The role of scientific knowledge in Extinction Rebellion's communication of climate futures

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Introduction: Extinction Rebellion (XR) is one of the central players in climate movements in the United Kingdom. Considering the historical relationship that environmentalists have had with science and scientific knowledge, we examine the current treatment of science in the narrative put forward by XR United Kingdom.

Methods: Using mixed qualitative methods, the group's online press releases for the year 2019 were analysed, alongside fieldwork from 2 weeks spent at the United Nations' climate conference in Glasgow in 2021. The fieldwork data consists of participant observation combined with semi-structured interviews.

Results: The movement's demand to "tell the truth" utilises a narrative established on a fact-based enlightenment. This is complemented by notions of a fixed temporal deadline and predicted societal collapse. We highlight prominent perspectives that came to light and identify three main positions that the activists held with respect to science.

Discussion: The findings show the positioning of science and scientific knowledge as a supreme authority, which acts to depoliticize the discourse and induces reductionism in imagining climate futures. This positioning, combined with the centrality of apocalyptic imagery, hampers the construction of alternative futures and fails to engage meaningfully with climate justice.

1. Introducing Extinction Rebellion: From a blocked road to progress to road blocks in the United Kingdom[1]

Despite the inclusion of climate change in public discourse, government policies, and international agreements, global greenhouse gas emissions continue to rise every year.[2] That the road to decarbonisation has been repeatedly diverted and blocked is a complex matter relating, among other things, to structures of entrenched power (Carroll, 2021; Stoddard et al., 2021; Buller, 2022). However, there is increasing academic recognition of the role that the climate movement has in advancing climate policy (Temper et al., 2020; Pathak et al., 2022; Thiri et al., 2022). The Sixth Assessment Report by the Intergovernmental Panel on Climate Change (IPCC) states that social movements lay the groundwork for larger societal transformations: "shifts in development pathways result from both sustained political interventions and bottom-up changes in public opinion. Collective action by individuals as part of social movements or lifestyle changes underpins system change" (Pathak et al., 2022).

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1   We use UK spelling throughout the manuscript.

2   https://ourworldindata.org/greenhouse-gas-emissions (accessed October 5, 2022).

The United Kingdom has a long tradition of climate activism and is notable in the European context for initiating "Climate Camps", which are now an annual feature of radical environmental groups on an international scale. Starting in 2006, the climate camps combined features of movement and direct action, aimed towards a fossil fuel infrastructure, thus laying the foundations for standardising non-violent direct action (NVDA) in activist action repertoires in the United Kingdom and Europe (Doherty et al., 2007; Saunders, 2012). Extinction Rebellion (XR) is an international climate movement known for its prominent disruptive civil disobedience and NVDA tactics (Gardner et al., 2022). XR was founded in the United Kingdom in late 2018, adding to the throng of climate activism at that time, significantly the start of Greta Thunberg's striking from school and the ensuing birth of Fridays For Future (Sommer et al., 2019; de Moor et al., 2021; Malm, 2021). Following the successful mobilisations in April 2019, which saw several main streets and bridges in London blockaded, XR came to dominate the environmental activism scene in the United Kingdom (for an overview, see Gunningham, 2019). The movement enjoyed a growing popularity, and the "Autumn Uprising" in October 2019 was attended by ∼30,000 people (Malm, 2021) and resulted in the arrests of over 1,800 activists (Stuart, 2022). The presence of XR activists at main climate demonstrations in the United Kingdom has become routine; their fondness for dramatical actions and the headline-grabbing tactic of utilising arrests in their favour has familiarised the public with the movement (Rohden, 2021).

After a COVID-19-induced hiatus in direct climate action in the United Kingdom, late 2021 and 2022 saw activists springing back into physical operation, with Insulate Britain and Just Stop Oil producing numerous headlines.[3] Both these campaigns, although claiming independence from Extinction Rebellion, are notably composed of an overlap of activists,[4] and employ similar tactics. XR, therefore is of importance also with respect to the latest activism, as the organisation represents the primary source from which these groups splintered off or at the very least, their pervasive and established presence in British climate activism influenced the approaches adopted in recent actions. Considering the critical role of social movements combined with their pervasiveness in the field of climate activism, XR is a relevant group to research.

This article seeks to address one aspect of the climate movement that has as of yet been neglected, namely, the role and relation the movement has to climate science and scientific knowledge. Unlike other social movements, the climate movement is uniquely tied to science (Yearley, 1991). When compared to other social issues such as poverty and discrimination, the effects of climate change are not dramatically experienced by people in the United Kingdom. Escaping thus far from the tangible impacts that more vulnerable parts of the world have been subject to, climate activists have

had to rely on scientific evidence to support their claims. At first glance, Extinction Rebellion seems to lean into this relationship, with scientific guides on climate change included on their central webpage and even a particular faction called "Scientists for Extinction Rebellion". It is illuminating to pull into focus how the movement themselves express the relationship with science in order to investigate this phenomenon. Embedded in the storeys that activists tell is information on where agency lies, which themes claim attention, and how interfaces between knowledge and policy are supposed to work. We thus employ a narrative analysis of a combination of online documents from XR in the United Kingdom with problem-centred interviews embedded in participant observation of the movement's direct action over the 2-week period of the 26th United Nations Climate Change Conference (COP26) and as part of a larger group of researchers interested in global climate governance (Aykut et al., 2022).

Exploring the nature of the relationship between scientific knowledge and XR delves into the issue of interacting and conflicting authorities of scientific, political, and moral authority. This, in turn, can be used to interpret the impacts such a narrative has on limiting the movement's ability to reimagine the future. We, therefore, ask two related research questions, namely, (i) how does the movement Extinction Rebellion present science in their narrative and (ii) how does this resonate with their constructions of climate futures?

2. Theoretical considerations: Science, activism, and the science-policy interface

2.1. Science and climate movements

One can view scientific authority as fundamental to the organisational development of the environmentalist movement in a variety of ways. Yearley summarises that "the green movement is doubly bound to science, by epistemological affinity and common descent" (Yearley, 1991, p. 119). Environmental campaigners are set apart from other social movements in that, rather than seeking to mobilise participation by appealing to the lived struggles of oppressed or marginalised groups, environmentalists ground their motivation in scientific knowledge. Phenomena such as pollution, acid rain, and the thinning of the ozone layer have all relied on scientific inquiry to illuminate these issues as worthy of civil concern. In the case of the United Kingdom, Yearley traces this connexion back to early conservation groups in the 19th century, which demarcated areas of preservation on the basis of being critical areas of scientific interest. The importance of scientific expertise was further practised by the more radical movements established in the 1960s, as the earlier environmental movements made use of science to strengthen their arguments and add authority and objectivity to their agendas. There exists, as Brown puts it, "a long tradition of environmental political thought that relies on a view of science as value-neutral expertise" (Brown, 2016).

In the climate case, the creation of the IPCC in 1988 is a case in point (Hulme and Mahony, 2010). Pioneering in terms of composition, status, and use, the IPCC has come to be a synonym with "climate science" in common parlance, achieving no less

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3   https://www.vice.com/en/article/4awexw/just-stop-oil-protests-interview (accessed October 5, 2022).

4   https://www.theguardian.com/environment/2022/apr/10/just-stop-oil-behind-the-scenes-with-the-activists (accessed October 5, 2022). https://www.timeout.com/london/news/who-are-insulate-britain-and-why-does-everyone-seem-to-hate-them-092321 (accessed October 5, 2022).

than what Miller calls a globalisation of the atmosphere (Miller, 2004). The IPCC championed the use of experts as "politically neutral agents" and succeeded in framing climate change as a global issue. However, Edwards interprets the chasm between the scales of "knowledge infrastructures" adopted by climate scientists, who frame the issue as global, and the local frameworks used by policymakers, as one of the reasons why effective policy to decarbonise has yet to be implemented (Edwards, 2016).

To pull focus now to the social movement in question, a connexion between XR and science has been observed since the initial launch of XR. The 2018 Special Report by the IPCC concerning 1.5°C warming (SR15) was explicitly referred to and stated as a direct justification for the formation of the group (Pickard, 2021; Rödder and Pavenstädt, 2022). Arguing for politicians to listen to scientists, the centrality of their demand to "tell the truth", and even having a dedicated branch of the movement called "Scientists Rebellion", XR appears to rely on science to lend them credibility and legitimacy in the public eye, in what Faehnrich calls a "currency for social recognition" (Faehnrich, 2018, p. 9).

Finally, a note on the understanding and relationship between truth and science, which is critical to exploring the demand made by XR to "tell the truth". Science can be thought of as the extension of certified knowledge (Merton, 1973) by way of scrutinising truth claims, and hence the slogan "tell the truth" acts to invoke connexion to science. Although science can be a way or means by which truth claims become negotiable, the very notion of "truth" itself has famously been disputed both in the philosophy and sociology of science. Perhaps, a useful distinction to recognise is that between "scientific truth", as knowledge claims supported by evidence, and "everyday truth", which has its opposite in the form of a lie. Linguistically, the term "truth" can be invoked as an inverse of falsehoods or deceptions, and therefore claims to truth are used to morally strengthen arguments.

2.2. Post-politics and climate reductionism

A central aspect of discussions surrounding the science of climate change is the notion of strong agreement between actors, namely, consensus. Pepermans and Maeseele (2016) critique the dominant discourse, which assumes the construction of scientific or social consensus, on the grounds that this fosters depoliticisation. Here, depoliticisation is understood to mean that consensus eliminates dissent and that policy is a construct of expert knowledge rather than political or economic choices. The view that establishing scientific consensus would facilitate political action has dominated the climate discourse, even being advanced by scientific research centres since the 1990s, which have made this direct link between knowledge and policy (Nisbet, 2010; Bolsen and Shapiro, 2017; Grundmann and Rödder, 2019). While trying to legitimise their cause with the reasoning of scientific knowledge, placing science in the technocratic role can "negate the legitimacy of alternative rationalities" and thus is part of a post-political discourse (Blühdorn and Deflorian, 2021).

By eliminating heterogeneity and antagonisms from the climate debate and elevating the role of technocratic actors in

the task of providing solutions that fit within the pre-existing market, the issue can be considered depoliticised also from the standpoint of Marxist theory (Swyngedouw, 2011, 2022). "Post-political" denies heterogeneities by shifting conflict onto a platform of consensus founded on expert knowledge and interest intermediation (Swyngedouw, 2011). In the depoliticised state, climate change is then perceived as an externality to the capitalist economy (Berglez and Olausson, 2014) and calls for transformation which addresses the underlying structures that are overlooked. Proposed solutions working within this framework then maintain the socio-political status quo (Berglez and Olausson, 2014).

Feeding this assumption is the idea that climate change is an abstract issue, with impacts that are temporally and spatially detached from their trigger. Therefore, support for environmental politics is built through raising awareness and acquiring scientific knowledge so that actors can understand the effects of climate change. Working backwards leads to the conclusion that the inaction regarding the implementation of climate policy is the result of a lack of scientific knowledge. Therefore, the remedy to political inaction on climate change is access to information. Is XR reliant on this linear model, and how does this impact the ways in which climate futures are communicated?

Hulme (2011) interprets the discussion of climate change as increasingly reductionist. He argues that this reductionist role ignores the "complexity of interactions between climates, environments and societies" (Hulme, 2011), and furthermore, that the hegemony exerted by the natural sciences "downgrades human agency and constrains the human imagination". Beck and Mahony (2018) argue that treating climate change as a solely technical matter leads to a binary position of either trusting or mistrusting experts, ruling out deeper engagement. After first identifying the position of science in XR's narrative, we will then ask if political pathways are mobilised or restricted by this narrative.

3. A narrative analysis of Extinction Rebellion in the United Kingdom

3.1. Narrative in social movements

Narrative analysis is an established tool with which to probe the meaning-making of social movements (Davis, 2002; Polletta and Gardner, 2015). The way in which social movements recount their storey can be instrumental in achieving their aims; stories can be used to maintain and deepen activists' commitment; they can be wielded as a tool to either evaluate or legitimise opportunities (Polletta, 1998). "Narratives' endowment of events with coherence, directionality, and emotional resonance provides not only an explanation for events but rationale for participation" (Polletta, 2002). Storytelling can act as a "vehicle of ideology", which allows a particular worldview to be put forward with less critical reception than argumentation that relies on purely logical reasoning (Polletta and Gardner, 2015, p. 536). This study follows the understanding of narrative analysis as theorised by those such as Davis (2002), Goodson and Gill (2011), and Polletta and Gardner (2015), with a central argument that there is a "storied nature embedded in human experience", containing meaning that is expressed by the narrator in their choice of events and overarching

plot (Goodson and Gill, 2011). By sequencing events in a certain manner, the plot that the storey follows is used to offer the group's ideology and future visions, whereby possible worlds are created. This creates spaces of possibilities for political action to be opened or closed, as imaginations are performative; imagined futures have tangible impacts. Furthermore, Polletta argues that it is the inherent ambiguity of narrative that necessitates the active participation of the audience's interpretation (Polletta, 1998).

Stories build themselves around the chronology of a plot, and this sequencing of events provides the structure for a narrative. The plot provides the cause and effect of events, which in turn provides an intrinsic meaning to the storey for the audience to interpret (Polletta and Gardner, 2015). However, the plot is not simply the presence of chronology, but rather it is the linking of events with causality, which is consciously curated (Davis, 2002). This differs from classical argumentation, which would follow a line of reasoning based on logic. The plot may be somewhat familiar to an audience, using characters with whom the audience can emotionally connect. The fact of familiarity, that stories are a folk concept, widely used by many people, invokes a response in people, unlike other ways of expressing a viewpoint through explanations or arguments based on logical structures and proof (Polletta and Gardner, 2015). Audiences expect a storey to be somewhat ambiguous but are less likely to treat new information critically if they are absorbed in the storey. Therefore, activists can uniquely use stories as a means to connect with the public and express their ideology (Goodson and Gill, 2011). As Fine (2020) nicely puts it, "Movements thrive when they transform events into experience, experience into narrative, and narrative into action."

But what kind of action is galvanised by this narrative? Social movements can use narratives to construct or deconstruct "models of what is normal or expected" (Davis, 2002). Just as some norms are legitimised, others are treated as unacceptable. As a result, the power in social movements is derived from "their ability to contest, to loosen the boundaries of conventional notions of interest by exposing their contradictions". Narrative, then, is the curation of a coherent whole through the selection and emplotment of events as well as the active interpretation of an audience, which allows movements to foster participation, maintain a collective identity, and guide moral and behavioural norms.

3.2. Methods and data corpus

The approach of this project is a mixed-methods design that combines narrative analysis of online documents with problem-centred interviews embedded in participant observation of the movement's direct action. In the first part, the press releases published by XR at the start of their mobilisations (the year 2019) were analysed. It is interesting to consider the formative period as giving insights into the basic structures, concepts, ideology, and actions that shaped the current movement. Examining the content published by XR on the UK webpage with systematic analysis will allow for the specific narrative of the UK group to be investigated. The press releases offer a source where the central views of the organisation, as well as the events they promote and their coverage of UK news, can be gathered. We selected the media type and sample considering the geography, the accessibility and availability, who published the data and where, and a temporal limit. Regarding the United Kingdom, we took written web content from their press releases on the centralised site. These data were chosen as the core views and principals of the movement's narrative could be found, as they themselves self-describe.

The first dataset comprises a total of 207 press releases that were published as web content throughout the year 2019 (Table 1). This year is regarded as the beginning of XR, considering the inception of the movement to be in late 2018, with the first acts of mass mobilization not seen until 2019. Considering the impact that the pandemic had on limiting action in public spaces in 2020, the material published in the year 2019 then represents a closed first chapter in the narrative. Although XR has a decentralised structure, there is an umbrella UK webpage, on which national press releases are published on. The nature of the structure allows any actor to be a part of XR, provided that they adhere to the central principles of the group. The press releases are then published with the author byline 'By Extinction Rebellion', making it clear that the movement takes responsibility for the work. The writing has been authorised to some degree as the text is released on the website and can be taken to represent the group's values. By considering the data released over the course of the year 2019, a preliminary picture of the movement's narrative can be built up.

The second part involved fieldwork, as we performed participant observation over the two-week period of the 26th United Nations Climate Change Conference (COP26), and as part of a larger group of researchers interested in global climate governance (Aykut et al., 2022). Taking place in Glasgow, Scotland, COP26 represented a focal point for climate activists across the globe to rally around. Extinction Rebellion formed a visible and active section of the movement present. The range of activities witnessed during this time spanned demonstrations, workshops, film screenings, music events, panel discussions, and casual chats. The activist programme for the fortnight was comprehensive yet constrained by the time limit, meaning that every day was full. Such an intensive schedule allowed for the collection of a rich dataset, as each day presented the opportunity to experience a variety of activities in different settings and compositions. In addition to the participant observation, we conducted semi-structured interviews, 15 of which were with people who partook in XR-led demonstrations or stated affiliation with Extinction Rebellion. There was a range of ages and a mix of genders represented (Table 2). With such large numbers of protestors and relatively few researchers, we proffered interviewing those activists that stood out as particularly engaged with XR (whether through actions or through symbolic forms of affiliation, such as wearing an XR patch) rather than simulating an attempt at random representation.

The combination of attending events organised by XR as well as the interviews allowed for a variety of data sources to be compiled, with general impressions and memorable moments complementing the more in-depth insights into how activists express themselves. We cite interviews by referring to the respective number of the interview and the line of the respective quote (e.g., 2: 34). References to the written material collected in 2019 will be referred to the date published and paragraph (e.g., 08.02., p. 2).

TABLE 1 Number of press releases per month in 2019.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Number of documents	0	7	13	26	9	15	27	10	17	43	21	19

N = 207.

TABLE 2 Interview participant gender and age.

Gender		Age groups			
Men	Women	18−25	26−30	31−60	<60
9	6	4	5	4	2

N = 15.

The two fieldwork methods are complementary; it can be considered that participant observation allows insights into what people do, whereas interviews provide insights into what they say they do. There are limits to both techniques. Participant observation is research in a natural (non-laboratory) setting (Berger, 1998). The researcher can observe the happenings in a natural environment, with the research participants relaxed and in a low-pressure setting, with the logic of explanation to understand social phenomena and social actors *in context* (Post, 2017). The drawback is that one can only observe the physical happenings, as the thought processes, aims, and agendas of the actors are hidden. This can be complemented by qualitative interviews, which explore the interviewees' sense-making and reasoning. The initial analysis of the press releases allowed for dominant themes to be explored, but through conducting semi-structured interviews, we were able to build up a picture of the heterogeneity that runs through the movement, and it was interesting to note also the diversity and subtlety of positions that did not come to light in the earlier analysis of press releases.

The narrative was systematically examined using MAXQDA as a tool for qualitative data analysis. The first part of the project (a review of the press releases from 2019) was part of a larger comparative study of climate movements in Germany and the United States (Rödder and Pavenstädt, 2022). The codebook for the comparative project was deductively developed with categories assumed from a theoretical standpoint. During the course of the project, the team met regularly to ensure reliability. After the initial deductive coding, a further process of inductive coding allowed for a case-specific, data-driven set of analytical categories to be developed (Schreier, 2012).

In what follows, we offer an integrated analysis and presentation of both datasets, using typical quotes to illustrate our points. We address our first research question—how does XR relate to science—by first discussing the use of the notion of "truth" in the movement's narrative (4.1). We go on to describe three distinct positions on science offered by XR through a combination of the fieldwork data and the press releases (4.2). Subsequently, we prepare for the second research question, "How does science's positioning resonate with the movements' overall future construction?", by describing the contours of XR's future narrative (4.3) and alternatives to the science-centred framing (4.4).

4. Findings and analysis

4.1. Tell what truth?

At the end of each press release is a statement reiterating XR's three fundamental demands. Their demands are aimed towards the government, with a change or implementation of policy regarded to be of critical importance.

"Extinction Rebellion's key demands are:

1. The Government must tell the truth about the ecological emergency, reverse inconsistent policies and work alongside the media to communicate with citizens
2. The Government must enact legally binding policy measures to reduce carbon emissions to net zero by 2025 and to reduce consumption levels
3. A national Citizen's Assembly to oversee the changes, as part of creating a democracy fit for purpose."

The first demand deals with the element that a crucial part of the solution is "truth telling". In the second demand, a temporal objective is set, and the target is to achieve net zero carbon emissions. The final demand expresses that these comprehensive changes should be decided through deliberative democracy. In addition to the prominence of the demands in the press releases, the three slogans were also directly quoted and discussed by XR protestors in Glasgow, and they remain the principal demands.

Focusing initially on the first demand, the overarching theme of "tell the truth" forms an integral component of XR's rhetoric. It acts as a generically enticing trope to suggest that there is a truth to be told, a truth that currently exists yet is hidden. This is our first insight into how XR presents science and scientific knowledge: through the centrality of "truth telling". We must "wake up" to the reality provided by climate science; the information exists "yet the science is being ignored" (12.02, p. 6). Acting to enlighten society, Extinction Rebellion are the truth-tellers, or, in their terminology, "rebels". Upholding this distinction, XR offers a strong visual identity, even among the diverse crowd of climate activists present at COP26. The Global Day of Action drew 100,000 people to march through Glasgow; however, the group maintained itself and formed substantial and distinct blocs on the day of mass protest. From the hilly roads, it was possible to see nothing other than a sea of XR flags with their iconic hourglass symbol waving and the characteristic band composed of colourfully dressed drummers. As impossible to ignore as the visual indicators of who is "in" is the understanding that certain others are "out".

Furthermore, the direct actions of activists in the group were interpreted as a means by which the truth could be told,

"In another act of truth telling, today 7 Extinction Rebellion activists glued on to each other in front of HM Treasury." (25.04c, p. 2).

They ascribe their own narrative and purpose as having started a wave of truth telling; they identify truth telling as a part of their origin storey. "We are out of time, Business as Usual is over, the space of truth telling and acting has begun" (23.09, p. 4). The movement regards truth-telling and acting as part of the same deed; it is a performative action. Yet again, it is not clear: what exactly is this truth? One interpretation is that the movement is referring to the historical role of climate movements as working against denialism, which could be clearly seen from the interviews. The primary response to questions regarding the role of science was for activists to state that climate change is real. However, it is also significant that there are no attempts to clarify what precisely is meant by "truth" as the movement continues to utilize the inexact meaning of the word.

Let us ask, what specifically is the "truth" that Extinction Rebellion is looking for? As discussed in the theoretical section, there is a distinction between "scientific truth" and everyday truth, which has its opposite in the form of a lie. Empirically, the claim "tell the truth" presents itself as a broad and imprecise demand, as it also works to juxtapose the dishonest actions and lies that politicians and the media are accused of. "Truth" does not necessarily link back to scientific facts as the truth, but rather the truth that XR, or their audience, wishes to interpret: the truth of the current political system, the truth about the effects of climate change, and the truth of one is not the truth of another, yet this very ambiguity allows the appeal of such a trope to be universal, much like conspiracy theories.

By basing the fundamentals of their argumentation on the assumption that "truth telling" leads to action, XR engages the knowledge deficit model: there exists a lack of knowledge among citizens about the issue and, hence, a lack of coherent political will (Nisbet et al., 2015). The deficit of knowledge is regarded as the problem, and the public should be given access to "the truth". Yet this logic is flawed. By employing a narrative established on fact-based enlightenment, the political position is then covered as a "fact". This works to make political or moral positions invisible in order to gain legitimacy. In the case of XR, it has led to an apolitical standpoint whereby solutions are not offered beyond the telling of the truth and giving the power back to the people in the form of a citizen assembly. However, what lies within this offer of truth is no option other than to accept the truth as offered by XR.

4.2. What has science got to do with it?

As discussed above, the notion of science and scientific knowledge is inherently implied in Extinction Rebellion's first demand. Considering the centrality of this message, one of the most striking insights from the analysis of the web content from 2019 was that *explicit* mentions of scientific evidence, quotations from scientists, or references to the IPCC were seldom found in the main body of a press release. However, by conducting problem-centred interviews with activists in Glasgow, we were able to directly ask questions pertaining to the role of science and gain more detailed insights on where activists place science in their narrative. Here, we overview the most prominent perspectives that came to light and identify three main positions that the activists held

on science. These positions are in some instances contradictory, reflecting the variety of voices that affiliate with XR and echoing the historical ambivalence that environmental movements have had towards science. They can be categorised as (1) science as problem defining, (2) science as problem addressing, and (3) ambivalence and mistrust towards science.

4.2.1. Science as problem defining

Although in the course of an interview activists tended to discuss various aspects of science, it is significant that the primary response was to assert the credibility of climate change:

> "We've got like 100% agreement within the scientific community that the climate crisis is a human created issue." (46: 24).

As noted, the press releases included minimal referencing to science; however, whenever such allusions to science did occur, they acted to enforce this problem-defining role. Activists were keen to emphasise that climate change is real, and scientific knowledge was accredited for providing the basis of awareness on the issue.

This is illuminating in several ways. First, the narrative presents climate change as an established scientific fact. The historical affinity between environmental activists and scientific knowledge (Yearley, 1996; Jasanoff, 1998) is clearly demonstrated here. Furthermore, the activist in this quote infers that scientists are a homogenous and consensual body. This could be seen again, with one activist claiming "XR is a movement that follows science one on one" (15: 26) indicating both the founding centrality of science to the movement and simultaneously describing science as a unity. Other examples of this include the repeated referencing of the IPCC to substitute all science and an illuminating phrase supplemented at the end of every press release as part of a standardised appendix: "Societal collapse and mass death are seen as inevitable by scientists and other credible voices, with human extinction also a possibility, if rapid action is not taken" (08.02, p. 3). In this key sentence, scientists are given the role of predicting societal collapse and mass death, a significant responsibility. XR legitimises their claims by using the authoritative role of scientific research to lend weight to the call for rapid action.

The first notable role of science is that it provides means of defining the problem, and this is done in a manner to imbue science with the tone of authority, self-evidence, and unquestioning, "The UN's Intergovernmental Panel on Climate Change just told the world what our future looks like" (14.02, p. 2). There is no room for doubt or alternative outcomes, with the unitary body of science used to impress the singular consequence of doom, "This is real. The science is done. We are going to experience hell if this is not sorted" (09.03, p. 3). The problem is defined as a consequence of not following the advice of scientists, "We have climate scientists. And nobody is listening to them" (09.03, p. 2). Despite this simplistic presentation, in the course of 2 weeks of participant observation as well as interviews, activists demonstrated an appreciable level of understanding of complex aspects of climate science, such as being familiar with the concept of tipping points. This demonstrates

that the movement has successfully created spaces of learning and education for its members (Jamison, 2010), even if the nuances behind the sources of information are not fully interrogated (for reasons strategic or otherwise).

4.2.2. Science as problem addressing

The second position can be thought of as problem addressing; how does XR imagine science assisting in addressing the issue? The material shows the prevalence of the linear, evidence-first model as a theory of change. The evidence-first model relies on the assumption that there is a knowledge deficit causing the lack of political action. By supplying this information and lending weight to the scientists' voices, an agreement can be reached. An example comes from an interview in which the interviewee expresses the conviction that scientific knowledge cannot be disregarded: "Knowing all the science, that's what you really can't ignore" (4: 86–87). Scientific knowledge is afforded the position of underpinning action on the part of politicians:

> "Sustained education of people I think is, like you can hear 1.5 degrees once and it doesn't really mean much, but you really have to keep hammering through those same statistics. Being aware of the facts, and hammering that through is really important." (20: 66).

This activist is of the opinion that as long as the information is "hammered through" hard enough, there will eventually be a point when people treat the issue with more severity. Following on from this is the positioning of scientists in a place of leading authority:

> "It's highly necessary for people to see the faces of the people who have dedicated their lives to studying this crisis. And they're the ones who know more than anyone how urgent this issue is." (20: 64).

In the technocratic approach, scientists are given a dominant role, and scientific expertise provides the foundation for policy-making. We noted this authoritative role during the participant observation, with the promotion of speakers with academic accreditations being emphasised.

The aspect of problem addressing can also be seen in the role that science and technology play in the development of solutions, with activists discussing the role of green technologies and the need for research and development in this sector. This extended over a range of criticisms, with some activists viewing wealthy countries as responsible for investing in the development of sustainable technology:

> "A country like Britain has a big role because we have such a well-developed science and research sector that we really ought to be taking a lead on developing alternative fuel sources and an alternative to plastic and so on." (1: 38).

Events in Glasgow demonstrated yet another aspect of how science falls into the category of "problem addressing" for XR, in the physical protest of members of XR's "Scientist Rebellion", a number of whom were arrested in the course of the Global Day of Action.[5] Away from the mass of 100,000 activists marching on this Saturday of the mid-conference weekend, 21 protesters from Scientist Rebellion chained themselves together on the King George V Bridge in the city centre. The news media quoted them from their Twitter accounts as saying, "scientists could not 'rely on our leaders to save us anymore' and felt a 'moral duty to act'", and "Over 15,000 scientists declared that we're in a climate emergency, but most aren't acting as if it's an emergency."[6] On Twitter, the activists proclaimed that "Today's protest was the largest number of Scientists ever arrested for climate direct action, proving that Scientists can lead by example in the fight for a future!".[7] The "first ever mass arrest of scientists over the climate crisis", in the words of an activist, also made it onto the pages of Nature News (Thompson, 2021). In addition, the activists documented news coverage of their actions on social media.

4.2.3. Ambivalence and mistrust towards science

The third position taken by activists was one in which the nuance of science could be recognised. Although a less common standpoint, some activists expressed science as heterogeneous and complex, being fed by and related to other social and political power structures. Here, we see suspicion about the motives of scientists and the articulation of mistrustful views, along with the conflation of science with technology. Mistrust was also conveyed as being more integral; more radical activists in Glasgow were keen to pin the origin of the climate crisis on the industrial revolution. In one exchange with an activist on the role of science, they summed up the issue as:

> "We're looking at scientific advances to solve a problem that was caused by scientific advancements." (46: 24).

Another activist questions which factors drive scientific research, suggesting that economics exerts substantial influence on scientific work and, furthermore, that the scientists themselves are morally responsible for resisting this force and prioritising utility over profit. Alternatively, the mistrust could be directed at a specific type of technology development:

> "I also have very little faith in Carbon Capture and Storage, which has promised a lot and delivered very very little." (5: 47).

Other activists were concerned that focusing on technical fixes would act as a distraction and result in leaving broader matters of social justice out of the conversation. This illustrates an interesting aspect of activists reflecting on the broader situated position of science and scientific knowledge, which is that it opened up the discussion and permitted space for underlying social structures and matters of climate justice to be articulated.

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5 https://www.nature.com/articles/d41586-021-03430-5 (accessed October 5, 2022).

6 https://www.bbc.co.uk/news/uk-scotland-59185007 (accessed October 5, 2022).

7 https://twitter.com/ScientistRebel1/status/1457052349336281094 (accessed October 5, 2022).

> "I think we talk a lot about technical solutions, as if climate change is just a mere sort of calculation of the amount of CO2 levels in the air. But of course the climate change issue that we're in is caused by a social situation which is a situation of inequality, of oppression, of colonialism, neo-colonialism, and patriarchy. A bright climate future for me would be a socially just future, a place where people can live with equal rights and without oppression." (15: 18).

This activist refuses to define climate change as purely a matter of increasing CO_2 levels but rather tries to situate the issue within a wider social context. They show a recognition that there is a range of elements tied up in the matter, and the need to centralise a discussion of wider social justice in order to progress. In another interview, an activist expressed the view that science has provided the case for decarbonisation, but the implementation of policy is not determined by this information:

> "Climate science has done a really good job of showing us what needs to be done, but the solution is political." (05: 47).

Here, they recognise that scientific knowledge has played an important role but is not sufficient to enforce a change. The prevalence of greenwashing and strong rhetoric from companies preaching green credentials led some activists to counter this discourse with a measured approach to the role of science:

> "There's a part of me that is very apprehensive to say that sort of "science will get us out of this". Science will be a part of the solution but there's no silver bullet that's going to be invented tomorrow that will solve all this." (8: 35).

The activists situate science as one piece of the puzzle. Instead of looking for solutions just in technology, they feel that exploring the democratic participation of citizens and addressing existing social inequalities are better solutions. The third demand of XR calls for the creation of "a Citizen's Assembly to deliberate decisions about the most effective way for the UK to become carbon-neutral by 2025" (14.02, p. 2). By describing such an assembly as a "tool for facilitating a conversation in a large crowd to ensures that all voices are heard" (20.04, p. 6), XR appears to promote a diverse discussion—within limits. XR is seeking a reformation, not a revolution, and their third demand to "go beyond politics" nonetheless is situated within the framework of our existing market. XR attempts to bypass partisan politics by expressing climate change as a scientific issue.

> "Party politics is failing to deliver solutions—the Government must allow democracy to be strengthened with a Citizens' Assembly with legislative power. Randomly chosen citizens, informed by experts and allowed to deliberate, will have the courage to make the necessary decisions." (09.10b, p. 10).

However, what could be seen as an act to return power to the people is in fact constrained to work inside the existing political structures, as the centring of technocratic experts is a condition of the citizen's assembly. The solution thus acts to reinforce the depoliticisation of the debate.

4.3. Future positioning: Deadlinism and apocalypse bound

This section looks at the movement's future scenarios and, in particular, what the implications of the narrative situating the issue of climate change as a crisis with an apocalyptic future are. The advantage of collecting fieldwork, as well as a basis of written content, is that it allowed the heterogeneity of the movement to be documented. The press releases comprised of prose that was presented as having a singular author, "Extinction Rebellion", and was assumably edited and approved before publication. However, through talking to activists, it was clear that people affiliate with the group for a wide range of reasons, with some activists being particularly critical or self-reflective. However, it was interesting to see the saliency of apocalyptic language, despite the movement comprising heterogeneous actors.

A cornerstone of XR's future vision stems from the second demand of the group:

> "The Government must enact legally binding policy measures to reduce carbon emissions to net zero by 2025 and to reduce consumption levels."

Here, the concept of a fixed deadline is established, with a corresponding limit to the future. Various themes were established in the storey; references to time were used as recurring motifs that were perpetually implemented in the narrative, such as framing the issue primarily with urgency and requiring critical action. Although several terms were used to refer to climate change or global warming, most notable was the use of the word "crisis" or, moreover, the term "Climate and Ecological Emergency", a finding consistent in both the written data and in the fieldwork. Both serve to reinforce the sense of urgency. Aiding this theme, a further differentiation could be made in terms of a supposed deadline. Implementing a temporal aspect to events was common, with the sentiment "act now" used in the framing of actions. Poignant slogans on marches such as "Are we the last generation?" (19.04, p. 1) act to further reinforce the approaching deadline, with the suggestion being that there is nothing to hope for when a certain threshold is passed.

This was then used to add an element of pressure on actors, either political or the public: "we are running out of time. We have only one choice before us: Extinction or Rebellion" (06.05, p. 3). Accentuating the name of the movement was also a tactic used by protestors in Glasgow, with a standard call-and-response chant of "Extinction!"—"Rebellion!". The two components of the movement's name were used to verbally balance each other, encouraging resistance as the response to impending doom. However, the narrative focus on destruction tipped this balance in favour of extinction. Moreover, the deadline was given further gravity and legitimacy as science was used to justify feelings of alarm: "Scientists are despairing because we are almost out of time. They are telling us to panic" (04.10, p. 3).

On the one hand, for a movement whose very name references the end of life, the use of rhetoric leading back to images of apocalyptic visions is somewhat unsurprising. On the other hand, that these extreme visions are so readily shared by activists retains a certain shock factor, even as a researcher. In one instance, when asking an activist how they envisaged the future, they bluntly responded:

> "Billions dead, millions dead you know, it's just the body count which changes really." (5: 45).

It is somehow different to read about the expectation that the world is ending and to talk to people who are convinced that this is the outcome. Yet the conviction that we are on a path to doom was not only expressed verbally but could also be seen visually at the climate conference. A very real reminder of the approaching cut-off point was on display in Glasgow, at the end of the Global Day of Climate Action, a "deadline" clock was projected onto a tower. It read "7 years, 258 days, 3 h, 4 min, 2 s" as the projected "time left" to limit global temperature rise to 1.5 degrees, with the display changing in real-time. As noted earlier, the IPCC special report on the 1.5 degree warming was used by the movement as part of its origin storey and was used as a justification for the inception of the group. The information published in this same report was interpreted by XR as setting a definitive cut-off point for action, referenced also in the press releases and emphasised during actions, such as:

> "30 rebels stage a timed die-in at 11 am for 11 min with 11 bodies because we only have 11 years left." (17.02, p. 2).

4.4. What, if not science? Justice and the development of the discourse

In the press releases, science was presented as a uniform body elevated to a position of authority that should be accepted and followed. Data collected through fieldwork revealed three positions of activists' relation to or description of science, offering a more nuanced and sometimes contradictory picture. The combined analysis of both datasets revealed a portrayal of science that is not as simple as that narrated solely in the press releases. This raises the question then: if science is not responsible for leading the change in climate action, then who is? Which other actors are assigned responsibility? What are the theories of change expressed in the narrative?

The rallying calls for activism in April 2019 were repeatedly characterised as actions intended to "shake awake our fellow human beings who are sleepwalking into disaster" (30.03b, p. 3). Invoking the connotation that fellow human beings, or the public, are sleepwalking is interesting on a few accounts. First, it implies that there is a lack of knowledge in the public about the "climate crisis". By characterising the public as unaware of the imminent "disaster", that faces them, it is assumed that a lack of knowledge has led to this position, and thus must be remedied by a wake-up call provided by Extinction Rebellion. These narrative tropes were found both in the press releases in 2019 and pervaded the discourse of 2021. When asked what the role of XR is, one activist responded:

> "Partly there is a responsibility of whistleblowing, of raising the alarm." (8: 29).

Another activist felt that:

> "Eventually humanity will wake up and change, but only after it's too late." (46: 30).

Following the characterization of "sleepwalking" is the assumption that the public does not know about the issue. This disregards another explanation, for example, that the climate issue is simply not considered to be of the highest importance to some members of society. By placing a dichotomy of one enlightened group (XR) and one ignorant party, the narrative disallows the possibility that some parts of the public do not feel they have a responsibility to engage in civil disobedience despite being in possession of relevant information. Nevertheless, the public is then later offered the opportunity, and indeed an obligation, to engage in their proposed solution—the implementation of a Citizen's Assembly. By choosing this approach, XR implicitly places responsibility on the public. This calls into question the authenticity of the proposed solution of a Citizen's Assembly. Is this simply an act of placation? If the bones of XR's narrative hold the public in a place of moral low ground based on ignorance, why should it then be held as consistent that these people are also the very means of resolution?

Therefore, if one were to assume that this lack of action is indeed due to a deficit of knowledge, where does this line of reasoning follow? In a linear model of cause and effect, the solution to the issue is found in obtaining information. Understanding, in the sense of both literacy (access to knowledge in a certain area) and acceptance (the information regarded as valid), then makes the political dimension invisible. Citizens are treated as rational thinkers that can respond to information in expected ways (Bolsen and Shapiro, 2017). By ignoring the underlying social structures that influence the acceptance of knowledge and the role that these structures have in social action, an integral key to understanding the problem is lost (Grundmann and Rödder, 2019).

The authenticity of solutions based on participatory democracy is again called into question based on the disdain for the public that was expressed by some activists. The superior mind-set perpetuated by the rhetoric of "sleepwalking" present in the press releases in 2019 reached a natural evolution as the public was represented in an interview as being the cause of the problem:

> "If I was to put blame on anybody it would definitely be the people." (46: 20).

Additionally, one activist explaining the concept of Citizen's Assemblies made a differentiation between the right and wrong sort of citizen:

> "Hopefully you'll get the right witnesses and then they can get to the truth, they can get actual experts as opposed to, people who think that vaccines are full of microchips, those people that aren't very helpful." (7: 63).

Complementing the rhetoric of XR "rebels" ringing the alarm for a sleepwalking nation is the theme of sacrifice. Common to both datasets was the notion that those in the movement had the moral obligation to sacrifice something in order to achieve their aims. This could be their liberty, as a common XR tactic is to maximise the number of people that are arrested at actions. Alternatively, it could be their lifestyles that they must give up. Within the scope of solutions suggested by protestors, the importance of individual choices such as following plant-based diets was noted. One activist said:

> "We're looking at people actually making sacrifices. And people are actually willing to realise now that there are things that we can live without and we don't have to consume constantly." (46: 14).

We offer a critique of the attitude of sacrifice on two accounts. First, by assuming the position of being sacrificed, the XR activists are acting as saviours for the rest of humanity. This fosters the implication that there exists a hierarchy between citizens: those that are saving and those that are being saved. By creating a division between those that join the movement and those that do not, there is again a disregard shown for the differentiated communities that make up the United Kingdom and the various priorities, worldviews, and socio-economic conditions that influence participation in such a movement (Bell and Bevan, 2021). Second, it centers on a theory of change on an individual basis. By focusing on individual choices, the production processes, industries, and infrastructures that constitute the majority of emissions are neglected (Stuart, 2022). The ingrained dependence that the political, economic, and technoscientific structures in our society have on fossil fuels is not one that can be so easily disentangled and requires a systemic analysis (Fahy, 2020).

However, again, it is important to note the heterogeneity within the movement, as demonstrated in some circles, where the narrative has evolved since 2019 to deal with questions of justice. For example, one activist critically reflected on the notion of raising the alarm:

> "So there's raising the alarm. I don't think it will ever be fully achieved, there will always be someone who maybe could know more about this or that. I think now a focus need to shift away from that and towards platforming other groups, platforming other solutions that are promoting climate justice." (8: 29).

Here we see a cognitive distancing from the characterisation of "raising the alarm", as the activist chooses to centre marginalised and frontline activists, rather than the prototypical "rebel", thus creating a broader understanding of what "other solutions" may work.

5. Discussion

The results have shown that XR use science and scientific knowledge to add legitimacy to their claims and justify their actions. Science is presented as a homogeneous and consensual block, and their narrative revolves around rebels telling a sweeping and undefined truth. Perpetuating the representation of science as an authority also defines the participants of the movement as enlightened and encourages technocratic solutions, with the ideal proposal being the formation of an expert-led citizen's assembly. At the same time, pressure is exerted by a specified temporal limit beyond which societal collapse and mass death are inevitabilities, a claim supported by scientific authority. The development of the narrative saw an increase in referencing climate justice, but the analogy of a sleepwalking public remained pervasive. The following section pulls apart the web of this rationale to make sense of the process of mobilising expertise and to explore the limits of centring scientific knowledge in this manner. Here we examine which mechanisms can lead to depoliticisation and see how this impacts the imagination of climate futures.

First, let us turn to the temporal boundary and theme of mass destruction. The pervasiveness of apocalyptic themes is evident, but what effect does XR have by shaping their narrative around a crisis, a time limit, and a looming apocalypse? Social movements are naturally concerned with bringing about change in the face of what is perceived to be a problematic issue. Starting from concern over the lack of political action on climate change and a desire to see change, XR has developed a fixation on a deadline or time limit in their narrative. This is evident, for example, in their second demand, in which the movement sets a time window for achieving net zero carbon emissions by 2025. This notion was further emphasised as a common theme in demonstrations, with the ticking countdown clock in Glasgow serving as an emblematic example. With the near-focused aim of 2025 to reach their goals, what does the post-2025 world look like? Here we can use the notion of climate reductionism to explore the impact of apocalyptic visions. Hulme (2011) defines this term as when climate acts as the dominant factor that shapes human life and societal futures. Climate reductionism is a form of neo-environmental determinism: humans make choices but are ultimately restricted by nature (Hulme, 2011). By enforcing a temporal boundary, XR adheres to the concept of climate reductionism, with the impact that human agency is restricted. The freedom to explore alternative visions is impeded by the propensity for apocalyptic ones, with XR ultimately conveying that degrees of human agency are obsolete due to the climate.

This works to contradict, or rather, to demonstrate the limits of prefigurative politics. Climate (and other social) movements are inherently preoccupied with future happenings, whether from short-term demands or utopic visions. One way to analyse this aspect is through the notion of prefigurative politics, that is, the theory of change that takes actions in the present to embody and trigger a shift to a new paradigm; activists work to alter the future through their conduct and active practise (Evans, 2021). Contrary to Evans' (2021) claims that the organisational structure and direct actions of XR amount to a prefigurative approach, the movement acts to contradict the opening of futures by inherently adopting climate reductionism. XR presents a future vision that is deficient in the recognition or expectation of humans to change or shape the future. To take this critique further, Malm condemns apocalyptic soothsaying as having prefigurative power in the opposite sense: "Climate fatalism is a performative contradiction. It does not passively reflect a certain distribution of probabilities but actively

affirms it" (Malm, 2021, p. 142). The active affirmation of societal collapse as inevitable works to create discursive and imaginary lock-ins. The narrative expressed by XR, which envisages an impending apocalypse and places scientists in a technocratic role, therefore restricts political pathways.

Using language intended to invoke emotional responses of fear, "Scientists are despairing because we are almost out of time. They are telling us to panic" (04.10, p. 3), is a scare tactic that has been shown although good for gaining attention, not an effective method to induce genuine engagement (O'Neill and Nicholson-Cole, 2009). Terms such as "climate chaos", "climate breakdown", and "climate emergency" frame the "climate crisis" as a universal humanitarian threat that leads to "societal collapse" in yet another example of the reductionist framing used by XR. The setting of this as a pervasive danger is socially homogenising (Swyngedouw, 2011), and the differences that exist on a geographical or socio-economic level are obscured. Critics of scarcity discourse argue that by implementing a time limit, we risk "inhibiting our cognitive capacity to imagine human life beyond the prevention of dangerous climate change" (Asayama, 2021, p. 11). It is presenting climate change as a strictly technical issue, one with a determined life span, and hence it follows that it can be solved in a technical way. This then contradicts any notions of climate justice that XR attempted to cultivate, as the social factors are omitted.

Pepermans and Maeseele argue that establishing climate change in terms of scientific consensus obscures the social web of assumptions, values, and interests that underlie this representation. This consequently hinders discussions of alternative political pathways that lie outside a neoliberal market economy and, at the same time, discourages political engagement (Pepermans and Maeseele, 2016). Furthermore, the solutions put forward by XR encompass various approaches of "depoliticizing communication strategies" (Pepermans and Maeseele, 2016). Primarily, this can be seen in the presentation of science and scientific knowledge as a homogenous body with supreme authority. The technocratic model aims to remove political obstacles from the debate by focusing solely on science. To address the knowledge deficit, scientists are invoked as being responsible for disseminating information about climate change in order to foster social consensus. The assumption is that scientists and scientific knowledge are held distinct from the other structures that constitute the "rotten" system, affording them an authority that overrides that of other institutional authorities. Namely, the authority of the government is simultaneously depreciated through its "criminal inactions" (note here the use of legal authority to validate the claim) and reinforced by XR directing their demands solely at the government.

Part of the basis of the consensus-building perspective is that climate change is considered materially to be a physical phenomenon, which can be measured and regulated primarily in the domain of scientific expertise. Scholarship has indicated the potential benefits of citizen assemblies for increasing policy support and overcoming polarisation (Dryzek et al., 2019; Kuntze and Fesenfeld, 2021). Despite acknowledging their potential as a deliberative format, our interpretation as part and parcel of a technocratic approach is informed by the specific context in which XR introduces the assembly as a solution: the diagnosis of an information deficit, which can be overcome through assemblies at which citizens debate and decide among different pathways and solutions already laid out by the experts. By differentiating

between the "right witnesses" and "actual experts" who should partake in a citizen assembly, XR favours hierarchical structures in which scientists hold a position of authority that supersedes that of other voices, undermining the principle of democracy that they claim to champion. Wells et al. (2021) study on assemblies in the United Kingdom indeed found that assemblies increase momentum and consensus around pre-existing policy options rather than creating innovative, citizen-centred policies. Likewise, Sandover et al. (2021, p. 76) conclude that they entail "minimal challenges to the authority of existing institutions".

Preferring consensus to ideological divisions and attempting to universalise their political demands, XR thus subscribes to Swyngedouw's definition of a post-political structure (Swyngedouw, 2011, 2022). Smiles and Edwards argue that as long as XR distance themselves from political frames, their commitment to climate justice can only exist on a surface level (Smiles and Edwards, 2021), with "political" here referring to the economic systems and power structures which shape our environment. The movement's self-image as "beyond politics" reaffirms the analysis of climate change as a physical issue, with consequences that are unequally distributed as an unfortunate side effect. Exploring the reasons for the existence and development of differentiated vulnerability is therefore avoided (Smiles and Edwards, 2021). It also legitimises the proliferation of market solutions that fit within the existing system (Swyngedouw, 2011) and obscures "corporate complicity in prolonging climate inaction" (Smiles and Edwards, 2021). By remaining resolutely apolitical, XR fails to offer meaningful critique on the pursuit of economic growth and neoliberal structures, which ultimately constrain society's potential to reduce greenhouse gas emissions (Stuart, 2022).

Whilst seemingly contradictory for a climate activist movement to both oppose and maintain the current socio-ecological condition, Swyngedouw (2022) comprehensively identifies that both "most mainstream as well as many radical climate discourses, practise, and policies are formally similar to populist arguments and should be considered as an integral part of a deepening process of post-politicization" (p. 1, 2022), many aspects of which are also present in the XR narrative. For example, by directing demands at a political elite and situating the climate in a reductionist role, which ultimately constitutes a universally experienced threat (Hulme, 2011; Swyngedouw, 2022) XR fulfils these criteria. A consequence of this is "a particular form of populism that obscures the power relations responsible for the growth of greenhouse gas emissions" and preserves the status quo (Swyngedouw, 2022).

6. Conclusion

Environmental movements are tied to science and scientific knowledge by a historical dependency that is unlike that of other social movements. By prioritising the claim "tell the truth", the narrative of XR follows the linear model of the relationship between science and policy often put forward in the climate debate. Haunted by the trauma that exists in climate movements from decades of countering climate denialism, the activists seek to legitimise their claims by presenting science and scientific knowledge as a consensual and singular front. Activists claim that "this is a rebellion against a system that is rotten to its core" (14.03, p.

3), yet science is elevated and somehow distinct from this rotten system. This positioning is consistent with the role of science in the narratives of XR's German and US factions as well as in other new climate movements such as Fridays for Future and the Sunrise Movement (Rödder and Pavenstädt, 2022). However, science can only be a point of departure for political questions central to climate action, and therefore this flawed logic acts to depoliticise the climate discourse. XR further fosters this depoliticised environment by claiming to "go beyond politics". By pushing for an expert-led Citizens' Assembly and not allowing for complexities within the narrative on science, they presuppose the relationship between science and politics as predetermined and fixed. Affording experts this defining role upholds the epistemic and institutional authority perpetuated by the IPCC.

Impending catastrophe is afforded saliency in the overarching narrative arc, with a focus on an upcoming deadline. The storey is bound to a temporal horizon, thus inherently limiting the extent of XR's vision. The looming apocalypse works to push hypothetical choices and political will to unequivocal necessities, limiting the scope of future visions explored. We are waiting for "societal collapse", but this future vision is imagined as an event, rather than the lived everyday reality that many people are already experiencing. Despite an increase in references to Indigenous peoples and communities that are resisting on the frontlines of climate change, XR's engagement with climate justice rings hollow. They offer a one-dimensional image of what constitutes a "rebel"; the heroes of their storey sacrifice themselves and wake up their sleeping counterparts, with undertones of enlightenment and saviourism running through the narrative. Yet XR "rebels" do not represent the sole resistors against climate change and capital. Engaging with climate justice on a surface level means that the perspectives and techniques employed by those who continue to resist after the end of their world are left out of view.

This study contributed to the understanding of the particular manner in which the climate movement is tied to science; nonetheless, understanding this special relationship would benefit from further research, particularly considering the use of science and technology in solutions that the movement may find problematic. Do the mechanisms that foster reductionist approaches operate in a similar way on the other end of the debate, such as with techno-optimism? In terms of the British movement, XR is worth considering as a parent group or springboard from which further action arose, but it would be also worthwhile to consider the nascent movements Just Stop Oil and Insulate Britain. With the demands and even names of these groups relating to very specific policy proposals, it is compelling to ask if the climate movement in the United Kingdom is moving away from relying on science as a cultural authority and instead focusing its attention more centrally on the political arena. Furthermore, current political activism in the United Kingdom is being driven by industrial strike action from various sectors. Will the climate movement attempt to support or make alliances with the labour and other social movements in their fight for climate justice?

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical review and approval was not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants in accordance with the national legislation and the institutional requirements.

Author contributions

EKH and SR conceptualised the research project. EKH collected and coded the press release data and drafted the article. Both authors did fieldwork and interviews in Glasgow, were involved in analysing the data and revised it. Both authors contributed to the article and approved the submitted version.

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The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

Asayama, S. (2021). Threshold, budget and deadline: Beyond the discourse of climate scarcity and control. *Clim. Chang.* 167, 1–16. doi: 10.1007/s10584-021-03185-y

Aykut, S. C., Pavenstädt, C. N., Datchoua-Tirvaudey, A., D'Amico, E., Braun, M., Karnik Hinks, E., et al. (2022). *Circles of Global Climate Governance: Power, Performance and Contestation at the UN Climate Conference COP26 in Glasgow* (CSS Working Paper Series 4).

Beck, S., and Mahony, M. (2018). The IPCC and the new map of science and politics. *WIREs Climate Change* 9, 16. doi: 10.1002/wcc.547

Bell, K., and Bevan, G. (2021). Beyond inclusion? Perceptions of the extent to which Extinction Rebellion speaks to, and for, Black, Asian and Minority Ethnic (BAME) and working-class communities. *Local Environ.* 26, 1205–1220. doi: 10.1080/13549839.2021.1970728

Berger, A. (1998). *Media Research Techniques*. Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781452243160

Berglez, P., and Olausson, U. (2014). The post-political condition of climate change: an ideology approach. *Capitalism Nat. Socialism* 25, 54–71. doi: 10.1080/10455752.2013.845588

Blühdorn, I., and Deflorian, M. (2021). Politicisation beyond post-politics: new social activism and the reconfiguration of political discourse. *Social Movement Stud.* 20, 259–275. doi: 10.1080/14742837.2021.1872375

Bolsen, T., and Shapiro, M. A. (eds.). (2017). "Strategic framing and persuasive messaging to influence climate change perceptions and decisions," in *Oxford Research Encyclopedia of Climate Science* (Oxford: Oxford University Press). doi: 10.1093/acrefore/9780190228620.013.385

Brown, M. (2016). "Environmental science and politics," in *The Oxford Handbook of Environmental Political Theory,* eds Gabrielson, T., Hall, C., Meyer J. M. and Schlosberg, D. (Oxford: Oxford University Press), p. 491–504. doi: 10.1093/oxfordhb/9780199685271.013.1

Buller, A. (2022). *The Value of a Whale: On the Illusions of Green Capitalism.* Manchester: Manchester University Press. doi: 10.7765/9781526166036

Carroll, W. K. (2021). *Regime of Obstruction: How Corporate Power Blocks Energy Democracy*. Athabasca: Athabasca University Press. doi: 10.15215/aupress/9781771992893.01

Davis, J. E. (2002). *Stories of Change: Narrative and Social Movements*. Albany: State University of New York Press.

de Moor, P., de Vydt, J., Uba, M. K., and Wahlström, M. (2021). New kids on the block: taking stock of the recent cycle of climate activism. *Social Movement Stud.* 20, 619–625. doi: 10.1080/14742837.2020.1836617

Doherty, B., Plows, A., and Wall, D. (2007). Environmental direct action in Manchester, Oxford and North Wales: a protest event analysis. *Environ. Polit.* 16, 805–825. doi: 10.1080/09644010701634182

Dryzek, J. S., Bächtiger, A., Chambers, S., Cohen, J., Druckman, J. N., Felicetti, A., et al. (2019). The crisis of democracy and the science of deliberation. *Science*, 363, 1144–1146. doi: 10.1126/science.aaw2694

Edwards, N. (2016). "Downscaling: from global to local in the climate knowledge infrastructure", in *Infrastructures and Social Complexity: A Companion,* eds Harvey, C., Jensen, P., and Morita, A. (Milton Park: Routledge), p. 339–351.

Evans, H. (2021). Beyond resistance: the role of prefiguration in social movements addressing the climate crisis. *Bath Papers Int. Develop. Wellbeing* 66, 1–29.

Faehnrich, B. (2018). Digging deeper? Muddling through? How environmental activists make sense and use of science—an exploratory study. *J. Sci. Commun.* 17, A08. doi: 10.22323/2.17030208

Fahy, D. (2020). Energy humanities: insights for environmental communication. *Environ. Commun.* 14, 712–716. doi: 10.1080/17524032.2020.1758377

Fine, G. A. (2020). Now and again: eventful experience as a resource in senior activism. *Soc. Movement Stud.* 19, 576–591. doi: 10.1080/14742837.2018.1555753

Gardner, P., Carvalho, T., and Valenstain, M. (2022). Spreading rebellion? The rise of extinction rebellion chapters across the world. *Environ. Sociol.* 8, 1–12. doi: 10.1080/23251042.2022.2094995

Goodson, I. F., and Gill, S. R. (2011). The narrative turn in social research. *Counterpoints* 386, 17–33.

Grundmann, R., and Rödder, S. (2019). Sociological perspectives on earth system modeling. *J. Adv. Model. Earth Syst.* 11, 3878–3892. doi: 10.1029/2019MS001687

Gunningham, N. (2019). Averting climate catastrophe: environmental activism, extinction rebellion and coalitions of influence. *King's Law J.* 30, 194–202. doi: 10.1080/09615768.2019.1645424

Hulme, M. (2011). Reducing the future to climate: a story of climate determinism and reductionism. *Osiris* 26, 245–266. doi: 10.1086/661274

Hulme, M., and Mahony, M. (2010). Climate change: what do we know about the IPCC?' *Prog. Phys. Geogr.* 34, 705–718. doi: 10.1177/0309133310373719

Jamison, A. (2010). Climate change knowledge and social movement theory. *WIREs Clim. Chang.* 1, 811–823. doi: 10.1002/wcc.88

Jasanoff, S. (1998). "NGOs and the environment: from knowledge to action," in *Beyond UN Subcontracting,* eds Weiss, T. G. (London: Palgrave Macmillan UK), p. 203–223. doi: 10.1007/978-1-349-26263-2_10

Kuntze, L., and Fesenfeld, L. (2021). Citizen assemblies can enhance political feasibility of ambitious climate policies. *SSRN Electron. J.* doi: 10.2139/ssrn.3918532

Malm, A. (2021). *How to Blow Up a Pipeline.* New York: Verso Books.

Merton, R. K. (eds.). (1973). "The normative structure of science," in *The Sociology of Science: Theoretical and Empirical Investigations (3rd edn)* (Chicago: University of Chicago Press), p. 267–278.

Miller, C. A. (2004). "Climate science and the making of a global political order," in *States of Knowledge: The Co-Production of Science and the Social Order,* eds Jasanoff, S. (Milton Park: Routledge), p. 46–66.

Nisbet, E. C., Cooper, K. E., and Ellithorpe, M. (2015). Ignorance or bias? Evaluating the ideological and informational drivers of communication gaps about climate change. *Public Understand. Sci.* 24, 285–301. doi: 10.1177/0963662514545909

Nisbet, M. C. (2010). "Knowledge into action: framing the debates over climate change and poverty," in *Knowledge Into Action: Framing the Debates over Climate Change and Poverty. Doing news framing analysis: Empirical and theoretical perspectives,* eds D'Angelo, P., and Kuypers, J. A. (Milton Park: Routledge), p. 43–83.

O'Neill, S., and Nicholson-Cole, S. (2009). "Fear Won't Do It". *Sci. Commun.* 30, 355–379. doi: 10.1177/1075547008329201

Pathak, M., Slade, R., Shukla, R., Skea, J., Pichs-Madruga, R., Ürge-Vorsatz, D., et al. (2022). *Technical Summary. Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. (Advance online publication).

Pepermans, Y., and Maeseele, P. (2016). The politicization of climate change: problem or solution?' *WIREs Climate Change* 7, 478–485. doi: 10.1002/wcc.405

Pickard, S. (2021). You are stealing our future in front of our very eyes. The representation of climate change, emotions and the mobilisation of young environmental activists in Britain. *E-Rea* 18, 17. doi: 10.4000/erea.11774

Polletta, F. (1998). Contending stories: narrative in social movements. *Qualitative Sociol.* 21, 419–446. doi: 10.1023/A:1023332410633

Polletta, F. (2002). "Plotting protest: mobilizing stories in the 1960 student sit-ins," in *Stories of change: Narrative and social movements*, eds Davis, J. E. (Albany: State University of New York Press), p. 31–51.

Polletta, F., and Gardner, B. G. (2015). "Narrative and social movements," in *The Oxford Handbook of Social Movements,* eds Della Porta, D., and Diani, M. (Oxford: Oxford University Press), p. 534–548.

Post, S. (2017). "Methods for assessing journalistic decisions, advocacy strategies, and climate change communication practices," in *The Oxford Encyclopedia of Climate Change Communication*, eds Nisbet, M., Ho, S., Markowitz, E., O'Neill, S., Schäfer, M., and Thaker, J. (Oxford: Oxford University Press). doi: 10.1093/acrefore/9780190228620.013.493

Rödder, S., and Pavenstädt, C. N. (2022). Unite behind the Science! Climate movements' use of scientific evidence in narratives on socio-ecological futures. *Sci. Public Policy* 50, 30–41. doi: 10.1093/scipol/scac046

Rohden, F. (2021). Experts, influencers, and amplifiers: exploring climate movements' hyperlinking practices. *J. Sci. Commun.* 20, A09. doi: 10.22323/2.20070209

Sandover, R., Moseley, A., and Devine-Wright, P. (2021). Contrasting views of citizens' assemblies: stakeholder perceptions of public deliberation on climate change. *Politics Governance.* 9, 76–86. doi: 10.17645/pag.v9i2.4019

Saunders, C. (2012). Reformism and radicalism in the Climate Camp in Britain: benign coexistence, tensions and prospects for bridging. *Environ. Polit.* 21, 829–846. doi: 10.1080/09644016.2012.692937

Schreier, M. (2012). *Qualitative Content Analysis in Practices.* Newcastle upon Tyne: Sage.

Smiles, T., and Edwards, G. A. S. (2021). How does extinction rebellion engage with climate justice? A case study of XR Norwich. *Local Environ.* 26, 1445–1460. doi: 10.1080/13549839.2021.1974367

Sommer, M., Rucht, D., Haunss, S., and Zajak, S. (2019). *Fridays for Future: Profil, Entstehung und Perspektiven der Protestbewegung in Deutschland.* doi: 10.1515/9783839453476-012

Stoddard, I., Anderson, K., Capstick, S., Carton, W., Depledge, J., Facer, K., et al. (2021). Three decades of climate mitigation: why haven't we

bent the global emissions curve?' *Ann. Rev. Environ. Resour.* 46, 653–689. doi: 10.1146/annurev-environ-012220-011104

Stuart, D. (2022). Tensions between individual and system change in the climate movement: an analysis of Extinction Rebellion. *New Polit. Econ.* 26, 1–14. doi: 10.1080/13563467.2021.2020740

Swyngedouw, E. (2011). Depoliticized environments: the end of nature, climate change and the post-political condition. *Royal Institute Philosophy Supplem.* 69, 253–274. doi: 10.1017/S1358246111000300

Swyngedouw, E. (2022). The unbearable lightness of climate populism. *Environ. Polit.* 31, 1–22. doi: 10.1080/09644016.2022.2090636

Temper, L., Avila, S., Del Bene, D., Gobby, J., Kosoy, N., Le Billon, P., et al. (2020). Movements shaping climate futures: a systematic mapping of protests against fossil fuel and low-carbon energy projects. *Environ. Res. Lett.* 15, 123004. doi: 10.1088/1748-9326/abc197

Thiri, M. A., Villamayor-Tomás, S., Scheidel, A., and Demaria, F. (2022). How social movements contribute to staying within the global carbon budget:

evidence from a qualitative meta-analysis of case studies. *Ecol. Econ.* 195, 107356. doi: 10.1016/j.ecolecon.2022.107356

Thompson, T. (2021). Scientist Rebellion: researchers join protesters at COP26. *Nature* 599, 357. doi: 10.1038/d41586-021-03430-5

Wells, R., Howarth, C., and Brand-Correa, L. I. (2021). Are citizen juries and assemblies on climate change driving democratic climate policymaking? An exploration of two case studies in the UK. *Climatic Change* 168, 5. doi: 10.1007/s10584-021-03218-6

Yearley, S. (1991). *The Green Case: A Sociology of Environmental Issues, Arguments and Politics.* New York: Harper Collins Academic.

Yearley, S. (1996). "Nature's advocates: putting science to work in environmental organisations," in *Misunderstanding Science? The Public Reconstruction of Science and Technology*, eds Irwin, A. and Wynne, B. (Cambridge: Cambridge University Press), p. 172–190. doi: 10.1017/CBO97805115637 37.009