

Climate communication: How researchers navigate between scientific truth and media publics

Communication and the Public
2023, Vol. 8(1) 29–44
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DOI: 10.1177/20570473221138612
journals.sagepub.com/home/ctp



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Abstract

Recent attacks on scientific authority have intensified calls for climate scientists to seek out a more active stake in public engagement. Yet, today's media landscape presents scientists with the challenge of gaining the epistemic trust of diverse audiences. This article qualitatively investigates how publicly engaged academic climate researchers imagine the public as they partake in various science communication practices. It finds that scientists' strategies for securing public trust in their epistemic authority and defining their own public role vary with the media public they are addressing. Their communications reflect an oscillation between filling a "knowledge deficit" and communicating complex "truth tensions."

Keywords

Climate change, engaged scientists, media publics, platforms, post-truth, trust

Introduction

Over the past two decades, there has been a dramatic increase in the quantity and diversity of both scientific and lay perspectives featured in the mass media's climate change coverage (Boykoff, 2008; Schäfer, 2015). Indeed, the news media sphere is thought to constitute a space where the "cultural politics of climate change" takes shape (Boykoff, 2011), as different parties contest and come to agree on the social meanings of the phenomenon. In tandem, digital media forms such as blogs, online video platforms, and social networking sites have emerged as important settings for public communication about climate issues. While these allow for more direct public communication by scientific experts with (lay) publics

(McClain, 2017), the amount and effectiveness of their usage for communicating scientific knowledge about climate change has been shown to vary vastly (A. A. Anderson, 2017; König & Breves, 2021). These developments signal important changes in the media environment where knowledge about the global issue of climate change is publicly presented, deliberated, authorized, and contested.

However, along with greater public engagement around scientific knowledge comes the threat of

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epistemic bubble-formation, defined by fragmented publics that adhere to “competing versions of knowledge and facts,” rendering all knowledge “just another subjective opinion” (Dahlgren, 2018, pp. 22–25). In the debate about “post-truth politics,” journalism’s relationship to truth—and its methods and institutional conventions of arriving at and authorizing its truth claims—have been a major focus of analyses of media’s influence on the epistemic authority of experts in society (Harsin, 2018; Otto, 2016; Petersen et al., 2019).¹ Yet, journalistic truth has also been distinguished from science and *its* respective relationship to truth (Michailidou & Trenz, 2021). Indeed, calls have intensified for scientists/academic experts to respond to the challenges posed by the rapidly changing media landscape by engaging in more direct public engagement and communication of science, themselves (Iyengar & Massey, 2019).

As climate scientists become more involved in public engagement with a range of (scientific non-expert) audiences through a variety of media (plat)forms, they also face struggles in positioning themselves and their knowledge as epistemically authoritative on the issue at hand. Along with the changing media landscape, the shifting nature of institutionalized scientific knowledge production becoming increasingly intertwined with policymaking (Weingart, 1999) and commercial interests (Mirowski, 2011) has influenced public trust in science. Scientists’ epistemic authority, which is often assumed to stem from their professional impartiality, may or may not be accepted by (some of) the audiences they are increasingly coming into communicative contact with.² Hence, this article is interested in how publicly engaged scientists working on climate issues navigate their roles within the multifaceted communicative spaces of the contemporary media environment in a scientifically advanced society. How do engaged scientists seek to be trusted as experts by the array of audiences with whom they communicate? This article treats academic climate researchers’ public engagement experiences and practices as an important vantage point from which to investigate the interface between science and the public.

The small-scale case-study research, conducted among publicly engaged academics in the Netherlands, presents an analysis of how scientists seek to ensure

trust in their expertise when participating *as experts* in a complex media environment. In what follows, we further outline the relevant theoretical debates from media studies, science communication, and social studies of science that conceptually frame our discussion, and we present the research methodology and background to the case. The three analysis sections that follow develop this article’s argument around the three respective themes that were identified in the scientists’ accounts and practices of publicly communicating knowledge. These were (a) weighing considerations about media proficiencies and a pursuit of common epistemic ground with niche audiences. (b) Negotiating how to address specific audiences as epistemic communities without undermining other such communities. (c) Adapting engagement strategies when addressing more amorphous, mass audiences. The concluding section reflects on the further practical and theoretical implications of the argument.

Theoretically framing the publicly engaged scientist of the contemporary media age

The influence of news media in the communication of scientific knowledge has been investigated already for more than half a century (Hanson-Easey et al., 2015). But more recently, we have seen an upsurge in attention for scientists as active public communicators (Dudo & Besley, 2016).³ Recent studies also suggest that climate scientists are indeed engaged in public communication practices in growing numbers (Besley, Dudo, & Yuan, 2018; Besley, Dudo, Yuan, & Lawrence, 2018) and the motives, approaches, and frames employed by publicly engaged scientists are current areas of investigation in this work. Notably, these discussions have signaled a need for scientists’ public engagement initiatives to proactively address threats to scientific knowledge and institutions by climate skeptics. Indeed, as Kaiser and Puschmann (2017) have pointed out, such skeptic networks formed online constitute non-progressive “counter-publics,” media publics that define themselves through opposition to the authorized knowledge circulated in the “mainstream” media.

Some have characterized the affront to scientists’ epistemic authority from such corners as

involving a “widespread dissemination of misleading and biased information” motivated by political partisanship (Iyengar & Massey, 2019, p. 7656). As such, battling science disinformation has been articulated as a key purpose of contemporary science communication endeavors, one that some claim “requires political mobilization and public activism” (Lewandowsky et al., 2017, p. 365), especially when it comes to the highly polarized issue of climate change. This perspective calls for urgent expansion of scientists’ role beyond knowledge communication and public education activities and toward greater, purposeful influence on policy and public opinion. As Susanna Priest (2019) has put it, “we are engaged—we must be engaged—in persuasion, not just education” (p. 391). This outlook aligns with a current in the science communication scholarship that calls for targeted and outcome-oriented public engagement on the part of scientists themselves (see Dudo & Besley, 2016).

However, as media scholars have pointed out, institutional changes in the media landscape, as well as emerging media cultures, have brought about concomitant changes in the way the public makes sense of and engages with mediated knowledge claims by scientific experts. Arguably, the public role of media in communicating knowledge, information, and truth has been undermined (Dahlgren, 2018; Murdock, 2021), a development that can be traced through the global privatization of public press and mass broadcast media (Deuze, 2006), only to be cemented with the rise of powerful corporate platforms (van Dijck, 2013). Platforms’ private interests and values do not necessarily overlap with the multiplicity of publics that these platforms produce and serve (van Dijck et al., 2018). The problem is not limited to a lack of public legitimacy for scientific knowledge and a need for common sense-making; it also spills into the closely related debate about whether the proliferation of platform-mediated information spheres may undermine the public value of truth itself.

A growing literature on the influence of platform communications on information quality has demonstrated that the commercial logics of corporate social media platforms subordinates information with greater truth-value to information that is more popular, sensational, and current, and is therefore of greater

commercial value (Büscher, 2021; Lewandowsky et al., 2017; Marres, 2018). Further affronts to the very idea of truth by the media environment have been identified as the extreme *abundance* of information or “information deluge”⁴ afforded by web technologies, which is “likely to overwhelm the traditional safeguards of professional editorial oversight” in the context of journalism (Petersen et al., 2019), and the *speed* of information communication, which is thought to lead to “ever-smaller micro-zones of attentive engagement” (Dahlgren, 2018). The increasingly networked and platform-oriented nature of the media landscape is transforming contemporary science communication processes, despite the fact that platforms are “commercial environments serving the marketplace of ideas” rather than advancing accurate knowledge or truth-seeking (van Dijck & Alinejad, 2020).

This raises an important tension for scientists’ more active public engagement. By virtue of the media environment that they must navigate to engage with the public, scientists who heed the call to pursue a greater stake in public communication may face challenges to the very epistemic authority they seek to draw upon in their public participation. They must build a relationship with the public that maintains or even enhances the legitimacy of/trust in science.⁵ Institutionalized media has historically been deeply important for helping to generate public legitimacy for science in modern mass democracies (Weingart, 2012). The literature on the “mediatization” (or “medialization”) of science has typically cast this relationship between science and media as neither a good nor a bad one, but sees developments in this relationship as “a new kind of coupling of science with the media and—through them—with other social systems” (Weingart, 2012, p. 31). Within this framework, media can be seen as playing a role in shaping the political meanings of science (Rödger, 2011). This can be understood as a specific type or mild degree of science politicization, one that is necessary for the functioning of democratic deliberation that takes scientific expertise into account (Pielke, 2007). Hence, the role of institutionalized media has long been essential for the public sense-making of scientific knowledge; a role that is increasingly complicated with the rise of social media and platform ubiquity.

Within the contours of this emerging media landscape, platforms' efforts toward enhancing information quality suffer from much the same problems that platform self-governance suffers from more generally (Cotter et al., 2022). That is, steps taken toward various forms of content moderation and fact-checking reflect a compromise between demands and values of different actors involved (Gillespie, 2018), rather than promotion of a dominant value of independent scientific, truth-seeking principles in the interest of relating accurate information to the public. Hence, the political economy of the contemporary media landscape arguably undermines the public value of truth by advancing an increasingly agnostic attitude by (private) media institutions toward what is true. This transformation of the media environment has also left it relatively ill-equipped to address the problems that "post-truth politics" pose for science and scientific institutions. This form of politics is defined as more than a mere disregard for, or selectivity about, factual information but a development involving political figures manufacturing and disseminating their own facts, which support and follow from their political positions, values, and claims (Lockie, 2017).

This problem raises important questions about how scientists are able to position themselves and see their roles with relation to the public amid the changing technological and societal conditions for communication. Our investigation is therefore interested in understanding how publicly engaged scientists experience their engagement within the media environment described, and especially how they negotiate their relationship to the public they imagine for their communications. As social media casts into question any simple distinction between producer and audience, the "imagined audience" is something social media platform users unavoidably think about, are attuned to, and see themselves in social relation with, thus shaping their own participation (Litt & Hargittai, 2016; Marwick & boyd, 2011). We specifically focus on how the significance of truth and truth-seeking in academic knowledge production is communicated to these publics as scientists traverse public engagement. A notion of "epistemic trust" underpins our discussion of the relationship between scientists and their media publics. As Wilholt (2013) explains, to

invest epistemic trust in someone is to trust them in their capacity as a provider of information. This includes not only their commitment to truth but also their assessment of the implications of their truth-seeking investigations. It implies that the public's trust in the knowledge provided rests on both its truth and the value judgments involved in producing the knowledge. As such, scientists seeking to gain the public's trust in their epistemic authority do so with relation to an imagined media audience that may or may not share experts' value judgments about their truth-seeking practices.

The idea of truth we work with here is informed by how scientists grapple with "truth tensions" around climate science and environmental expertise (Büscher, 2021). Drawing on Arendt and Foucault, Buscher deploys the term "truth tensions" to explain the importance of acknowledging the contradictions, uncertainties, limitations, and partialities that emerge through the situated processes of knowledge production. Crucially, Buscher adds to this an analysis of the attacks of contemporary "post-truth politics" on academic climate knowledge as being essentially a pure expression of power, against which only the reclamation of compelling claims to truth are an effective response, rather than further acquiescence to the validity of segmented communal realities (Büscher, 2021).⁶ We use the idea of truth tensions—encompassing both the partialities and epistemic robustness of scientific knowledge about climate change—as we analyze our empirical material.

Case and method

Our research case was situated in Amsterdam, The Netherlands. The interview-focused investigation was carried out over the span of approximately 6 months (between November 2020 and April 2021), during which 10 engaged scientists were interviewed. The research also involved conducting observations at online and offline events and gatherings held by organizations of scientists, and analysis of these observations and some of the documents (statements and promotional materials) these organizations produced, as well as additional media materials produced by the key respondents and their organizations.⁷ The organizations the scientists were involved with

included networks such as Scientists 4 Future, Scientists for Extinction Rebellion (Scientists for XR) and Code Rood, as well as the Dutch Degrowth Platform, the Wellbeing Economy Alliance, and Utrecht Young Academy. The scientists were all working on areas related (directly or indirectly) to the theme of climate change and ecological crisis (including researchers of climatology, energy transition, sustainable urban planning, and green economics). They were selected for their particularly active or leading positions in the public-facing organizations or initiatives of which they were a part as scientific experts.⁸ Several of the respondents were among the 50 Netherlands-based scientists who drafted the statement (“consensusverklaring”) in support of the climate strike of September 2019.⁹ That statement went on to receive signed support from 2100 scientists across academic disciplines. The international emergence of publicly engaged scientists as a relatively new presence was particularly evident since this period in 2019.¹⁰ The approach of contextualizing the interview material with relevant multiple forms of media content and elements of participant observation at (online and offline) events was inspired by the research approach of short-term ethnography, a more narrowly focused adaptation of traditional ethnographic methods, which is well-suited to (digital) media research (Pink & Morgan, 2013).

The interviews conducted with the key respondents were all either zoom video calls that were (audio-visually) recorded or were telephone or shorter in-person interviews about which notes were taken. Each of the recorded interviews with the key respondents lasted a minimum of 1 h, and some interviews were also followed-up with further questions. All of the engaged scientists had a PhD in their relevant fields or were in the process of obtaining one, and all were employed at Dutch academic institutions. While several were early career academics, the sample also included experienced scientists.¹¹ Seven respondents were men and three were women. The study’s approach to scientific knowledge about climate research as an interdisciplinary field follows from work that has emphasized the importance of broadening understandings of what environmental expertise entails (Sörlin, 2013) as its discussion of science is not limited to the natural sciences.

The respondents’ attributes do not necessarily make them a representative sample of the population of publicly engaged scientists in the Netherlands working on climate change and communicating with media publics. This was not the goal of the sampling strategy, nor is it known for certain how large this population is. Instead, qualitative sampling was used as new respondents were sought out who fell within the category of academic scientists working on climate change thematics who were particularly actively/visibly engaged in public debates in their role as scientists/academic knowledge producers during the period in question. This was the category of research subjects the research question suggested as the main focus of the study. The aim was therefore to seek out academics who met the key criteria of working on the relevant themes and being active enough in the public realm so as to have sufficient depth of experience with public engagement for the analysis. This was a form of purposive sampling (Bernard, 2000), which also included some snowball sampling (Bryman, 2012) as some of the interview respondents were suggested by those who had already been interviewed. The goal of the sampling method used was to seek out a variety of new respondents and elicit a diversity of perspectives and experiences related to the topic guide. The guide operationalized the key categories of public engagement practices, experiences with media, and reflections concerning the purpose of science, which the research question probes. This generated a sample that covered a range of characteristics that could be relevant influences on the key categories (i.e. gender, stage of career, disciplinary background, and form of public engagement). All interviews were conducted and recorded with the informed consent of the respondents.¹²

The interview topic guide covered questions concerning topics such as how respondents saw their role in the public discussion, what their media use/participation constituted, how their professional environment responded to their activities, and what role their public activities play in their scientific practices. The interview responses covered a variety of scientists’ perspectives on their own role within concrete engagement activities, and the respondents elaborate on a multiplicity of intellectual, political,

ethical, epistemic, and professional commitments and motives. The purpose of the interviews was to elicit material on how engaged scientists understood their own position with relation to lay-publics, policymakers, and media discussions pertaining to climate change. These experiences and practices offered an entry point for discussing how climate scientists position themselves with relation to various publics, as is analyzed in the following three sections. The interview results were categorized through a process of identifying themes¹³ that emerged from the responses through comparison across interviews. These emergent themes concerned the kinds of publics engaged with, the epistemic assumptions used, and the modes of authorization mobilized. These themes informed further sampling decisions after some initial interviews were conducted, and they are also reflected in how the written analysis was ultimately organized into the three written sections that follow.

Seeking out niche publics

Igor was a climate physicist involved in an outreach initiative that sought to address a youth audience on climate change knowledge. The initiative was originally envisioned to help inform school pupils, prompted by young activists like Greta Thunberg, who had become interested in climate change themes. Many of these pupils also joined the youth climate movement, Fridays for Future, which staged walkouts and pupil strikes, internationally, as well as in the Netherlands. Igor spoke about some of the ways the initiative had thought about engaging with young publics about climate:

We should especially speak to the youth in their language. Which is not text, at all. We actually once asked the Fridays for Future students where they got their information and they said Google and Instagram. They really search YouTube instead of going to Wikipedia even.

I have colleagues who actively try to access audiences, for instance, on TikTok. Sometimes I see, here and there, that people bring up a complex problem and explain it on TikTok while. . . I don't know, doing makeup [laughs]. I don't follow it, but I know this is

becoming common. And it seems like this is another form of communication that can be effective. We have to choose the media they like, and find the humility to go to schools and approach teachers, find intermediaries that are talking the language of both.

Here, Igor alludes to the connections made between the university and secondary schools to promote the initiative and gather information from students. He went on to note both the possibilities and the practical barriers to accessing youth audiences as a specific media public, reflecting on the vastly different kinds of social and communicative capital that TikTok teens and scientists have, respectively. This instance exemplifies a more general challenge that emerged for some respondents when it came to seeking out and engaging with specific publics. Namely, engaged scientists envisioned specific publics for science communication as inseparable from particular media platforms, genres, and styles in which they lacked fluency, a concern that has been documented in other research, as well (Collins et al., 2016). Similar to Igor's articulation of the need for "intermediaries," other respondents observed that resources for effective translation and communication for various lay-publics were needed, and many lamented a lack of such resources. For instance, Twitter was seen by many as the obvious platform for fulfilling their motivation to seek out more direct communication with lay publics, a desire that all respondents expressed. But while many of the interviewed scientists tweeted about their work, few had managed to amass a substantial lay following via Twitter, and considered themselves as lacking the time and proficiency with typical platform use for their online engagement to be as effective as they would have liked.

Yet, platform-based public engagement was not a pursuit in itself but was articulated as a means to an end: more direct communication with publics than the usual institutionalized channels for climate science communication were able to offer. Scientists' reflections on how mass news media outlets (domestic and international) covered climate issues included several respondents pointing out what they considered to be lacks in sound communication of the implications of the scientific knowledge about climate issues and their consequences. Some scientists articulated concerns about mainstream press

reporting insufficiently conveying the gravity of looming climate disasters. Others also raised complaints about the lack of mainstream media attention for academic research on projections of alternative, hopeful scenarios of climate futures that could be attained through intervention. These contrasting concerns suggested that there was far from a single scientific truth-based story to tell about climate change in the media—that different scholarly disciplines and perspectives have different knowledge to contribute to the public discussion. Awareness of this was a reason for some to suggest that a wider variety of academic researchers would be valuable for public discussions on climate issues.

Informing these considerations were also the past experiences that scientists had with engaging with different kinds of publics in their role as scientists. On this basis, some did not expect all publics to treat their knowledge as authoritative. For example, Ana was an economist whose work was concerned with the societal transitions needed for post-fossil fuel economies as a response to climate and ecological challenges. Her public engagement practices involved recommendations for policy frameworks and measures in line with an economic de-growth agenda advocated by networks of academics working on this theme. She described sometimes finding herself faced with the need to challenge common-sense ideas held by some publics (including policymakers) about the process of scientific knowledge production, itself, as a prerequisite to communicating messages about her research. She explained,

There's not just one thing we need to do; to reduce CO2 emissions. The problem is much more complex than that, and there are many related things that need to change. People will be affected differently in different places and positions in the world, so their struggles with what climate change means and which policy measures will be implemented to stop it will also be different. [...] When you talk about de-growth or post-growth, some people say "oh, but that's ideological, you're promoting an ideology instead of presenting facts." But we are compiling material drawn from academic papers and we do deal in facts. Nobody says to someone who is studying social and technical transitions within the dominant paradigm, "oh, you're ideological because you're operating within the

neoliberal capitalist economic system." The way I think about it is, if we can imagine different technological systems, why can't we imagine different systems for doing business or organizing production?

Here, Ana describes the problem with having to justify the basis of her expertise for some publics who discount her work as insufficiently scientific. As a result of such experiences, she explained her decision to focus much of her engagement work on dialogue with more sympathetic policymakers, as well as giving presentations at specialized public events. She also came to more closely embed her engagement/communication activities within the initiatives and networks of other scholars working on the theme of post-growth thinking for sustainable climate futures. These instances from Ana's and Igor's accounts together illustrate a theme that emerged across cases, namely of scientists not simply adapting their message to the audience, but of seeking out an ideal match between their audience on the one hand, and their particular media proficiencies and disciplinary and theoretical background of their knowledge on the other. In this way, respondents actively sought out audiences who might be most receptive to their expertise and whom they were able to access with the resources available to them.

This shows us something about how these scientists navigate between seeking out engagement and maintaining epistemic authority. Namely, not by doing simplistic "boundary work" that separates their knowledge production practices from societal forces and emphasizes scientific consensus (Ramirez-i-Olle, 2015). Rather, they make complex calculations about communication outcomes. This includes engaging in (implicit or explicit) meta-communication about their scientific and disciplinary principles, as well as considering the barriers to their social capital and other resources that affect their proficiency with cultural scripts and communication affordances of specific media forms. Ultimately, this leads some of them to seek out niche publics rather than refurbishing their message for a mass audience. In doing this, they appear to address their engagement-robustness predicament through a different route than attending to how they might better engage with publics by

acknowledging and adapting to local knowledge (Callison, 2014), as some have advised as an alternative to boundary work or scientific demarcation. Rather, they adopt an approach that follows from the interdisciplinary nature of academic research on climate science and its social consequences and pursue their audiences based on their expertise.

Media publics as knowledge communities

The future existence of our civilization and the preservation of large segments of human culture hang in the balance. That is why this matter is unique and incomparable to any other problem that would drive citizens to civil disobedience. We're facing an actual existential crisis. . . The facts make it incontrovertibly clear that our time is running out.

This excerpt is taken from an article by Peter titled "Why I am a climate activist alongside being a scientist" (Roessingh, 2020). This was a review article published in the Dutch Review of Books (*de Nederlandse Boekengids*), and was about the book of another respondent, Bart Verheggen (2020), titled "What Everyone Needs to Know about Climate Change." This piece, the book about which it is written, and the background of the two authors form an illustration of how scientists' experiences and practices of public engagement can reflect both their shared understandings about the effects of anthropogenic greenhouse gasses, as well as tensions between different theories of knowledge that they subscribe to, and different public messages about societal action they espouse. Peter and Bart also see themselves as addressing different publics than one another in their engagement efforts. Their difference is reflective of a wider tendency among those studied to imagine their audience as a community who shares a perspective on what scientific knowledge is.

Peter is an evolutionary biologist and Bart is an environmental scientist. In their public communications, and in the research interviews conducted, the two openly articulate different epistemic foundations for their scientific work. The two also articulate these theories of knowledge as guiding their respective outlooks on how to position themselves in the

public realm. For instance, in the piece cited above, Peter's claim is that Bart's ideas about the separation between the sphere of science and politics, informed by his epistemic position, is problematic because politics and science are mutually intertwined. This leads Peter to argue that Bart's book does not go far enough in explaining, for the public, what needs to be done about the climate crisis, and the urgency with which this action must be undertaken. For Peter, Bart's ideal of politically neutral science is unrealistic, while for Bart, Peter is insufficiently separating his political perspective from his presentation of the scientific knowledge he communicates.

Peter's explicit motivation with the review piece was to reach an audience that Bart's book might not have. He envisioned the former as an audience who already knew and accepted settled climate science, but who was sympathetic to Peter's Latourian epistemic perspective that scientific knowledge is inherently societally and politically constituted, and has therefore never existed outside the effects of political power. Hence, for Peter and his audience, scientists' active political participation on this issue does not cross a previously uncrossed boundary as all scientific inquiry is already shaped by societal and individual values. This contrasted with Bart's perspective, which was inspired by the ideas of David Hume about value-free science. It made Bart imagine his audience as a much broader public than Peter's, one that shared an idea about the correct place of science in society as informing policy but staying out of politics.

What was especially striking but also typical about this example was that the two scholars acknowledged the validity, and even importance, of the other's public engagement. Like the other respondents, both these scientists were aligned in thinking they were each well-positioned to reach and compel different audiences, and that the net effect of this was oriented toward the same general goals of shaping lay-opinion and informing policy with scientific knowledge. Hence, Bart and Peter's accounts reflected how the respondents were able to hold conflicting epistemic ideas in productive tension with one another, avoiding undercutting one another's perspective or engagement practices, and stating that it had not led them to any disagreement about the content of scientific claims. Their

discussion was indicative of a discursively expressed epistemic pluralism across academic fields and perspectives. Hence, while scientists envisaged their respective publics as being different from one another, they still seemed to see addressing these different publics as part of, and compatible with, a wider, shared project of seeking out, and communicating with the public about, scientific knowledge concerning climate change issues.

The value of “epistemological pluralism” has long been acknowledged in the context of the interdisciplinary scientific research on ecology (see Miller et al., 2008). However, scholarship on climate scientists’ public engagement and science communication activities pays little attention to (potential) differences in scientists’ epistemic backgrounds and how this might influence the way they engage with different publics or which publics they appeal to. Our discussion shows how different scientists use different theories of knowledge among themselves, leading to elements of epistemic pluralism *within* the science they communicate. This plurality can be understood as inherent to a shared project of knowledge production, as well as manifesting in how science is communicated with different publics. As such, this apparent pluralist outlook underpins a key difference between publics that are envisioned as epistemic bubbles and publics that are envisioned as existing in productive tension with one another.

Previous research shows evidence for epistemic communities bolstering trust in knowledge about climate change through their social cohesion (Vähämaa, 2013). In light of the analysis we have presented, this suggests the potential of publics that form around experts and a shared theory of knowledge toward building trust in expertise. Most importantly, we show in our analysis that what scientists do in this case is evidently different from simply bridging epistemological distances between themselves and the public (and/or policymakers) in the way described by some scholars (Garvin, 2001). It is, instead, a claim to scientific robustness that sets it apart from forms of epistemic diversity or relativism that do not distinguish the committed pursuit of truthful knowledge that constitutes the scientific project from other kinds of knowledge claims around which communities may convene. It must

also be differentiated from scientists communicating the importance of non-positivist epistemologies, as such, (Blue, 2016) in order to build public trust, as some have advocated. What we see in this pluralism allows different epistemic foundations to be held in tension with one another as part of a shared pursuit of truth, thus enabling it to be construed as a form of “truth tension” (Büscher, 2021). This finding contrasts with previous research on the use of digital media by scientists, which reflects their tendencies to both imagine their audience as an undifferentiated and monolithic “general public” and to eschew the open-ness of revealing the ambiguities, uncertainties, and complexities present in their respective fields (Roedema et al., 2021). The kind of epistemic pluralism found here suggests, rather, that with particular audiences meta-communication about epistemological partiality (and complementarity) is used as a strategy for gaining epistemic trust from the public.

Vacillating between truth tensions and knowledge deficits

The epistemic plurality discussed in the previous section sometimes fell by the wayside when scientists put into practice their initiatives to communicate with certain audiences. The communication of facts as epistemically neutral, and the appeals to “the truth” about climate change as something self-evident that policymakers must acknowledge were indicative of this contradiction. The latter was in line, for instance, with the Extinction Rebellion (XR) movement’s demands, one of which is for governments to “tell the truth” about climate change. Another message to leaders and policymakers is “don’t silence the science.” Some of the engaged scientists were involved with the Dutch chapter of XR’s subdivision organized specifically for scientists, Scientists For XR, a network that has active chapters in multiple countries. There was an apparent abandonment of epistemic pluralism in certain messaging and initiatives—sometimes by the same engaged scientists who advanced such a pluralist outlook in other contexts. This was most noticeable in instances when scientists envisioned those being engaged with as a general mass public.

One initiative set up by some of the engaged scientists in question, the Climate Help Desk (*Klimaathelpdesk*), was an illustrative case in this regard. The Help Desk was a website promoted via the university's own site and launched at a university-based event. It was oriented toward answering any questions the lay public would ask about the climate change problem through Twitter or via the website, itself. Scholars across relevant fields working at the university were invited to contribute their answers, and through an editing and feedback system that mirrored academic peer-review, the answers would come to be published on the site. The Climate Help Desk format also allowed the contributors to refer to scientific papers or other sources that their short, online texts drew upon. Yet, the platform called for little disciplinary or epistemic contextualization, and the social scientific answers to what was to be done about climate change were presented in much the same style and form as the natural scientific answers given on high-consensus topics. The individual styles and communication motivations of the respective scientists were also minimized, and potential disagreements between scientists with expertise in the same area were implicitly downplayed by the form. In other words, it could be said that "truth tensions" were largely avoided in favor of an appeal to neutral factuality and emphasis on consensus.

In addition, the case was relevant for how social media was employed alongside a partially institutionalized platform for science communication: a website promoted via the university's own official website, and a project that was buttressed by the university's wider plans to advance "open science" initiatives that have the stated goal of enhancing the involvement of citizens in knowledge production processes. The initiative presents an interesting case that brings together aspects of valuing the use of social media and web formats to directly speak to lay-audiences through the scripts of interactive media cultures, on one hand, and the use of institutional links to the university and a vetting process that mimics peer-review to establish credibility, on the other. It can be seen as an instance in which the traditional, linear, institutional model of science communication is transformed by the newer, non-linear, networked model of science communication, without

the latter replacing the former or making it obsolete (van Dijck and Alinejad, 2020). The Help Desk initiative and its development process seems to reflect a merging of the need for institutional links for credibility and resources, and the need to turn toward the more short-form text formats and language style that is more typical of web media use.

While the university's standing bolsters legitimacy and makes an initiative like the Help Desk possible, the website's aesthetic and genre harken to the recognizable appearance of blog-style online text formats that are easily accessible, illustrated with pull-quotes and images. The knowledge presented is framed by the format as analogous to a technical help requested by the public who writes in with questions, and the initiative is orientated toward a general lay-audience that seems to be envisioned in terms of its knowledge gaps; the expertise presented subsequently fills those gaps, thus reflecting an assumption of a public knowledge deficit in line with the "deficit model" (Bucchi & Neresini, 2008). However, at the same time, the initiative can also be understood as incorporating elements of a public deliberative process through the ability of the audience to pose the questions, and therefore state in their own words the problems to be addressed by scientists. Public problem-definition is one of the defining characteristics of avoiding the technocratic use of science in decision-making, according to science and technology scholarship (Engdahl & Lidskog, 2014). This dialogical element of the initiative can therefore be seen as imagining and seeking of assuage a "trust deficit" (Bauer et al., 2007). Yet, further public deliberation is truncated in this format, implicitly reflecting a model of science communication in which a uniform public interprets facts in similar ways, using the same ideological and value dispositions to make sense of the information (Nisbet & Scheufele, 2009).

The communication approach here appears to envision and address a broad and unspecified audience. It can be understood as the combination of direct, online communication with an interactive public and a more institutionally embedded public engagement strategy that imagines a public compelled by institutional credibility rather than trust in the epistemic community formed around a particular

(kind of) knowledge or scientist. The way epistemic authority is appealed to in this initiative seems to be more through institutional credibility built around neutrality than an emphasis on open-ness. Like the messaging of Scientists for XR and other examples, a theme that emerged from the material was the imagining of a broad audience (even if not actually a mass media audience) going hand in hand with a more reserved position to the kind of open-ness described in the previous sections of this article. This is despite the fact that research on communicating openly about scientific uncertainties has demonstrated that doing so (about knowledge in certain scientific fields) does not diminish trust in scientists (Retzbach & Maier, 2015).

In their recent work on climate scientists' communication strategies, Schenuit et al. (2020) describe scientists doing a complicated balancing act. Namely, scientists shift between making unequivocal claims in response to complex climate questions, and communicating uncertainty and the full range of valid evidence about anthropogenic climate change. A similar tradeoff is described by Tøsse (2013) when discussing how climate scientists made a choice in their communications between open-ness and control. Open-ness referred to sharing of information about the scientific process and internal deliberations, whereas control denoted the closing down of such public visibility in the interest of protecting science against motivated attacks that could misuse such information. Tøsse describes scientists' approaches to this choice as not being mutually exclusive but shaped by the political context and what that implied about their potential audience's responses to what was being communicated and how. We may therefore understand the approach in this case as a way to ensure convincing scientific robustness when the audience is envisioned as too broad to build epistemic publics that share common ground.

The lack of a single communication strategy and outlook about the public, overall, suggests that scientists vacillate between openly acknowledging the truth tensions inherent to scientific knowledge, and using comparatively more closed and controlled communication strategies to draw on things like institutional reputation as shorthand for epistemic authority. The occurrence of this oscillation—based

on the kinds of media platforms being used and audiences being imagined—suggests scientists' clear need to anchor their epistemic authority in some way or another, depending on the media public. Our analysis tracks roughly with research conducted in other national contexts that shows a link between scientists' social media use and their use of more dialogical forms of communication rather than the use of bureaucratic science communication routes and forms (Jia et al., 2017). It also complicates work that argues for open-ness and public deliberation as the strongest general strategy for climate scientists to gain greater public trust (e.g. Pearce et al., 2015), as our focus here has been on understanding how scientists manage to or struggle with putting such open-ness into practice within the present media environment. We have instead shown how they use communication strategies of different degrees of open-ness as part of how they navigate the envisioned potential trust deficits within different types and scales of (media) publics.

Conclusion

The advance of social media platforms has been lauded as producing new kinds of social spaces and audiences for the communication of scientific knowledge, with possibilities for reaching “non-traditional audiences” for climate science communication (Nisbet & Scheufele, 2009). However, scholars are also increasingly critical of platform dynamics in society, not only due to platforms' user affordances for malevolently motivated actors to wage the kinds of “post-truth politics” underpinning much climate skepticism but also because of corporate platforms' more systemic undermining of the role of public institutions' in communicating trustworthy, authoritative knowledge. In this media context, scientific experts that are becoming more active participants in the public communication of knowledge are often keenly aware of the fact that their expertise can face various forms of forceful public contestation. The media environment shapes how they perceive their own science communication efforts, as their conceptions of their “imagined publics” are shaped by their experiences of direct contact with journalists, how they see their subject area covered in the news media,

and an awareness that science-skeptical media audiences exist and may be exposed to their public messaging (Tøsse, 2013).

The aim of this study was to show how such scientists navigate between gaining the trust of media publics in the complex landscape described, and how they articulate and seek to gain trust in their epistemic authority as practitioners of a scientific endeavor. We showed that rather than scientists *either* assuming the public to have a knowledge deficit *or* seeking a public basis for open, dialogical communication, a complex picture emerged of how they communicate knowledge and build trust. First, we found that there is a weighing of considerations about specific media proficiencies and a pursuit of common epistemic ground with audiences. Second, we showed how engagement with specific audiences constitutes the development of knowledge communities, without necessarily narrowing the epistemic purview to exclude truth claims of other scientific knowledge communities. Finally, we demonstrated that there was an oscillation between the imagining of such communal publics—that allow for greater epistemic transparency—and the appeal of a more simplified credibility appealed to for more broadly envisaged, generic audiences.

The scientists' public engagement through media forms appears distinct from how many have studied the use of media by scientists so far. It could neither be characterized as the strategic garnering of media coverage for the promotion of scientific knowledge through advancing certain science policy or funding agendas (Nölleke et al., 2021: 741), nor can it be defined as the use of platforms for professional networking (Collins et al., 2016). Their engagement might be better characterized as an effort to advance the influence of scientific expertise within the existing media debate on climate, which also tends to recognize some connection, directly or indirectly, to the local and international climate movement and public contestations around climate science. Hence, it can be said to signify more closely a form of "science communication as political communication" (Scheufele, 2014). But, importantly, it also constitutes a form of communication about the nature of scientific truth and knowledge production. Going beyond the matter of which expert authority and information the public

accepts, we reveal something about the receiving side of trust by having shown how scientists seek to gain public trust in their epistemic authority. However, it is also important to acknowledge the specificities of the study that may limit how far we can extend the above-mentioned claims to other issues and contexts. The Dutch setting in which the investigation was carried out likely has important differences from non-liberal democratic settings, and the relatively publicly contested scientific expertise around climate issues is bound to bring particularities that differ from issues that are not highly politicized.

While niche publics can be constructed as epistemically mutually exclusive, our discussion has demonstrated that they can also be envisioned pluralistically as epistemic communities in ways that soundly mediate the interdisciplinary and epistemically diverse nature of climate research. It has been emphasized that the changing relationship between science and society has brought about the need for multi-directional and open-ended communication between scientific experts and the lay public (Bucchi, 2008). Our analysis suggests that the changing media landscape does not necessarily preclude the possibility of communication that communicates complex "truth tensions" and the value of knowledge-seeking that is inherent to science. We show that what is behind scientists defaulting to less open (meta-)communication about the contexts in which scientific knowledge is produced is not so much a stubborn or principled lack of trust in audience's ability to deal with things like partiality and uncertainty, but more of a complex balancing of considerations about media formats, publics, and envisioned political outcomes alongside, and in relation to, commitments to epistemic principles and values.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: The authors received financial support from the Horizon 2020 research project "Policy, Expertise and Trust in Action" (PERITIA) (Grant Agreement No. 870883).

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Notes

1. Some scholars have also discussed how these media developments are related to an ostensible crisis marked by the fragmentation of the public sphere in Western democracies (see Schlesinger, 2020).
2. Research on conspiracy theory communities have shows how such actors vie for epistemic authority in the public realm against scientists (Harambam & Aupers, 2015).
3. This also goes beyond climate science to include other politicized and publicly contested areas of knowledge (see Besley et al., 2018, p. 560).
4. See also Andrejevic's (2013) notion of "infoglut".
5. In philosophy of science and science communication scholarship, some scholars recognize the problem as a lack of epistemic trust, or a public "trust deficit" rather than a "knowledge deficit" (Bauer et al., 2007; Goldenberg, 2021, p. 80).
6. For Buscher, a (re-)introduction of the key concern with the ongoing, dynamic *pursuit* of truth offers a corrective to the urgent problem posed by the politics of "truth wars," but does so without lapsing into a response that appeals to decontextualized technical facts or a crude positivism. This understanding of scientific truth as being subject to power relations but also being "more-than-power" helps concisely bring together the strengths of STS with the emergent need for new strategies for countering politically motivated attacks on scientific truth.
7. This was a period in which online meetings and interactions through video conferencing platforms was becoming increasingly normal among networks of both academics and activists, hence the online/offline nature of the research reflected the usual condition of social gatherings and interactions in the research context at the time in the earlier stages of the Covid-19 pandemic.
8. In addition, interviews were conducted with five NGO staff and activists active within the same civic sphere of the environmental movement in Amsterdam, which helped to comparatively situate and understand themes that were specific to engaged scientists' experiences and practices around climate change.
9. <https://scientists4future.nl/public-statement-of-support/>
10. In 2019, 12,000 scientists signed a statement by researchers in Germany, Austria, and Switzerland in support of the weekly youth climate strikes. Similar statements were signed by scientists in support of youth strikes in New Zealand and the UK. *Nature* magazine reported: "Scientists worldwide join strikes

for climate change, from Bangkok to Brisbane, researchers were among those protesting to urge action on global warming." <https://www-nature-com.proxy.library.uu.nl/articles/d41586-019-02791-2>. The wider context in which this research was conducted, therefore, included a period of a year or two prior, in which national and international momentum around scientists being involved in the climate protest movement was burgeoning.

11. The deficit model also ostensibly shares parallels to what has been called "the public education model" and argued to suffer from some of the same shortcomings (Callon, 1999).
12. The research ethics approach consisted of gaining informed consent via consent forms that were read and signed at the beginning of each interview together with the interviewer. Where clearly identifying characteristics and details are included, the respondents were approached with the relevant parts of the text to give their consent. Where respondents could be reasonably anonymized in the text, pseudonyms were used to conceal respondents' identities.
13. Identified and used for categorization of data by first author.

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