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A toolkit for understanding and addressing climate scepticism

Matthew J. Hornsey[1], **Stephan Lewandowsky**[2,3]

[1]UQ Business School, University of Queensland, Brisbane, Australia 4059

[2]School of Psychological Science, University of Bristol, Bristol, United Kingdom, BS8 1QU

[3]School of Psychological Sciences, University of Western Australia, Perth, Australia, 6009

Abstract

Despite over 50 years of messaging about the reality of human-caused climate change, significant portions of the population remain sceptical. Furthermore, many sceptics remain unmoved by standard science communication strategies such as myth-busting and evidence-building. To understand this, we examine psychological and structural reasons why climate change misinformation is prevalent. First, we review research on motivated reasoning: how interpretations of climate science are shaped by vested interests and ideologies. Second, we examine climate scepticism as a form of political followership. Third, we examine infrastructures of disinformation: the funding, lobbying, and political operatives that lend climate scepticism its power. Guiding this review are two principles: (1) to understand scepticism one must account for the interplay between individual psychologies and structural forces, and (2) global data are required to understand this global problem. In a spirit of optimism, we finish by describing six strategies for reducing the destructive influence of climate scepticism.

Decades ago, scientists reached consensus that human activities are changing the Earth's climate, and that these changes will have dramatic, largely negative consequences. This message has been a prominent and persistent feature of the global conversation, occupying policy makers at all levels. Nonetheless, a sizeable – and frequently vocal – minority of the population continues to argue that the scientists are wrong. At the turn of the century, the main contrarian claim was that temperatures are not rising[1]. A sequence of record-breaking global temperatures during the next two decades forced a shift in the narrative of climate sceptics: yes, temperatures are rising, but human activities are not a primary cause of it[2]. Over time, new elements were added to the spectrum of arguments: that climate change will be benign, that the issue has been exaggerated, or that known mitigation methods are ineffective[2,3]. What unites these arguments is three features: (1) they defy the overwhelming scientific consensus, (2) they slow our collective ability to respond to the climate crisis, and (3) the number of people who hold them is too big to ignore. For example, in Australia (a world-leading exporter of coal) and the U.S. (the second biggest carbon emitter in the world) roughly a third of the population maintains that climate change is not predominantly caused

Correspondence to: Matthew J. Hornsey.

Corresponding author: Prof. Matthew Hornsey, UQ Business School, Joyce Ackroyd Building, 37 Blair Drive, St Lucia, University of Queensland, m.hornsey@uq.edu.au, T: +61 412964690.

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by humans[4–6]. Surveys from South America indicate wide variability in levels of scepticism across nations, but 40-50% of respondents in Honduras, Dominican Republic, and Ecuador agreed with the statement "Climate change is not a problem"[7].

In trying to understand this phenomenon, one line of thought subscribes to a deficit argument: perhaps climate change scepticism is due to lack of education or scientific literacy. Research suggests a kernel of truth in this argument, and there is a long history of finding positive effects of interventions designed to address information deficits[8,9]. However, the effects of education and science literacy are relatively modest[10,11], and "classic" science communication strategies —ones that rely on myth-busting or easily digestible distillations of scientific conclusions – have had limited effects on sceptics[12,13]. On that basis, scholars have long understood that facts alone would not be sufficient to dispel climate scepticism: what is needed is a broader set of understandings of the psychology of climate scepticism.

This paper aims to de-mystify two urgent questions: why are so many people sceptical of climate science, and what can be done about it? First, we focus on climate scepticism as motivated reasoning: how people's interpretations of evidence are influenced by underlying vested interests, ideologies, and worldviews. Second, we examine climate scepticism as an intergroup phenomenon: an expression of political followership. Third, we examine the infrastructure of disinformation that lends climate scepticism its power: the funding, lobbying, and campaigning that has super-sized climate scepticism from being an "argument" into being a movement. In the final section —and in a spirit of optimism — we examine strategies for reducing the damage associated with climate scepticism.

Before beginning, we note that we use the term "scepticism" to include what some scholars refer to as "denial"[9]. The difference between terms is largely about tone and politics: climate science contrarians believe the term "denier" is stigmatising and resent the fact that it presumes an objective truth which they dispute. Many climate change scholars resent that the term "sceptic" is being appropriated by people with rigid and non-sceptical belief systems, used in opposition to a scientific method that is inherently sceptical and inquisitive about truth[14,15]. Although our sympathies lie with the latter argument, we use the term "climate scepticism" in this paper in acknowledgement of the fact that it has a broader and more flexible implication, incorporating a range of views from outright rejection of climate trends to more nuanced arguments about the effectiveness of mitigation measures.

Furthermore, this paper construes climate scepticism as a multi-level belief system: one that resides "under the skull" of individual community members but also one that is manufactured at the macro-level of media, industry, political operatives, and government. In this review we toggle between the micro- and the macro-level of understanding, but we emphasise that these levels are interdependent and mutually reinforcing (see Fig. 1 for an articulation of how collective-level and individual-level factors reinforce each other to shape climate scepticism).

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Climate scepticism as motivated reasoning

Classically, human reasoning was thought to operate something like this: a person gathers all the evidence they can find and assimilates it in an unbiased and dispassionate way. Once that process is complete (and only then), the person reaches a conclusion. Indeed, most people do their best to follow a rational process, and ensure that their reasoning process is directed by the goal to be accurate.

For the last 50 years, however, social science research has revealed important exceptions to this rule. Rather than drawing conclusions after examining data, in some cases the causal order is reversed: people reach conclusions first, and then select, critique, and remember evidence in a biased way with the goal of buttressing their conclusion (more like a cognitive lawyer than a cognitive scientist)[16–18]. When Simon and Garfunkel sang “a man hears what he wants to hear and disregards the rest”, they were describing motivated reasoning.

The notion of motivated reasoning – as a process of rationalising conclusions already reached – is transformative because it changes the critical question. Rather than asking “Why do people reject climate science?” the more important question becomes “Why would people want to reject climate science”? Any answer to that question helps understand the climate scepticism problem, as well as providing clues on how to solve it.

One pragmatic answer to the question is vested interests: for some, climate change is an “inconvenient truth” in that it implies painful sacrifice[19]. It is psychologically unrealistic to expect that anybody could appraise climate science with perfect objectivity, but it might be especially unrealistic when change is painful (e.g., for individuals whose livelihood is reliant on fossil fuel industries, or for people with a large carbon footprint that is costly to shrink). Rather than engaging with solutions that are painful, it may be easier to reject the science[20] by embracing slivers of scientific dissent, clinging to baseless conspiracy theories, or shifting standards of proof as a function of how convenient the evidence is. This escape into denial from painful solutions is widely discussed in the climate change literature[21], and the principle has also been documented elsewhere: smokers are more likely to deny science on the negative health effects of smoking[22,23] and coffee-drinkers are more likely to deny science on the negative health effects of caffeine[24].

For others, climate change is an inconvenient truth not because it costs them materially, but because the implications of the science upset their ideological worldview[20,25,26]. Meta-analyses of the predictors of accepting anthropogenic climate change[10] show that the biggest correlates are not education (r = .12, i.e., modest positive association between education and acceptance), self-reported science literacy (r = .18) or personal experiences of extreme weather events (r = .05), but rather values-driven ideologies that ostensibly have nothing to do with science or climate. This includes where one stands on the extent to which individual freedoms should be prioritised over the interests of the collective (r = -.28, i.e., negative association between prioritising individual freedoms and accepting climate science), tolerance for status and power hierarchies (r = -.26) and belief in the sanctity of the free market (r = -.30). These associations likely reflect the fact that mitigating climate change is often construed as requiring Big Government solutions designed to regulate the

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freedoms of individuals and businesses[27,28]. Rather than aligning with solutions people find ideologically objectionable, the temptation is to reject science that suggests these solutions are necessary (a phenomenon referred to as "solution aversion")[20].

Climate scepticism as political followership

Climate change beliefs are situated within broader intergroup contexts, reflecting and creating societal schisms[29]. The contested, "them-against-us" nature of the climate change debate exists in many forms, but the societal faultline that has attracted by far the most research attention (and seems deepest, particularly in fossil fuel reliant countries) is around political identity.

In a study that was conducted well before political polarisation became a zeitgeist topic, Cohen[30] showed political partisans in the U.S. a draft welfare policy. Although all participants received the same policy, they were told it was drafted by either Republicans or Democrats. Participants responded as one might expect: when the welfare policy was drafted by their own political ingroup they evaluated it more positively than when the same policy was drafted by the outgroup. What was striking, though, was the magnitude of the effects. Depending on whose policy they thought they were reading, participants veered dramatically between presuming the policy would be effective or ineffective; moral or immoral.

The notion that perceptions of reality are filtered through the lens of group loyalties is not surprising to social identity theorists[31,32]. When intergroup identities are salient, people internalise the "party line" through processes that are both cognitive (psychological assimilation to ingroup attitudes and values; psychological contrasting with those of the outgroup) and motivational (the desire to preserve a positive identity that is distinct from rival outgroups). So when a scientific issue gets drawn into the culture wars – one that differentiates between political identities – that issue can get sucked into a self-reinforcing feedback loop of political polarisation. Once this has occurred, beliefs may reflect more of an identity-expressive motive than an accuracy motive, and so "facts" become rubbery and subjective.

In some countries, climate science has had the misfortune of being drawn into these culture wars. In their historical analysis of the scrambling of climate science in the U.S., Oreskes and Conway[33] highlighted that the original contrarians were nuclear scientists who themselves had strong conservative (anti-communist) attitudes. Their minority views were amplified by conservative think tanks, which in turn were financially supported by elements of the fossil fuel industry[34]. Drawn to the ideological implications of climate scepticism – a commitment to free markets, economic growth, and individual freedoms – the message was adopted by some conservative politicians and by elements of the conservative media.

By the 2000s, a degree of climate scepticism became "baked in" to the cluster of arguments that describe and prescribe one's political loyalties as conservative in some countries. In the 2015 Republican primaries, only a minority of the candidates were on the record as accepting the reality of human-caused climate change[35]. The winner, Donald Trump, explicitly embraced the language of climate denial, referring to climate change as a hoax

invented by China[36]. In Australia, two conservative Prime Ministers in the 2010s expressed their distaste for action on climate, either verbally (describing climate science as "absolute crap") or symbolically (carrying a chunk of coal into Parliament and admonishing MPs not to be afraid of it). Within weeks of taking office, Brazil's conservative President Jair Bolsonaro dismantled several government divisions dedicated to climate change and named openly climate-sceptical Cabinet members[37].

It should not be surprising, then, that political conservatism is one of the most-replicated and most-discussed predictors of climate scepticism in the literature[4,25,38–42]. Meta-analyses show that the biggest demographic predictor of climate scepticism is whether people plan to vote for the Left or the Right; far more so than age, sex, race, and education[10]. People's beliefs and attitudes about climate science became a shorthand way of signalling political loyalty. This raises the possibility that people are not always making up their mind about climate science themselves but are rather "taking their cues" from elites within the political party with which they identify.

Consistent with this notion, longitudinal analyses showed that climate concern in the U.S. shifted reliably as a function of elite cues, such as whether a respondent's Congressional representative had joined the Tea Party Caucus, press releases on climate change issued by Republicans and Democrats, and Fox News coverage[43-46]. In Australia, data from 2009-2019 show that climate scepticism ebbed and flowed reliably as a function of political support for conservative political parties[4].

There are three interesting sidenotes to the literature on political identification and climate scepticism. First, as elaborated later, there are dramatic differences internationally in the extent to which political conservatism is associated with people's climate change beliefs, and in fact the relationship is robust in only a subset of nations.

Second, in the U.S. in particular, evidence for political polarisation is greater among respondents who are more educated and science-literate[47-52]. On one hand, this seems surprising: one might think that education and science literacy would give people the analytic skills to look beyond group loyalties and appraise evidence objectively. But from a psychological point of view, the pattern is not so surprising. Equipped with the scientific nous to know how to find convenient truths – and to dismiss inconvenient truths – the highly educated are better equipped to engage in motivated reasoning, curating their own informational reality[53]. Furthermore, the highly educated are more attuned to ideological and policy differences between political parties, making them more sensitive to elite cues[48].

Third, historical analyses suggest that the conservative turn against climate science (and science in general) is a relatively recent phenomenon. In the early 1970s, conservatives in the U.S. had greater trust in science than liberals[11] and in the 1990s, highly educated conservatives were more likely than highly educated liberals to believe there was scientific consensus about anthropogenic climate change[52]. After climate change started to be represented in the media as a partisan issue, both trends dramatically reversed[40,54,55]. To further understand this process, one needs to move beyond the notion of climate scepticism

being solely an individual's failure to appraise evidence, and to examine the extent to which individuals are responding to organized campaigns of disinformation.

Climate scepticism as organized disinformation

The European landscape

There is overwhelming evidence that disinformation about climate change is disseminated in a co-ordinated manner through well-funded, often global networks. Several recent reviews provided detailed analyses of the American landscape[9,56]. Highlights of this landscape include the findings that: (a) most environmentally sceptical books are published or financed by conservative think tanks[57,58], (b) funding of climate-denying think tanks and advocacy organizations is approximately $900 million annually[59], and (c) the fossil fuel industry was aware of the anticipated consequences of climate change as early as 1965 but continued to deny its existence in public for decades, as revealed by a comparison of ExxonMobil's internal and external communications[60].

By comparison, there has been less research on organized climate denial in Europe and we know of no reviews of those efforts. Analysing contrarian efforts in Europe is of particular interest because of the striking differences between the American and European political scenes and public opinion landscapes. Although there is considerable heterogeneity among European countries, these societies are generally less politically polarised than the U.S. In most European countries, all mainstream political parties subscribe to the scientific consensus on climate change, and at least until recently, rejection of climate science represented a "fringe" opinion[61]. This is particularly true in Germany, Europe's biggest economy, which is considered a leader in the energy transition from fossil fuels to renewables[62].

One consequence of the broad acceptance of climate science across the European mainstream is that explicit denial groups are more marginalised[63]. This marginalisation has softened somewhat since the recent electoral successes of far-right parties across Europe, which has created space for the public expression of climate scepticism. For example, the fraction of the German public who disagreed that the climate is changing has risen from 7% in 2011 to 16% in 2017[61]. This increase coincided with the success of fossil fuel groups in removing feed-in tariffs for solar energy in the second half of the 2010s[62]. Intriguingly, the key players engaged in lobbying against climate-friendly policies (such as feed-in tariffs) tend to nominally embrace the reality of climate change and limit their arguments to politics and policies[64]. This is unlike the U.S., where organizations that oppose specific climate policies are also typically rejecting and misrepresenting the science[65]. Rejection and misrepresentation of science in Europe is confined to a small but vocal set of organizations whose influence is modest[63].

One such organization, the German-based EIKE, is a think tank with close links to the Heartland Institute in the U.S. and to the far-right AfD party in Germany[61]. Although EIKE claims to be funded only through voluntary contributions, it refuses to reveal funders and several investigations have pointed at financial support from equivalent American organizations[66]. EIKE has contributed to hearings about climate science in the German

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parliament at the invitation of the AfD, thus establishing a “counter-public” by creating the appearance of a scientific debate using “expert” testimony. Analysis of EIKE’s public-facing outputs (more than 1,000 texts between 2015-2018) reveals that most texts seek to discredit scientists and climate campaigners so as to undermine their message[66].

The strategies employed by EIKE are mirrored by similar organizations across Europe. An examination of 8 major European think tanks in 6 countries found that they used counter-frames that mainly questioned the science of climate change (50% of the time) and the legitimacy of the IPCC (30%)[63]. The aggressive rhetoric of these European organizations parallels that of their American counterparts, although unlike the U.S. their political influence is limited[61].

Political influence in Europe is instead exercised by institutions that, like most of their corporate funders, at least pay lip service to the reality of climate change and the need for mitigation[67]. Instead of denying the science, public-relations and lobbying activities therefore focus on diluting effective climate policies or cloaking climate-harming activities with a green sheen[67]. For example, the gas industry has successfully positioned itself as a “transition fuel”, which the European Union has mainly accepted. Similarly, carbon capture technologies have attracted considerable public funding even though they have yet to deliver meaningful climate mitigation[67].

At a cross-European level, Plehwe[62,64] has identified the Center for European Policy as a notable player in eroding confidence in the transition to renewable energy. This Center focuses on European stipulations and was instrumental in creating doubt about the legality of (the highly successful) feed-in tariffs for solar energy in Germany. Plehwe[62] lists several other transnational institutions that pursue industry-friendly positions to undermine the transition to renewables. Several of those organizations are part of the global Atlas network, which is also at the core of American climate sceptic organisations[56].

In Germany, marginalisation of climate scepticism and sizable opposition to fossil-fuel driven capitalism has forced the energy industry and its allies to move away from pure status-quo protection and embrace modest reformism[62]. This position nominally acknowledges the need to transition to renewable energy but in reality seeks to slow the transition by opposing effective policies. The organisations involved in those efforts keep their distance from explicit denial organisations and the far right, and instead court or co-opt reputable academic institutions to develop alternative policy proposals and narratives. Those narratives claim to improve the transition with greater efficiency and savings in cost (e.g., by introducing market-based mechanisms rather than set feed-in tariffs) but in effect have slowed the transition for several years[64]. This is not surprising given that purely market-based solutions have a history of being less effective than their proponents claim[68].

Global perspectives on climate scepticism

As reflected in Fig. 2, there are wide differences globally in the extent to which members of different nations perceive climate change to represent a threat to their country[69]. Despite this, the vast majority of research on climate scepticism has emerged from so-called

WEIRD samples (i.e., from Western, Educated, Industrialised, Rich, Democratic nations), with reviews revealing that approximately half of studies were conducted in the U.S., UK., and Australia alone[10,70]. This disproportionate emphasis on the highly industrialised West may simply reflect a broader problem within the social sciences, where non-Western voices remain under-represented. Another possibility is that, because Western wealth construction is one of the biggest contributors to climate change, researchers considered the Western response to the challenge as particularly critical to the construction of effective solutions. However, given that it is in the Global South that the effects of climate change will be most severe, the marginalisation of non-WEIRD voices in the literature is especially unfortunate[71].

Having said that, there is important work that has taken a cross-national approach to understanding climate change attitudes, and in so doing provides a more global perspective on this global problem. Early commentary in this space focused on the so-called post-materialism hypothesis: the notion that richer nations are the ones that are most likely to embrace progressive social movements such as environmentalism because they are more likely to have satisfied their material needs for physical and economic security[72]. Contrary to this hypothesis, some international surveys suggest that concern about climate change is greater in nations with relatively low GDP per capita[73,74] and with relatively low per capita carbon emissions[75].

Another approach to examining international patterns relies on content analyses of print media. These analyses suggest that it is only in a handful of countries that the media had distorted the scientific consensus around climate change into an ideologically charged "debate": most strikingly in Australia, the U.S., and the U.K.[76,77]. Newspaper analysis of 27 nations indicated that media coverage of climate change (regardless of whether it was sceptical or not) was particularly pronounced in fossil fuel-producing nations that had made commitments under the Kyoto Protocol[77]. In other words, media coverage of the issue appears to be greatest among the nations for which there are strongest vested interests at play (i.e., the economic costs of decarbonisation are particularly acute).

Fossil fuel reliance also appears to be a factor in understanding the role of political ideology in shaping climate scepticism. In a correlational study among 25 nations, the relationship between conservatism and climate scepticism was strongest in the U.S. and second strongest in Australia[78]. For several countries – such as Brazil and Canada – the effects were still reliable but weaker and more variable. But for approximately three-quarters of nations (including China) the relationship was not statistically reliable at all. Interestingly, the role of conservatism in determining climate attitudes increased in lockstep with per capita carbon emissions of the nation, an index that is strongly geared toward fossil fuel production. This suggests that the link between political conservatism and climate scepticism only emerges when the stakes of decarbonising are high.

Secondary analyses of international data sets have also revealed interesting patterns involving education. In nations who are low- to mid-ranking on the Human Development Index there is a "common sense" education effect such that more educated respondents are less climate sceptical. In countries ranking highly in the Human Development Index,

however, this relationship is attenuated by right-wing ideology, suggesting that ideology trumps education[51]. This adds to the general global picture; that in less affluent nations (and/or in nations with a less active fossil fuel industry), acceptance of climate change is less prone to ideological influence.

As datasets become more global over time, it is inevitable that these broad-brush understandings of international patterns will be supplemented by more nuanced, country-specific analyses. One interesting pattern already emerging is that conventional left-right political identification predicts climate change attitudes more in Western European countries than in Central and Eastern European countries[79-81]. Analysis of former Communist countries, in particular, indicates that not all left-wing contexts are aligned with pro-environmental orientations[82].

In seeking new, global understandings of how political ideology might influence climate change attitudes, some researchers have focused on the international rise of populism. Although these analyses have typically focused on right-wing populist parties, the notion of populism transcends left-right distinctions to describe a political worldview defined by institutional distrust and a binary good-versus-evil division between “ordinary people” (who are pure and virtuous) and malevolent “elites” or the “establishment” (corrupt, amoral). To the extent that scientists or environmentalists are characterised as elites, this worldview provides a platform for discrediting climate science, often with the help of elaborate conspiracy theories. These dynamics have been described across several case studies (e.g., in Scandinavia)[83] and empirically, it is well-established that scepticism is higher among supporters of European right-wing populist parties[84,85]. Analyses in Austria confirm that the link between populism and climate scepticism is explained in part by generalised distrust of science and political institutions[86].

Interventions for reducing damage caused by climate scepticism

In this review we canvassed (a) individual factors that render people susceptible to rejecting climate science, and (b) organized dissemination of misinformation and contrarian lobbying efforts. Any interventions must target those two levels. Although the solutions to politically-motivated opposition must also be political—and hence is largely beyond our scope—the recommendation by Michaels and Ainger[67] that the revolving door between lobbyists and governments or the EU must be shut seems an obvious first step. The World Health Organization successfully created an explicit firewall between health policy making and the tobacco industry in 2007[67], and the creation of a similar firewall between fossil-fuel interests and climate policy making is an advisable political goal for the 2020s.

Other structural interventions are already underway. In some carbon-intensive sectors, reluctant organizations are being corralled into action by international trade regulations such as the European Climate Law. For governments and fossil-fuel industries, there is the growing threat of climate change-related litigation[87], with everything that implies both legally and in terms of personal and corporate legacies. Powerful activist investors are creating real change from within organizations to improve environmental performance[88] and there is evidence that firms meeting expectations around environmental responsibility

perform better and receive more investment money[89]. Note that these drivers of change are not necessarily driven by a sea-change in community attitudes and do not rely on the notion of "converting" sceptics to the cause. Rather, they are the results of politicians, regulators, judges, and policy makers wielding hard power.

Turning to the individual level, interventions range from the long-term mission to build critical literacy in the population[90] to a variety of short-term communication techniques. Because climate change is a time-sensitive crisis, long-term educational efforts are insufficient and scholars have been forced to think flexibly about strategies to reduce the damage associated with climate scepticism, both before and after misinformation takes seed in people's minds. Below, we highlight six strategies for doing so (see Table 1 for a summary). Note that we only consider communication strategies that adhere to the TARES principles of ethical communication[91]; that is, the strategy must exhibit Truthfulness of the message, Authenticity of the messenger, Respect for the recipient, Equity and fairness of communication, and Social responsibility for the common good.

Appealing to sceptics through value-based frames

As discussed earlier, many people embrace climate scepticism as an expression of ideological concern rather than as a result of cognitive reflection on evidence or arguments. Because sceptics nonetheless give the impression that they are talking about evidence (albeit in a flawed way[92,93]) the communication landscape is confusing and requires an indirect approach. Rather than focusing on the "surface" attitudes and beliefs that sceptics express – discussing solar flares and so forth – scholars have argued that it is preferable to attend to the underlying motivations for wanting to embrace those arguments (the so-called "attitude roots")[19]. If climate messages are aligned with sceptics' underlying attitude roots, they are more likely to be listened to, and more likely to shape attitudes and behaviour. Strategies like this have been described using various terms such as values-based frames, attitude matching, and jiu jitsu persuasion.

Given that climate scepticism has been reliably traced back to conservative worldviews in fossil-fuel reliant countries such as the U.S., U.K., and Australia, the implication is simple: when addressing sceptics, the need to mitigate climate change might be best framed in a way that resonates with conservative worldviews. Consistent with this, sceptics are indeed more likely to embrace the need for pro-environmental action when the fight against climate change is expressed using traditionally conservative values: as a way of protecting national security, as a way of protecting a traditional way of life, as a patriotic act, or as an expression of individual responsibility[94–100]. Conservatives are also more likely to accept climate science if the solutions are designed to be compatible with free markets[20,101]. Once convinced that mitigation does not necessarily require the Big Government regulations to which they ideologically object, conservatives' motivation to reject the science diminishes.

Appealing to sceptics through co-benefits

Fundamentally, sceptics do not accept that humans are the primary cause of climate change, so messages that focus on the importance of action – or the dangers of inaction – can be easily dismissed. Furthermore, attempts to explain the link between human action and

climate change are likely to meet the ideological headwinds just discussed. This has led some scholars to advocate for a suite of arguments that do not rely on accepting that climate change is real and important[102,103]. According to this approach, positive change can flow by articulating the co-benefits of working to mitigate climate change, independently of whether these efforts actually influence the climate. Examples of these co-benefits include improving social conditions (e.g., promoting green jobs, stimulating technological innovation, maintaining public health, reducing pollution)[104–109] and promoting a smarter and more benevolent society[110].

A 24-nation dataset from all inhabited continents confirmed that perceptions of these co-benefits are strong predictors of willingness to act pro-environmentally, and that the relationships are similarly strong regardless of whether participants believed climate change was an important issue[102]. Compared to traditional evidence-based messages, co-benefit frames tend to be at least as effective – and often more effective - in shifting pro-environmental intentions among self-reported sceptics[110,111].

Leveraging climate-friendly actors within the conservative movement

The above strategies focus on optimising the content of climate messages. However, research on communication in intergroup contexts suggest that the messenger is often more important than nuances of the message[112]. Specifically, people are influenced by ingroup members more so than by outsiders who deliver the same message[113]. This is largely because people work from the assumption that insiders have their best interests at heart, whereas outsiders do not[114].

An implication of this for the current analysis is that sceptics will be more influenced by messengers that share salient identities with them: rural people will be more influenced by rural messengers, conservatives will be more influenced by conservatives, and so forth. This is a challenging message for many climate activists because it underscores how their identification as “green” or “left” can be enough to render their voices impotent when it comes to influencing sceptics. It is also threatening because it emphasises how little evidence, sophisticated argument and impassioned advocacy can matter if one finds oneself on the other side of a polarised intergroup debate[114].

The optimistic upside of this equation, however, is that there are non-traditional climate activists – such as the conservative-leaning, U.S.-based Climate Leadership Council – for whom real influence among conservatives is within reach. In a field study, Goldberg and colleagues[115] tested the effectiveness of a one-month advertising campaign about climate change to potential voters in the U.S. states of Missouri and Georgia. The videos were crafted to appeal to Republicans, drawing on spokespeople with strong conservative credentials 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, providing evidence that the strategy is effective in the field as well as in the laboratory.

Leveraging climate-friendly actors within the conservative movement not only has the power to influence traditionally hard-to-reach populations, but it also has the potential to

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reconfigure the intergroup dynamic that has done so much damage to our ability to respond to climate change in the first place. Survey experiments in Australia revealed that when partisans learn that opposing leaders converged on a common policy proposal, it had a harmonising effect on respondents' climate-related attitudes, leading to greater consensus and less polarisation (i.e., people took their "elite cues"[116]). Extracting climate science from the culture wars would be game-changing in terms of our ability to unite in the face of the climate crisis[117].

Establishing norms

The term "norms" refers to two related perceptions: the perception that society (or important others) want you to behave in a certain way and the perception that the population (or important others) actually behave in a certain way. Both sets of norms – the prescriptive and descriptive – are consistently associated with behaviour, particularly when they align[118]. This is partly because norms increase conformity pressures around a behaviour: people fear judgement or negative attention for behaving in a non-normative way. Relatedly, norms signal whether a behaviour is the correct course of action; a form of social proof (the "consensus implies correctness" heuristic[119]). Once established, norms constrain behaviour in such a subtle and automatic way that people often remain unaware of their influence[120]. For example, one field study showed that normative information influenced energy-efficient behaviours more so than appeals to values and to economic self-interest, even though participants themselves reported the normative appeal as being relatively ineffective[121].

Examined in a diverse range of contexts – both in the laboratory and in the field – norms have become a favoured tool for shaping public behaviour to solve collective challenges[122]. In relation to climate change, norms are a strong predictor of pro-environmental intentions[123,124], and framing normative information in particular ways can influence people's willingness to behave pro-environmentally[121,125–131]. Relevant to the current analysis, norms have power because they appeal to our social nature – the universal need to belong and be liked – and so do not rely on an internalised sense of concern for the environment.

Importantly, norm-based interventions can also be effective beyond the individual level. For example, elected officials tend to underestimate the climate beliefs of their constituents, so correcting those misperceptions (e.g., with survey data) can be a helpful intervention. Correcting inaccurate perceptions about what the public thinks has proved useful in the past in reducing distorted perceptions of polarisation[132].

Consensus messaging

Using descriptive norms in communication relies on the existence of a popular consensus that can be leveraged. In cases where there is no community consensus, or the prevailing consensus runs counter to the intended message, it may instead be necessary to communicate the consensus in a specific reference group, such as scientists or experts. In the case of climate change, messaging would emphasise the fact that 97% of climate scientists agree on the fundamental principles of anthropogenic climate change[133].

Some theorists have invested considerable hope in this 97% heuristic as a persuasion tool, describing it as a gateway belief: should communicators successfully communicate this fact, concern for the environment and urgency to enact change should follow. There is some support for this: in experiments, those who are exposed to the 97% heuristic are typically more likely than those in control conditions to accept the existence of human-caused climate change and, in turn, to support policy interventions[28,134–137]. Two recent meta-analyses have confirmed the power of highlighting consensus among (climate) experts[138,139], and consensus information has been shown to be effective among sceptics[28,140].

Embedding climate-friendly actions in social practice

Much behavioural science works on the implicit assumption that individual actions are a result of mindful consideration; a planned process during which costs and benefits are consciously weighed. However, many behaviours occur while we are in an automatic and unthinking state. In the pragmatic language of “nudging” and consumer psychology, this is referred to as habit[141,142]. In practice theory (which emerged from sociology and anthropology), a similar point is made about the routinised nature of action but with an ideological overlay. From this perspective, asking for individual change is unrealistic at best and sinister at worst; a process of “responsibilisation”, cultivated as a neoliberal strategy to deflect attention from the structural causes of climate change, which can ultimately cause resentment[143,144].

Regardless, both perspectives converge to make a similar point: positive action is more likely if those actions are embedded in a network of social practices, so that it becomes part of the flow of one’s day and part of one’s social life. As a practical example of what this means, consider the example of recycling. When recycling is inconvenient, the decision to do so will be based on a conscious algorithm of costs and benefits, one that is partly captive to identity. But when recycling is made readily available and becomes routinised in daily life, it becomes a practice that sits outside of values, identities, and cost-benefit analyses.

Conclusion

The first scientific article to draw connections between fossil fuel combustion and climate change dates back more than 120 years[145] and it has been over 30 years since George Bush Snr. said: “Those who think we are powerless to do anything about the greenhouse effect forget about the 'White House effect'; as President, I intend to do something about it.”[146] However, neither scientific knowledge nor political rhetoric has thus far resulted in global commitments that are sufficient to address the climate crisis.

We have reviewed some of the reasons for this gridlock. The politically motivated operations to undermine or delay climate mitigation cannot be undone by better communication tools alone. However, we have shown that a suite of ethical communication techniques is at our disposal to accelerate any meaningful climate mitigation that might arise from political solutions to the political problem of climate scepticism.

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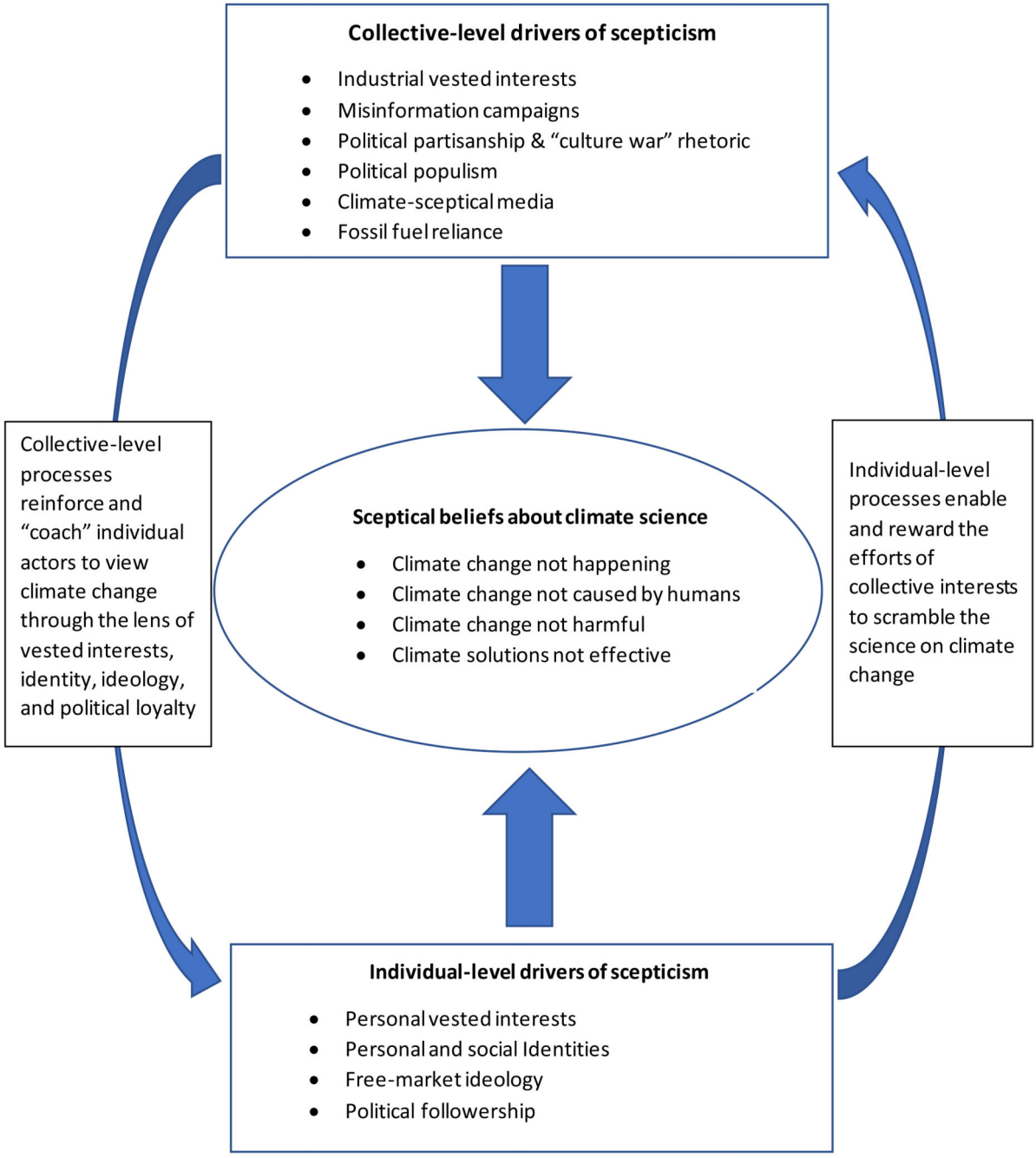

Figure 1. The interplay between individual and collective influences on climate scepticism

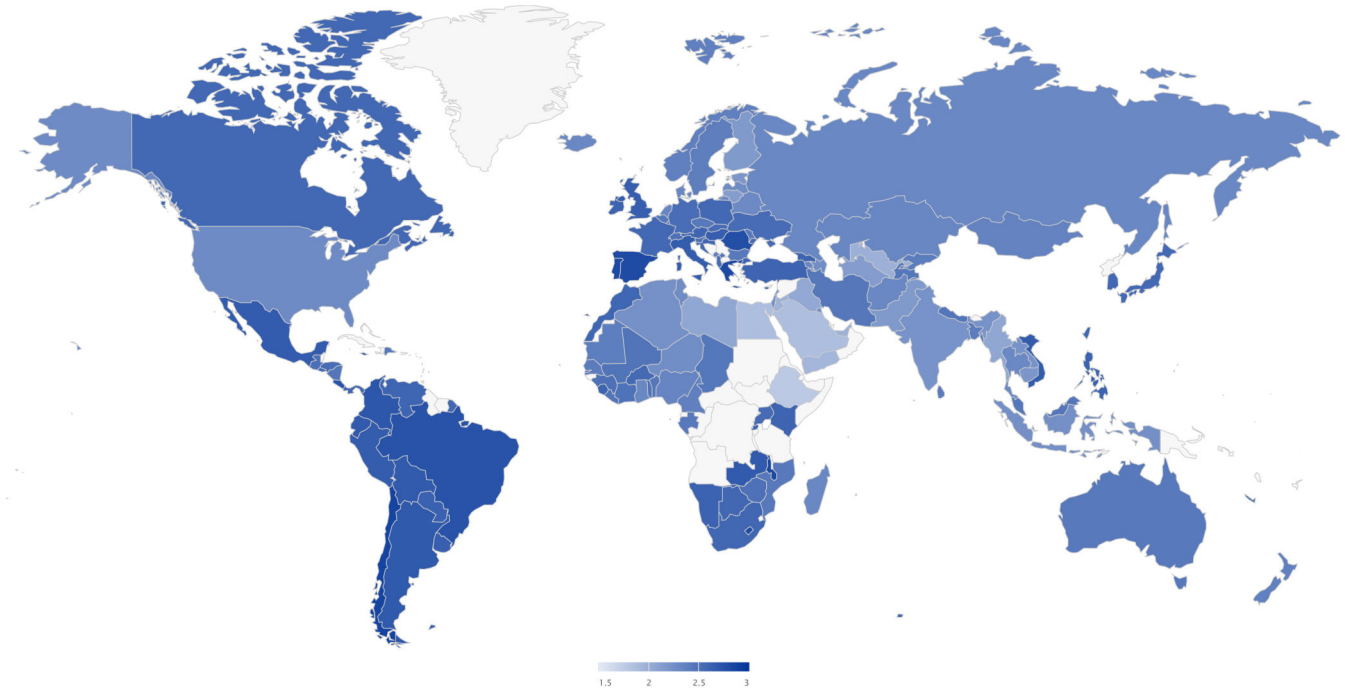

Figure 2.

Perceptions of the level of threat climate change presents to each nation, as reported in Lloyd's Register Foundation World Risk Poll (2021). Darker shades represent greater perceived threat (scores from the poll were reversed such that 1 = not a threat at all, 2 = somewhat serious threat, 3 = very serious threat).

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Table 1

Six strategies for reducing the damaging effects of climate scepticism

Strategy	Description
Appealing to sceptics through value-based frames	In many nations, climate scepticism is particularly strong among conservatives. For this subset of the population, climate change messages will be more effective if they are framed in ways that are congenial to conservative values (e.g., as reinforcing energy security, as a way of maintaining a way of life, as an expression of individual responsibility).
Appealing to sceptics through co-benefits	Given that they dispute humans are causing climate change, sceptics may not be influenced by traditional messages that focus on the importance of action to save the environment. However, they may be influenced by arguments that focus on the co-benefits of action in terms of promoting green jobs, stimulating technological innovation, or maintaining public health.
Leveraging climate-friendly actors within the conservative movement	Conservatives are more likely to be persuaded about the reality and urgency of climate change if those messages are presented by respected figures within the conservative movement.
Establishing norms	People are more likely to act in a certain way if they perceive – or are told – that valued others are acting in that way. Because they appeal to our social nature, norms-based interventions can have positive effects independent of political persuasion.
Consensus messaging	97% of climate scientists agree that climate change is happening and is largely caused by humans. Successfully communicating that consensus message has positive downstream influences on climate-friendly attitudes, beliefs, and behaviours.
Embedding climate-friendly actions in social practice	Positive action is more likely if those actions are embedded in a network of social practices, so that it becomes part of the flow of one's day and part of one's social life.