics of Climate Skepticism," *British Journal of Political Science* 51, no. 4 (2021): 1439–1456.
22. R. E. Dunlap and A. M. McCright, "A Widening Gap: Republican and Democratic Views on Climate Change," *Environment: Science and Policy for Sustainable Development* 50 (2008): 26–35.
23. R. E. Dunlap, A. M. McCright, and J. H. Yarosh, "The Political Divide on Climate Change: Partisan Polarization Widens in the U.S.," *Environment: Science and Policy for Sustainable Development* 58 (2016): 4–23.
24. J. M. Jones, "Democratic, Republican Confidence in Science Diverges," Gallup, 2021, https://news.gallup.com/poll/352397/democratic-republican-confidence-science-diverges.aspx.
25. M. J. Hornsey, E. A. Harris, and K. S. Fielding, "Relationships Among Conspiratorial Beliefs, Conservatism and Climate Scepticism Across Nations," *Nature Climate Change* 8, no. 7 (2018): 614–620.
26. M. J. Hornsey, "Why Facts Are Not Enough: Understanding and Managing the Motivated Rejection of Science," *Current Directions in Psychological Science* 29 (2020): 583–591.
27. M. J. Hornsey and K. S. Fielding, "Attitude Roots and Jiu Jitsu Persuasion: Understanding and Overcoming the Motivated Rejection of Science," *American Psychologist* 72, no. 5 (2017): 459–473.
28. P. H. Ditto and D. F. Lopez, "Motivated Skepticism: Use of Differential Decision Criteria for Preferred and Nonpreferred Conclusions," *Journal of Personality and Social Psychology* 63, no. 4 (1992): 568.
29. Z. Kunda, "The Case for Motivated Reasoning," *Psychological Bulletin* 108, no. 3 (1990): 480.
30. D. M. Kahan, H. Jenkins-Smith, and D. Braman, "Cultural Cognition of Scientific Consensus," *Journal of Risk Research* 14, no. 2 (2011): 147–174.
31. S. Lewandowsky and K. Oberauer, "Motivated Rejection of Science," *Current Directions in Psychological Science* 25, no. 4 (2016): 217–222.
32. M. J. Hornsey, "The Role of Worldviews in Shaping How People Appraise Climate Change," *Current Opinion in Behavioral Sciences* 42 (2021): 36–41.
33. T. H. Campbell and A. C. Kay, "Solution Aversion: On the Relation Between Ideology and Motivated Disbelief," *Journal of Personality and Social Psychology* 107 (2014): 809–824.
34. G. Dixon, J. Hmielowski, and Y. Ma, "Improving Climate Change Acceptance Among US Conservatives Through Value-Based Message Targeting," *Science Communication* 39, no. 4 (2017): 520–534.
35. M. J. Hornsey, E. A. Harris, P. G. Bain, and K. S. Fielding, "Meta-Analyses of the Determinants and Outcomes of Belief in Climate Change," *Nature Climate Change* 6 (2016): 622–626.
36. K. S. Fielding and M. J. Hornsey, "A Social Identity Analysis of Climate Change and Environmental Attitudes and Behaviors: Insights and Opportunities [Review]," *Frontiers in Psychology* 7 (2016), https://doi.org/10.3389/fpsyg.2016.00121
37. K. S. Fielding, M. J. Hornsey, H. A. Thai, and L. L. Toh, "Using Ingroup Messengers and Ingroup Values to Promote Climate Change Policy," *Climatic Change* 158 (2020): 181–199.
38. C. Achen and L. Bartels, "Democracy for Realists: Holding up a Mirror to the Electorate," *Juncture* 22, no. 4 (2016): 269–275.

39. D. R. Kinder and N. P. Kalmoe, *Neither Liberal Nor Conservative: Ideological Innocence in the American Public* (University of Chicago Press, 2017).
40. D. Amdur, B. G. Rabe, and C. P. Borick, "Public Views on a Carbon Tax Depend on the Proposed Use of Revenue," *Issues in Energy and Environmental Policy* 13 (2014): 1–9.
41. J. A. Krosnick, A. L. Holbrook, and P. S. Visser, "The Impact of the Fall 1997 Debate About Global Warming on American Public Opinion," *Public Understanding of Science* 9, no. 3 (2000): 239.
42. S. Båtstrand, "More Than Markets: A Comparative Study of Nine Conservative Parties on Climate Change," *Politics & Policy* 43, no. 4 (2015): 538–561.
43. Hornsey et al., "Relationships Among Conspiratorial Beliefs."
44. D. Plehwe, "Reluctant Transformers or Reconsidering Opposition to Climate Change Mitigation? German Think Tanks Between Environmentalism and Neoliberalism," *Globalizations* 20, no. 8 (2022): 1277–1295.
45. Brulle et al., "Shifting Public Opinion on Climate Change."
46. J. T. Carmichael and R. J. Brulle, "Elite Cues, Media Coverage, and Public Concern: An Integrated Path Analysis of Public Opinion on Climate Change, 2001–2013," *Environmental Politics* 26 (2017): 232–252.
47. M. J. Hornsey, C. M. Chapman, and J. E. Humphrey, "Climate Skepticism Decreases When the Planet Gets Hotter and Conservative Support Wanes," *Global Environmental Change* 74 (2022): 102492. https://doi.org/10.1016/j.gloenvcha.2022.102492
48. G. L. Cohen, "Party Over Policy: The Dominating Impact of Group Influence on Political Beliefs," *Journal of Personality and Social Psychology* 85, no. 5 (2003): 808–822.
49. L. van Boven, P. J. Ehret, and D. K. Sherman, "Psychological Barriers to Bipartisan Public Support for Climate Policy," *Perspectives on Psychological Science* 13, no. 4 (2018): 492–507.
50. G. S. Lenz, *Follow the Leader? How Voters Respond to Politicians' Policies and Performance* (University of Chicago Press, 2013).
51. J. Zaller, *The Nature and Origins of Mass Opinion* (Cambridge University Press, 1992).
52. J. M. Turner and A. C. Isenberg, *The Republican Reversal: Conservatives and the Environment from Nixon to Trump* (Harvard University Press, 2018).
53. C. R. Shipan and W. R. Lowry, "Environmental Policy and Party Divergence in Congress," *Political Research Quarterly* 54, no. 2 (2001): 245–263.
54. E. Merkley and D. A. Stecula, "Party Elites or Manufactured Doubt? The Informational Context of Climate Change Polarization," *Science Communication* 40, no. 2 (2018): 258–274.
55. Brulle et al., "Shifting Public Opinion on Climate Change."
56. D. L. Guber, "A Cooling Climate for Change? Party Polarization and the Politics of Global Warming," *American Behavioral Scientist* 57, no. 1 (2013): 93–115.
57. S. D. Benegal and L. A. Scruggs, "Correcting Misinformation About Climate Change: The Impact of Partisanship in an Experimental Setting," *Climatic Change* 148, no. 1–2 (2018): 61–80.
58. M. Tesler, "Elite Domination of Public Doubts About Climate Change (Not Evolution)," *Political Communication* 35, no. 2 (2018): 306–326.
59. J. Sohlberg, "The Effect of Elite Polarization: A Comparative Perspective on How Party Elites Influence Attitudes and Behavior on Climate Change in the European Union," *Sustainability* 9, no. 1(2017), Article 1, https://doi.org/10.3390/su9010039.

60. Merkley and Stecula, "Party Cues in the News."
61. A. M. McCright, M. Charters, K. Dentzman, and T. Dietz, "Examining the Effectiveness of Climate Change Frames in the Face of a Climate Change Denial Counter-Frame," *Topics in Cognitive Science* 8, no. 1 (2016): 76–97.
62. R. E. Dunlap and P. J. Jacques, "Climate Change Denial Books and Conservative Think Tanks: Exploring the Connection," *American Behavioral Scientist* 57, no. 6 (2013): 699–731.
63. J. Farrell, "Corporate Funding and Ideological Polarization About Climate Change," *Proceedings of the National Academy of Sciences* 113, no. 1 (2016): 92–97.
64. J. Farrell, "Network Structure and Influence of the Climate Change Counter-Movement," *Nature Climate Change* 6, no. 4 (2016): 370–374.
65. P. J. Jacques, R. E. Dunlap, and M. Freeman, "The Organisation of Denial: Conservative Think Tanks and Environmental Scepticism," *Environmental Politics* 17, no. 3 (2008): 349–385.
66. M. T. Boykoff and J. M. Boykoff, "Climate Change and Journalistic Norms: A Case-Study of US Mass-Media Coverage," *Geoforum* 38, no. 6 (2007): 1190–1204.
67. R. E. Dunlap and A. M. McCright, "Organized Climate Change Denial," in The Oxford Handbook of Climate Change and Society, ed. J. S. Dryzek, R. B. Norgaard, and D. Schlosberg (Oxford University Press, 2011), 144–160.
68. L. McAllister, M. Daly, P. Chandler, M. McNatt, A. Benham, and M. Boykoff, "Balance as Bias, Resolute on the Retreat? Updates & Analyses of Newspaper Coverage in the United States, United Kingdom, New Zealand, Australia and Canada Over the Past 15 Years," *Environmental Research Letters* 16, no. 9 (2021): 094008.
69. Dunlap and McCright, "Organized Climate Change Denial."
70. E. Merkley and D. A. Stecula, "Party Elites or Manufactured Doubt? The Informational Context of Climate Change Polarization," *Science Communication* 40, no. 2 (2018): 258–274.
71. M. J. Hornsey and S. Lewandowsky, "A Toolkit for Understanding and Addressing Climate Scepticism," *Nature Human Behaviour* 6 (2022): 1454–1464.
72. J. N. Kim, L. Ni, and B. L. Sha, "Breaking Down the Stakeholder Environment: Explicating Approaches to the Segmentation of Publics for Public Relations Research," *Journalism & Mass Communication Quarterly* 85, no. 4 (2008): 751–768.
73. A. Leiserowitz, C. Roser-Renouf, J. Marlon, and E. Maibach, "Global Warming's Six Americas: A Review and Recommendations for Climate Change Communication," *Current Opinion in Behavioral Sciences* 42 (2021): 97–103.
74. A. Krishna, "Lacuna Publics: Advancing a Typology of Disinformation Susceptibility Using the Motivation-Attitude-Knowledge Framework," *Journal of Public Relations Research* 33 (2021): 63–85.
75. J.-N. Kim, J. E. Grunig, and L. Ni, "Reconceptualizing the Communicative Action of Publics: Acquisition, Selection, and Transmission of Information in Problematic Situations," *International Journal of Strategic Communication* 4, no. 2 (2010): 126–154.
76. A. Krishna, "Motivation with Misinformation: Conceptualizing Lacuna Individuals and Publics as Knowledge Deficient, Issue-Negative Activists," *Journal of Public Relations Research* 29, no. 4 (2017): 176–193.
77. B. W. McKeever, R. McKeever, A. E. Holton, and J. Y. Li, "Silent Majority: Childhood Vaccinations and Antecedents to Communicative Action," *Mass Communication and Society* 19, no. 4 (2016): 476–498.
78. J. Compton, "Prophylactic Versus Therapeutic Inoculation Treatments for Resistance to Influence, *Communication Theory* 30, no. 3 (2020): 330–343.

79. G. Gauchat, "Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010," *American Sociological Review* 77, no. 2 (2012): 167–187.
80. R. Hofstadter, *Anti-Intellectualism in American Life* (Vintage, 1966).
81. E. Merkley, "Anti-Intellectualism, Populism, and Motivated Resistance to Expert Consensus," *Public Opinion Quarterly* 84, no. 1 (2020): 24–48.
82. T. Skocpol and V. Williamson, *The Tea Party and the Remaking of Republican Conservatism* (Oxford University Press, 2016).
83. E. Merkley and P. J. Loewen, "Anti-Intellectualism and the Mass Public's Response to the COVID-19 Pandemic," *Nature Human Behaviour* 5, no. 6 (2021): 706–715.
84. M. Motta, "The Dynamics and Political Implications of Anti-Intellectualism in the United States," *American Politics Research* 46, no. 3 (2018): 465–498.
85. K. Lunz Trujillo, "Rural Identity as a Contributing Factor to Anti-Intellectualism in the US," *Political Behavior* 44, no. 3 (2022): 1509–1532.
86. Merkley, "Anti-Intellectualism, Populism, and Motivated Resistance."
87. N. Oreskes, "Systematicity Is Necessary But Not Sufficient: On the Problem of Facsimile Science," *Synthese* 196, no. 3 (2019): 881–905.
88. S. D. Benegal, "The Spillover of Race and Racial Attitudes Into Public Opinion About Climate Change," *Environmental Politics* 27, no. 4 (2018): 733–756.
89. J. Chanin, "The Effect of Symbolic Racism on Environmental Concern and Environmental Action," *Environmental Sociology* 4, no. 4 (2018): 457–469.
90. S. Benegal and M. R. Holman, "Understanding the Importance of Sexism in Shaping Climate Denial and Policy Opposition," *Climatic Change* 167, no. 3–4 (2021): 48.
91. S. S. Bush and A. Clayton, "Facing Change: Gender and Climate Change Attitudes Worldwide," *American Political Science Review* 117, no. 2 (2023): 591–608.
92. I. Feygina, J. T. Jost, and R. E. Goldsmith, "System Justification, the Denial of Global Warming, and the Possibility of 'System-Sanctioned Change,'" *Personality and Social Psychology Bulletin* 36, no. 3 (2010): 326–338.
93. K. M. Jylhä, C. Cantal, N. Akrami, and T. L. Milfont, "Denial of Anthropogenic Climate Change: Social Dominance Orientation Helps Explain the Conservative Male Effect in Brazil and Sweden," *Personality and Individual Differences* 98 (2016): 184–187.
94. K. M. Jylhä and K. Hellmer, "Right-Wing Populism and Climate Change Denial: The Roles of Exclusionary and Anti-Egalitarian Preferences, Conservative Ideology, and Antiestablishment Attitudes," *Analyses of Social Issues and Public Policy* 20, no. 1 (2020): 315–335.
95. E. Anduiza and G. Rico, "Sexism and the Far-Right Vote: The Individual Dynamics of Gender Backlash," *American Journal of Political Science* 68, no. 2 (2022): 478–493.
96. B. F. Schaffner, M. MacWilliams, and T. Nteta, "Understanding White Polarization in the 2016 Vote for President: The Sobering Role of Racism and Sexism," *Political Science Quarterly* 133, no. 1 (2018): 9–34.
97. K. M. Norgaard, *Living in Denial: Climate Change, Emotions, and Everyday Life* (MIT Press, 2011).
98. T. G. Coan, C. Boussalis, J. Cook, and M. O. Nanko, "Computer-Assisted Classification of Contrarian Claims About Climate Change, *Scientific Reports* 11, no. 1 (2021): 22320.

99. D. Ding, E. W. Maibach, X. Zhao, C. Roser-Renouf, and A. Leiserowitz, "Support for Climate Policy and Societal Action Are Linked to Perceptions About Scientific Agreement," *Nature Climate Change* 1, no. 9 (2011): 462–466.
100. S. van der Linden, A. A. Leiserowitz, G. D. Feinberg, and E. W. Maibach, "The Scientific Consensus on Climate Change as a Gateway Belief: Experimental Evidence," *PLOS One* 10, no. 2 (2015): e0118489.
101. S. B. Capstick and N. F. Pidgeon, "What Is Climate Change Scepticism? Examination of the Concept Using a Mixed Methods Study of the UK Public," *Global Environmental Change* 24 (2014): 389–401.
102. K. Ekberg, B. Forchtner, and M. Hultman, *Climate Obstruction: How Denial, Delay and Inaction Are Heating the Planet* (Routledge, 2023).
103. W. F. Lamb, G. Mattioli, S. Levi, J. T. Roberts, S. Capstick, F. Creutzig, J. C. Minx, F. Müller-Hansen, T. Culhane, and J. K. Steinberger, "Discourses of Climate Delay," *Global Sustainability* 3 (2020): e17, https://doi.org/10.1017/sus.2020.13
104. J. Painter, J. Ettinger, D. Holmes, L. Loy, J. Pinto, L. Richardson, L. Thomas-Walters, K. Vowles, and R. Wetts, "Climate Delay Discourses Present in Global Mainstream Television Coverage of the IPCC's 2021 Report," *Communications Earth & Environment* 4, no. 1 (2023): 118.
105. Ekberg et al., *Climate Obstruction*.
106. A. Cislak, A. Cichocka, A. D. Wojcik, and T. L. Milfont, "Words Not Deeds: National Narcissism, National Identification, and Support for Greenwashing Versus Genuine Proenvironmental Campaigns," *Journal of Environmental Psychology* 74 (2021): 101576, https://doi.org/10.1016/j.jenvp.2021.101576
107. A. Cislak, A. D. Wójcik, J. Borkowska, and T. L. Milfont, "Secure and Defensive Forms of National Identity and Public Support for Climate Policies," *PLOS Climate* 2, no. 6 (2023): e0000146, https://doi.org/10.1371/journal.pclm.0000146
108. C. Rojas, F. Algra-Maschio, M. Andrejevic, T. Coan, J. Cook, and Y.-F. Li, "Augmented CARDS: A Machine Learning Approach to Identifying Triggers of Climate Change Misinformation on Twitter," *Nature Communications Earth & Environment* 5 (2024): Article 1573.
109. P. Diethelm and M. McKee, "Denialism: What Is It and How Should Scientists Respond?," *European Journal of Public Health* 19, no. 1 (2009): 2–4.
110. D. M. Kahan, H. Jenkins-Smith, and D. Braman, "Cultural Cognition of Scientific Consensus," *Journal of Risk Research* 14, no. 2 (2011): 147–174.
111. P. Bergquist and C. Warshaw, "Does Global Warming Increase Public Concern About Climate Change?," *Journal of Politics* 81, no. 2 (2019): 686–691.
112. M. A. Ranney and D. Clark, "Climate Change Conceptual Change: Scientific Information Can Transform Attitudes," *Topics in Cognitive Science* 8, no. 1 (2016): 49–75.
113. S. van der Linden, A. Leiserowitz, S. Rosenthal, and E. Maibach, "Inoculating the Public Against Misinformation About Climate Change," *Global Challenges* 1, no. 2 (2017): Article 1600008.
114. A. M. McCright, R. E. Dunlap, and S. T. Marquart-Pyatt, "Political Ideology and Views About Climate Change in the European Union," *Environmental Politics* 25, no. 2 (2016): 338–358.
115. E. K. Vraga, S. C. Kim, J. Cook, and L. Bode, "Testing the Effectiveness of Correction Placement and Type on Instagram," *International Journal of Press/Politics* 25, no. 4 (2020), 632–652.

116. S. Lewandowsky, N. Oreskes, J. S. Risbey, B. R. Newell, and M. Smithson, "Seepage: Climate Change Denial and Its Effect on the Scientific Community," *Global Environmental Change* 33 (2015): 1–13.
117. A. Leiserowitz, E. Maibach, C. Roser-Renouf, S. Rosenthal and M. Cutler, *Climate Change in the American Mind: May 2017* (Program on Climate Change Communication at Yale University and George Mason University, 2017).
118. N. Geiger and J. K. Swim, "Climate of Silence: Pluralistic Ignorance as a Barrier to Climate Change Discussion," *Journal of Environmental Psychology* 47 (2016): 79–90.
119. E. Maibach, A. Leiserowitz, S. Rosenthal, C. Roser-Renouf, and M. Cutler, *Is There a Climate "Spiral of Silence" in America: March, 2016* (Program on Climate Change Communicatio at Yale University and George Mason University, 2016).
120. I. Fritsche, "It's Getting Dark, But We Will See: Gaining Collective Momentum in Face of Existential Environmental Threat," *Global Environmental Psychology* 2 (2024): 1–16.
121. J.-W. Müller, *What Is Populism* (Penguin, 2017).
122. C. Oliveira, "Bolsonarism Uses Telegram to Destabilize Elections, Affirms Specialist," *Brasil de Fato*, 2022, https://www.brasildefato.com.br/2022/05/19/bolsonarism-uses-telegram-to-destabilize-elections-affirms-specialist.
123. J. A. Miguel, "A 'meada' do negacionismo climático e o impedimento da governamentalização ambiental no Brasil," *Revista Sociedade & Estado UnB* 37, no. 1 (2022): 293–315.
124. O. Carvalho, "Ciência ou palhaçada?," Diário do Comércio, May, 2007, https://olavodecarvalho.org/ciencia-ou-palhacada/.
125. Câmara dos Deputados, Audiência pública sobre o Projeto de Lei nº 1876/1999 – Código Florestal Brasileiro. Comissão Especial do PL 1876/99, November 12, 2009, https://www2.camara.leg.br/atividade-legislativa/comissoes/comissoes-temporarias/especiais/53a-legislatura-encerradas/pl187699/pl187699nt121109.pdf.
126. R. W. Santos, *Reconfigurações do Ecossistema Religioso diante da Crise Climática Global* (Cadernos do OIMC, 2024).
127. B. Bragança, *Psicose ambientalista: os bastidores do ecoterrorismo para implantar uma 'religião' ecológica, igualitária e anticristã* (Instituto Plínio Corrêa de Oliveira, 2012).
128. P. Bernardin, *O império ecológico ou a subversão da ecologia pelo globalismo* (Vide Editorial, 2015).
129. R. Jakubazko, C. B. L. Molion, and C. P. J. Oliveira, *CO2 aquecimento e mudanças climáticas: estão nos enganando?* (DBO Editores Associados, 2015).
130. E. Araújo, "Sequestrar e perverter," Metapolítica Brasil, November 14, 2018, https://www.metapoliticabrasil.com/post/sequestrar-e-perverter.
131. J. A. Miguel, Negacionismo climático no Brasil. *Coletiva*, Dossiê 27, Crise climática, 2020, https://www.coletiva.org/dossie-emergencia-climatica-n27-artigo-negacionismo-climatico-no-brasil.
132. N. Passarinho, "Como a política ambiental de Bolsonaro afetou imagem do Brasil em 2019 e quais as consequências disso," BBC News Brasil, December 31, 2019, https://www.bbc.com/portuguese/brasil-50851921.
133. G. Sargent and P. Waldman, "Why Bolsonaro's Stunning Loss Should Give Humans a Glimmer of Hope," *Washington Post*, October 31, 2022, https://www.washingtonpost.com/opinions/2022/10/31/jair-bolsonaro-lula-brazilian-election-amazon-putin-ukraine/.

134. T. H. Campbell and A. C. Kay, "Solution Aversion: On the Relation Between Ideology and Motivated Disbelief," *Journal of Personality and Social Psychology* 107 (2014): 809–824.
135. P. G. Bain, M. J. Hornsey, R. Bongiorno, and C. Jeffries, "Promoting Pro-Environmental Action in Climate Change Deniers," *Nature Climate Change* 2 (2012): 600–603.
136. C. Wolsko, "Expanding the Range of Environmental Values: Political Orientation, Moral Foundations, and the Common Ingroup," *Journal of Environmental Psychology* 51 (2017): 284–294.
137. C. Wolsko, H. Ariceaga, and J. Seiden, "Red, White, and Blue Enough to Be Green: Effects of Moral Framing on Climate Change Attitudes and Conservation Behaviors," *Journal of Experimental Social Psychology* 65 (2016): 7–19.
138. M. H. Goldberg, A. Gustafson, S. A. Rosenthal, and A. Leiserowitz, "Shifting Republican Views on Climate Change Through Targeted Advertising," *Nature Climate Change* 11, no. 7 (2021): 573–577.
139. M. J. Hornsey and K. S. Fielding, "Attitude Roots and Jiu Jitsu Persuasion: Understanding and Overcoming the Motivated Rejection of Science," *American Psychologist* 72, no. 5 (2017): 459–473.
140. T. Bolsen, R. Palm, and J. T. Kingsland, "The Impact of Message Source on the Effectiveness of Communications About Climate Change," *Science Communication* 41, no. 4 (2019): 464–487.
141. E. Porter, T. J. Wood, and B. Bahador, "Can Presidential Misinformation on Climate Change Be Corrected? Evidence from Internet and Phone Experiments," *Research & Politics* 6, no. 3 (2019): 2053168019864784.
142. M. E. Mann, *The New Climate War: The Fight to Take Back Our Planet* (Public Affairs, 2021).
143. R. J. Brulle, "The Climate Lobby: A Sectoral Analysis of Lobbying Spending on Climate Change in the USA, 2000 to 2016," *Climatic Change* 149, no. 3–4 (2018): 289–303.
144. N. Chater and G. Loewenstein, "The I-Frame and the S-Frame: How Focusing on Individual-Level Solutions Has Led Behavioral Public Policy Astray," *Behavioral and Brain Sciences* 46 (2022): 1–60.
145. G. Supran and N. Oreskes, "Rhetoric and Frame Analysis of ExxonMobil's Climate Change Communications," *One Earth* 4, no. 5 (2021): 696–719.
146. J. Henrich, S. J. Heine, and A. Norenzayan, "Most People Are Not WEIRD," *Nature* 466, no. 7302 (2010): 29–29.