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What Makes Climate Solutions Resonate with Audiences? Developing an Audience-Oriented Framework for Constructive Climate Communication

Imke Hoppe

Imke.Hoppe@lmu.de

Ludwig-Maximilians-Universität München

Henrike Rau

Ludwig-Maximilians-Universität München

Irene Neverla

Universität Hamburg

Sarah Kessler

Vienna University of Economics and Business

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Abstract

While constructive journalism is widely regarded as a promising approach to climate communication, evidence regarding its effects remains inconsistent. We argue that previous research has focused primarily on testing single problem-versus-solution frame elements while paying limited attention to what makes climate solutions resonant from an audience's perspective. Using a mixed-methods design that combined a representative survey (n = 1,145) and qualitative group discussions (n = 42), stratified by the Global Warming's Six typology, we identified two stages of audience reasoning through which people make sense of solutions. In the first stage, audiences assess constructiveness along three distinct but interrelated dimensions, which we term Epistemic, Emotional, and Mediated Constructiveness. The findings suggest that climate engagement groups differ especially in the criteria they apply when assessing Epistemic Constructiveness. Climate-engaged audiences sought to understand the impact and feasibility of solutions and rejected simplistic technological narratives or narrow frames of responsibility that obscured uncertainty and societal trade-offs. Less engaged audiences responded more positively to solutions that acknowledged social and economic constraints and offered feasible pathways for action. Across all segments, mediated constructiveness was expected to create an accessible and balanced space for considering solutions while preserving interpretive autonomy and avoiding "sugarcoating". The qualitative data indicate that these processes lead to a second step of reasoning, which entails deeper elaboration on a future projection of how solutions may affect their own lives, relevant social groups, and broader societal visions. Based on these results, our findings help to explain why solutions in climate discourse do not resonate because they are merely presented and framed 'positively', but because they enable audiences to understand better how transformation might work. The proposed framework can serve as a flexible tool for the iterative (co-)development and formative evaluation of media products and communication strategies (e.g., in science communication) across diverse audience groups.

Introduction

For decades, public climate-related communication has primarily focused on raising awareness about anthropogenic climate change (Carvalho, 2007; Leiserowitz, 2004; Moser & Dilling, 2011; O'Neill & Nicholson-Cole, 2009; Painter, 2013; Zhao et al., 2011), contributing to the high issue salience across international media agendas (Brulle et al., 2012; Hase et al., 2021; Schäfer et al., 2014; Schmidt et al., 2013; Wonneberger et al., 2019) and publics across the globe (Carmichael & Brulle, 2017, 2018). Yet despite high levels of climate awareness and robust scientific knowledge, societies are still falling short of the transformative changes required to limit global warming to 1.5°C (Intergovernmental Panel on Climate Change [IPCC], 2023). This defining gap between knowledge and action has long been recognized in the social sciences (Kollmuss & Agyeman, 2002). In response, scholars and practitioners have increasingly argued that climate communication itself needs to be rethought. One of the major ideas is to open up more communicative space for solutions and move 'From Global Doom to Sustainable Solutions' (Guenther et al., 2022). Despite the growing prominence of this paradigm shift in research and practice (Mast et al., 2019), widely discussed under the label 'constructive journalism' (Thier, 2025) or 'transformative journalism' (Brüggemann et al., 2021; Neverla, 2024), current research lacks an audience-oriented theoretical framework that explains why and for whom constructive climate communication resonates.

In media effects research, the jury is still out on testing and assessing the assumed positive effects of constructive climate communication on audiences, mainly relying on experimental designs measuring the effects of isolated content features, like solution-versus-problem-oriented frame elements (Mack et al., 2025; Mai & Sikorski, 2025). Despite providing important first insights pointing to positive effects on emotions (McIntyre & Lough, 2023), findings remain mixed and patchy, particularly regarding the cognitive and conative effects of media coverage (Schäfer et al., 2024). As a result, it remains open whether constructive communication is more effective in fostering the audience responses it aims to promote. To better explain the link between stimulus and effect, research on audience perspectives needs to challenge simplistic conceptualizations of solutions working like a linear knowledge-to-action link. Thus, it seems pertinent to pay heed to more critical approaches to 'solutionism' that question predominantly cognitivist, individualistic understandings(Hulme, 2023) and to better address the diversity of views regarding 'solutions'. Therefore, we apply an interdisciplinary approach that fuses communication studies and environmental sociology to offer a more nuanced understanding of constructive climate communication (Mahony &

Hulme, 2016): *How do different climate change engagement groups make sense of constructive climate change coverage?* To address this question, this study focuses on television as one of the world's most important sources through which people encounter climate change (Newman et al., 2023), thereby providing a real-world context for analyzing everyday meaning-making. Germany provides a paradigmatic empirical case due to its dual broadcasting system underpinned by a legal public-service mandate(Medienstaatsvertrag, 2024/GVBl.I/24, [Nr. 26]) that ensures high levels of quality journalism and press freedom (Hanitzsch et al., 2025). Additionally, German publics' moderate levels of climate awareness(Grothmann et al., 2023; Klinger et al., 2022) provide substantial variations to understand differences in how constructive communication resonates across audiences.

Origins and key characteristics of constructive journalism

Motivated by a significant decline in the use of and trust in traditional and online news (Newman et al., 2023), numerous initiatives across international journalism (e.g. 'The Oxford Climate Journalism Network', the 'Constructive Institute', Aarhus University, or the 'Declaration on Information Integrity on Climate Change', Brazil) are asking: What impact are journalists actually responsible for, triggered by the massive amount of negative news (on climate change)? Related concepts in journalism research reflect a new understanding of how journalists see their role and responsibility in society (Brüggemann et al., 2021). Thus, constructive journalism (CJ) serves as a vision for developing a journalistic stance on climate change as a chronic crisis whose dimensions and temporal scale are largely disregarded by classical 'news values'. It implies a strong focus on solutions, empowerment, and the near future (Höhle & Bengtsson, 2023). CJ's explicit focus on solutions aims to tackle audiences' issue fatigue. (Bro, 2024; Feinberg & Willer, 2011; O'Neill & Nicholson-Cole, 2009). By focusing on empowerment, it seeks to address – either implicitly or explicitly – some of the shortcomings of information-deficit concepts that limit much conventional journalism. Looking at current analysis of climate coverage, solutions seem to be increasingly prominent in international media reporting, although the catastrophe frame still dominates (Guenther et al., 2022)but undergo tremendous counterarguments in public policy arenas (Lamb et al., 2020).

CJ can also be understood as a critique of and an alternative to what has long been the focus of news in traditional journalism: namely, problems (Bro, 2024). It thus challenges the established journalistic practice of translating bad news such as terrorist threats, shootings, or economic crises into a 'good' news story (Haagerup, 2017). While definitions of CJ vary, they all emphasize a radical shift in focus from problems to solutions, driven by a concern for the expectations and experiences of different audiences and their roles as citizens of democracies. Constructive journalism as an 'idea" (Lough & McIntyre, 2023) or 'discourse and practice' (Höhle & Bengtsson, 2023) is - in the European context - traced back to the newsroom practitioners Haagerup (2017) and Hermans and Gyldensted (2019) (From & Nørgaard Kristensen, 2018). While follow-up research on Gyldensted's work centers on a vision to have greater impact by employing techniques from positive psychology, Haagerup (2017, p. 16) has a greater emphasis on portraying "*the most obtainable version of the truth*" (van Antwerpen et al., 2023) changing journalists' criteria for assessing which facts are treated as newsworthy. Bro (2024) sees CJ as an additional layer and lens that complements rather than replaces existing news values. Explicitly considering the impact of CJ on audiences, Hermans and Gyldensted (2019) argue that "*[t]aking responsibility for the impact news reporting has on people coincides with a bottom-up approach in which journalists take into consideration what people as citizens need and want from the news*" (p. 540). Importantly, this variant of journalism explicitly pursues an emancipatory and empowering agenda to give a voice to diverse people and enable them to contribute their perspectives to the development of suitable solutions. This also means discontinuing the standard journalistic practice of marking people as 'villains' versus 'experts', instead recognizing people's expertise and encouraging them to use their knowledge and agency.

Critique of constructive and solution-oriented climate communication

This said, Constructive Journalism has not remained unchallenged within journalism research, environmental sociology and beyond. Some consider an emphasis on negativity – a classical news value to be of core value for protecting democratic structures and processes ("watchdog-journalism"). Scholars from human geography and environmental sociology have criticized as naive the belief that presenting solutions will lead to increased climate action (Hulme, 2023). For

example,Blühdorn et al.(2020) deems any invocation of hope to be entirely irresponsible as, "*contrary to their certainly better intention, such hopeful narratives are not motivating and mobilizing, but above all reassuring and stabilizing. Because their message is: we are already on the right path, and a consistent continuation of this course will lead us safely to our goal*" (p. 110).Howe et al.(2019) analyzed this argument empirically and showed that well-founded hope led to stronger climate political behavior intentions, in contrast to false hope, which means individuals believe an issue will improve on its own. Similarly,Lennon(2024) argues that "*...environmental solutionism is the rhetorical offspring of polluting industries, masking exploitative corporate practices with a facade of a political consensus*" (p. 130). In his view, environmental solutionism constitutes a 'site of progressive dystopia' fraught with contradictions. Another critique points to the often-underlying information-deficit approach that assumes that (scientific) information about solutions will lead (more or less directly) to behavior change and underpins many solution-oriented efforts in policy and (journalistic) practice. This approach has been widespread, for example in information-based sustainable consumption campaigns that place the burden of responsibility on individual consumers as opposed to addressing systemic sources of unsustainability, attracting considerable criticism over the past two decades (Maniates, 2001). Alternatives to the information-deficit concept recognize the inherently social nature of information reception and processing as well as the persistence of highly routinized, mundane practices that reflect embodied knowledge (Kessler & Rau, 2023). Also, an uncritical belief in innovation and technology and related scientific expertise as the only answer for combating climate change presents another pitfall, partly because such a view clearly marginalizes visions of wide-ranging social and cultural change (Henkel et al., 2018). Yet, over recent decades, social scientific climate research has started to challenge the dominance of 'techno-fixes', offering alternative ideas of a more sustainable future rooted in low-tech sufficiency, social innovation and big cultural change (Hulme, 2015).

Empirical state of research on media effects

Across studies, experimental evidence on constructive elements in climate communication is considerably stronger for affective than for cognitive or behavioral outcomes, suggesting that evoking positive emotions through solutions is one of the most consistently demonstrated media effects of constructive climate communication (McIntyre & Lough, 2023). Instead of anger, anxiety, or sadness, audiences are more likely to experience hope, curiosity, or even joy, often accompanied by positive meta-emotions such as optimism or a general sense of positivity (Schäfer et al., 2024). Complementary, research from communication studies (Ettinger et al., 2021; O'Neill & Nicholson-Cole, 2009) and environmental sociology (Norgaard, 2011) shows that apocalyptic, catastrophic alarmist framings can be counterproductive, as they lead to uncomfortable emotions, defensive avoidance or disengagement rather than sustained reflection or action (Bilandzic et al., 2017; Conteh & Miller, 2026; Lowe et al., 2006; O'Neill & Nicholson-Cole, 2009). Such findings are particularly relevant in the context of late modern societies, in which individuals are already confronted with escalating cognitive and emotional demands (cf. e.g., Rosa, 2023) amid a polycrisis (Hoppe et al., 2026).

However, empirical evidence supporting the superior effectiveness of positive or hopeful emotions in the context of climate change messages on cognitive and behavioral constructs remains limited and mixed (Bilandzic et al., 2017; Hermans & Prins, 2022; Mack et al., 2025; Thier & Lin, 2022; Troy, 2025). Schäfer et al. (2024) found that a solution frame elicited more positive emotional responses than a problem frame alone, but did not lead to higher levels of information elaboration or information seeking. Ettinger et al. (2021) realized an experimental study with audiences differentiated by the Six Americas of Global Warming demonstrated that neither hopeful nor fear-based video messages produced significant differences in risk perceptions, behavioral intentions, or climate activism. Thus, the cited findings of experimental research indicate that treatment effects of the stimuli used may obscure substantial heterogeneity in how climate solutions are interpreted and evaluated (Mack et al., 2025). Rather than assuming that single journalism-oriented constructive framing elements (problem versus solution) automatically produce positive outcomes, greater attention should be paid to the sense-making processes through which audiences assess the proposed solutions (McIntyre & Lough, 2023). This also points to a need to move beyond stimulus–response models towards more process-oriented conceptualizations of communication, with differentiated accounts of how emotions interact with cognition and how climate engagement groups differ in their responses. Developed in the context of media effects research and political communication (Cho et al., 2009; Zhang, 2025). The O-S-R-O-R model (Orientation–Stimulus–Reasoning–Orientation–Response) helps overcome this limitation by enabling

“to theorize a set of the interrelated reasoning (R) processes” (p. 1). In this study, we apply and further extend the model to examine how audiences make sense (Ryghaug et al., 2011) of climate solutions, and how these meaning-making processes connect media stimuli and responses within different social and engagement contexts.

Results

Building on the O-S-R-O-R model of media effects, we understand reasoning as a multifaceted process starting after media use: “*Reasoning is not necessarily a purely rational process. Rather, reasoning could be illogical, emotionally charged, or based on premises that are wrong or biased, especially when deliberation is based on misinformation or driven by partisan motives” (p. 39). Thus, our concept of reasoning refers to the depth of reasoning, not the rationality in reasoning*. Based on our empirical findings, we describe all steps of the O-S-R-O-R model to understand better how solution-oriented coverage resonates across different climate engagement segments.

Encountering climate solutions through media

The model begins by considering basic audience orientations, suggesting that pre-existing, relatively time-stable, individual-level predispositions shape all subsequent steps throughout the communication process. Here, we assume it is important to understand audiences’ basic attitudes towards climate change, as these will likely influence how they reason about and respond to the solutions portrayed. In this study, we examined these orientations using a mixed-methods design combining a representative survey (n = 1,145) and qualitative group discussions (n = 42) in Germany, both segmented by the Global Warming’s Six typology into six climate engagement groups. Each group is characterized by a certain level of problem awareness, risk assessment, policy preferences, and behavioral components (details on the analysis see (Hoppe et al., 2026)), namely Alarmed (26%), Concerned (39%), Cautious (21%), Disengaged (2%), Doubtful (9%), and Dismissive (3%) (Leiserowitz et al., 2023). The standardized typology enables internationally comparable and longitudinal analyses while integrating key cognitive, affective, and behavioral dimensions of climate engagement.

These basic orientations are understood here as lenses structuring how audiences encounter climate solutions within the media environment, conceptualized in the model as the **stimulus** dimension. Within these media environments, climate solutions become available as “stimuli”. The study concentrated on television, as it is the most widely used for climate information (Ejaz et al., 2023). The quantitative results demonstrate that climate-engaged audiences consume more climate-related news (Hoppe et al., 2026) and thus are more likely to find content on solutions through news-dominant media diets than less climate-engaged audiences are. The qualitative data point to additional structural conditions that shape access to solution-related content, ranging from technical barriers such as inconvenient broadcast times (e.g., late at night) to complex digital high-choice environments (quote from the group discussion: “*...you really have to look for it*.” ALARMED). Pre-selected stimulus material (two videos per group; see Supplementary Information, Table 1) was integrated into the group discussions, thereby enabling a deeper understanding of sense-making processes and establishing a shared reference within the groups. The material was selected in collaboration with the editorial teams of Germany's four largest television broadcasters and assessed as the most constructive content on climate change aired during the study period (see Methods).

Participants’ response towards the salience of solutions was overall very positive (CAUTIOUS): *“Above all, I do not want to hear the same thing over and over again that everything is so bad. It is much, much more interesting when we are shown suggestions for solutions and (…) that I am also told 'ey, -' somehow 'you can do something about it'*.” However, they differed in how they evaluated such reporting, what they expected from it, and under which conditions it became meaningful. These wider audience-centered sense-making processes constitute the reasoning stage of the O-S-R-O-R model.

Constructiveness from an audience perspective

We understand reasoning as an active sense-making process (Ryghaug et al., 2011) of media content following media reception. We focus on this phase because it is crucial to understanding the missing link between encountering solution-oriented climate coverage and tangible, mid- and long-term audience reorientations and responses. Therefore, we first

conducted an Exploratory Factor Analysis (EFA) of the 15-item scale measuring perceived constructiveness according to Hermans and Gyldensted (2019) (n = 1,145) (see Supplementary Information, Table 2 for factor loadings and model fit statistics, Table 3 for the measurement). The EFA indicated two latent dimensions underlying audiences' perceptions of constructive climate coverage: Epistemic Constructiveness and Emotional Constructiveness, thus reflecting the general architecture of media effects, which are deeply shaped by this duality. Second, we used the deductive and inductive categories of the Qualitative Content Analysis (QCA) (n = 42) to substantiate and differentiate the findings (see Supplementary Information, Tables 4–6). Beyond supporting the EFA findings, the inductive analysis revealed an additional dimension of reasoning: Mediated Constructiveness. Third, we analyzed whether these reasoning dimensions varied across climate engagement segments. Quantitatively, differences in Epistemic and Emotional Constructiveness were assessed using ANOVAs (Analysis of Variance). Qualitatively, cross-cutting dimensions and their group-wise comparisons were employed (for a full description of all dimensions and related qualitative quotes, see the Methods section).

Epistemic Constructiveness: Understanding how transformation could happen

"Epistemic constructiveness" captures how audiences evaluate the cognitive quality of solution-oriented climate coverage, namely, whether coverage provides orientation, enables audiences to learn about solutions, and clarifies their potential contribution to future pathways, captured by the overarching question: "Do I learn how transformation can happen?" This dimension differed substantially across climate engagement groups (Welch's ANOVA: $F(5,176.08) = 38.99$, $p<.001$), with Alarmed participants reporting the highest levels of perceived epistemic constructiveness and Doubtful and Disengaged participants the lowest. The qualitative findings further differentiated this dimension by pointing to three criteria across segments: **impact, feasibility, and responsibility**. Participants assessed whether proposed solutions were perceived as effective for climate mitigation (impact), whether they appeared practically achievable (feasibility), and which actors were considered responsible for their implementation (responsibility).

Alarmed and Cautious participants frequently questioned small-scale solutions ("low-hanging fruit") they see as insufficient considering the scale of climate change. Instead, they emphasized either addressing systemic drivers of change or scaling up smaller-scale solutions through broader implementation and communication: "*The farmer did something to his fields so that he needs less irrigation – that is a very good approach. However, it would need to be spread much more widely*" ALARMED). Feasibility emerged as a second central criterion, particularly among Concerned and Cautious participants, who evaluated solutions in terms of their practical applicability and individual implications, often relating them to perceived costs and benefits and, in effect, asking "*What is in it for me?*" Fig. 1 summarizes the proposed O-S-R-O-R framework, illustrating how audiences' basic orientations shape the criteria through which they assess the constructiveness of climate solutions. While the perceived impact of a solution was more relevant for climate-engaged segments, feasibility was more salient for engagement segments with lower issue priority.

Less engaged segments more frequently questioned solutions requiring substantial personal or economic responsibility, particularly when they perceived limited individual or collective agency. Consequently, **responsibility attribution** emerged as an additional criterion for evaluating climate solutions. Qualitative comparisons suggested that participants from more engaged segments tended to emphasize shared responsibilities among societal actors. In contrast, participants from less engaged segments more often attributed responsibility to external actors, such as other countries or political institutions (see Methods for a more detailed explanation and Supplementary Information, Table 5, for further quotes).

Emotional Constructiveness: Feeling that transformation could happen

Emotional Constructiveness captures the extent to which audiences associate constructive journalistic elements with a positive, optimistic emotional atmosphere, as reflected in the overarching question: "Do I feel that transformation is possible?" The factor includes journalistic elements associated with constructive journalism, such as presenting a positive

perspective and communicating that the situation is solvable. Compared to Epistemic Constructiveness, Emotional Constructiveness differed only marginally across climate engagement groups (Welch's ANOVA: $F(5,180.84) = 4.54$, $p<.001$), suggesting that emotional evaluations of constructive climate coverage are more broadly shared across segments. Across all groups, emotional responses to climate communication were more broadly shaped by the perceived overdominance of fear-oriented narratives in public discourse. Highly engaged audiences reported emotional exhaustion, frustration, and helplessness stemming from repeated exposure to negative climate news and a perceived lack of progress. As one participant noted, "*The subject is totally serious. However, (…) it is the same thing over and over again. We want to, we have to. However, nobody ever starts*..." CAUTIOUS). Similarly, participants across all engagement groups expressed a desire for future-oriented communication that moves beyond documenting problems towards possible pathways of change. For less engaged audiences in particular, constructive climate coverage created emotional resonance by shifting attention from past failures towards anticipated, more positive future scenarios: *"We no longer turn to the past to see how bad it was but look to the future to see what we can change, how we can adapt our lifestyle so that we can cope with it*" DISENGAGED). This suggests that hope may function not merely as an affective outcome but as a motivation for further cognitive engagement with solutions.

Beyond this general response to a more positive emotional climate, Emotional Constructiveness across all engagement groups was shaped by **social identification** processes. Participants evaluated the emotional relevance of climate solutions in part by their perceived similarity to the actors who communicate or implement them. When portrayed protagonists were perceived as relatable and reflective of everyday experiences, identification facilitated emotional openness towards proposed solutions. Conversely, perceived social distance from solution-related actors could undermine emotional resonance. Among Disengaged participants, for example, climate solutions associated with socially distant groups, such as affluent elites or activist movements, sometimes generated feelings of exclusion rather than identification: "*I do not think I feel quite so well represented (…) Fridays for Future is not for me, so I cannot identify with it (…) no thought is given to solutions, and whether they are feasible.*" DISENGAGED). These responses indicate that emotional constructiveness depends not only on whether communication conveys optimism but also on whether audiences can identify with the portrayed communicators.

The interplay of epistemic and emotional constructiveness

Taken together, the quantitative and qualitative findings provide a more differentiated interpretation of the factor structure. The exploratory factor analysis identified two empirically distinct dimensions of perceived constructiveness in climate coverage: epistemic and emotional. However, the factor loadings (see Supplementary Information, Table 2) suggest that these dimensions are interconnected, as, e.g., the item *"…is emotionally engaging*" loads on the epistemic dimension. The qualitative findings help contextualize these links by suggesting that audiences experience cognitive and emotional responses to constructive climate coverage as closely intertwined. Feelings such as hope and optimism were described as supporting cognitive engagement, while the perceived relevance and feasibility of solutions shaped positive emotional responses ("*Yes. And that also reinforces my feeling that we are doing the right thing and trying our best in our own small way.*" ALARMED) and vice versa ("*I do not think that is an accurate portrayal*. (…) *And that makes me angry rather than anything else.*" DISENGAGED).

Mediated constructiveness: having a 'good space' for understanding and feeling

The qualitative findings identified mediated communication as an additional cross-cutting dimension, which we call Mediated Constructiveness, described by the guiding question: "*Do I assess this as a good space to understand and feel how transformation could happen*?" Even while this dimension did not emerge as a distinct latent factor in the survey data (probably because the scale primarily captured solution characteristics rather than media qualities), participants in the group discussions consistently reflected on how media communication can enable or constrain constructive sense-making. For audiences, mediated constructiveness refers to the extent to which media coverage makes solutions salient, but moreover,

creates conditions for supporting **interpretative autonomy** by balancing epistemic and emotional dimensions of engagement, rather than aiming at persuasion ("*With that video, I found it really, really awful. I think it was not 'we are reporting on a really important topic', but rather 'we are now telling an exciting story'. The way it was introduced was geared towards suspense, and behind it, the background music, that was all designed for tension*." CAUTIOUS) - with an overly optimistic intent or unreasoned optimism ("*The possible solutions also seem to me, (…) maybe overly good to be true".* ALARMED), but by creating a communicative environment in which audiences can critically assess agency and responsibility of different societal actors (including reflections on their own positionality). More aspects of this dimension are discussed in the Methods section.

Anticipation of Future Consequences

Future orientation emerges as part of mediated constructiveness, insofar as media are evaluated by the extent to which they allow solutions to become thinkable across different degrees of social and temporal distance. At a first level, participants relate climate solutions to their **own everyday life.** This involves considerations of feasibility, personal relevance, and potential benefits of incremental change ("*If you can recognize small successes, it... makes your actions much more effective and more encouraging than if you are constantly in observation mode, asking yourself, 'What am I doing wrong now, or what am I failing to do?*'." DISENGAGED). At a second level, participants relate solutions to relevant **social groups**. Participants consider whether mediated solutions appear socially plausible and whether responsibility assignments align with their expectations of fairness and feasibility for their relevant social groups. At a third level, participants engage with a broader societal vision of climate solutions. Here, **future orientation** refers to the extent to which media enable a sense of direction regarding societal transformation. This is often linked to whether solutions are perceived as contributing to meaningful system-level change or remain fragmented and insufficiently connected to structural drivers.

Beyond "just talk": making societal transformation sustainable

The extent to which these reasoning processes lead to mid- or long-term **(Re-)Orientations** of existing climate-related attitudes and **Responses** remains a key research question. Our findings indicate that, against the background of the reasoning process, it becomes central to ask whether desired media effects are primarily grounded in a logic of one-way transmission. Moreover, our findings raise a more fundamental question about how intended media effects should be conceptualized. Rather than assuming a linear logic, in which science and technology are expected to serve societies with ready-made solutions for immediate public uptake, our results point towards a **dialogical understanding of public communication** and support the groundbreaking difference "constructive communication" can make (Hermans & Prins, 2022), in a twofold way, that is, combining epistemic and emotional constructiveness. The notion of resonance emphasizes its societal significance as a continuous mediated space that accompanies transformation over time: acknowledging successes without overstating them, reflecting on failures, critically examining trade-offs, and connecting climate solutions across micro-, meso-, and macro-levels for different climate engagement groups. This notion is also reflected in participants' statements, which emphasize incremental, situated, and sustained engagement rather than abrupt behavioral transformation: „*Yeah, if maybe… illustrated…or with graphics, (…) showing what can be done in small ways… small steps… to make (a) contribution to climate change. And not necessarily all at once, but gradually, maybe step by step, and perhaps also having the chance to receive feedback along the way*" (DISENGAGED).

Conclusion

Our review of different bodies of literature reveals significant disagreement regarding the role of solutions in climate communication, ranging from optimistic views of their potential to initiate individual and collective climate action to critiques of solutionism as a dead end and a tool for suppressing dissent. Evidence to date on the media effects of constructive climate communication across different audiences remains patchy and calls for a deeper understanding of sense-making processes (reasoning). For example, many experimental studies say little about *how* participants experience and evaluate the solutions presented, and the relationship between audiences' emotional responses and their cognitive responses

remains under-researched. This study contributes to understanding this critical pathway of constructive climate communication by showing that audiences do not evaluate solution-oriented coverage solely based on the presence of 'positive' solutions, but in a first step through epistemic, emotional, and mediated dimensions of sense-making, and in a second step by anticipating future consequences with respect to their own life, that of relevant social groups and 'the bigger picture' for societies. The results underline that basic orientations (climate engagement segments) shape all reasoning processes of constructive climate communication. Figure 2 shows the data-based components for the reasoning stage of the O-S-R-O-R model.

Against this background of a deeper understanding of the reasoning process, it becomes central to ask if desired media effects are primarily grounded in the logic of one-way transmission. Thus, our findings raise a more fundamental question about how intended media effects should be conceptualized. Rather than assuming a linear logic in which science and technology are expected to serve societies with ready-made solutions for immediate public uptake (like a "one-hit wonder"), our results underscore a dialogical, twofold understanding of constructive climate communication.

Limitations

Several limitations should be considered. The qualitative component was not designed as a grounded theory study aiming at theoretical saturation, but as part of a theory-informed mixed-methods design examining reception processes across climate engagement groups. The findings reflect the specific German media context and require further research across different cultural and media environments.

Moreover, the exploratory design does not allow conclusions about whether the identified dimensions are complete and saturated, and to what extent they vary across different types of climate solutions (e.g., nature-based solutions versus technology-based solutions) and sectors (e.g., mobility versus energy). Future research could examine if these reasoning dimensions indeed function as moderators in experimental settings to measure differential media effects. Integrating the framework into survey studies or panel designs could help further identify audience responses to climate solutions over time and their quality expectations regarding 'mediated constructiveness'.

Recognizing the diversity of audiences' social, cultural, and economic contexts can offer valuable lessons for future studies. For example, recent sociological studies have highlighted a profound climate-cultural diversity in German society (Kessler & Rau, 2023), encompassing individual- and group-level differences, pointing to strong linkages between people's responses to climate change and their culturally rooted everyday practices, complementing socio-economic influences. Thus, future research could benefit from developing a typology rooted in broader social, cultural, and economic contexts to understand better audience perspectives on communicating climate change solutions.

Practical Implications for Climate Communication

As this is a theory-building rather than a theory-testing study, the practical implications should be considered preliminary and heuristic, requiring further empirical refinement. Rather than prescribing one-size-fits-all communication strategies, the proposed framework can serve as a flexible tool for the iterative (co-)development and formative evaluation of media products and communication strategies across diverse audience groups. Importantly, our findings should not be interpreted as suggesting that climate communication ought to promote particular solutions or persuade audiences to adopt them. Instead, they highlight the qualities of communication that audiences perceive as constructive while remaining consistent with the core principles of dialogic science communication (e.g., evidence-basedness, role of uncertainty,…) and quality journalism (e.g., balanced reporting). At the same time, our findings challenge an exclusively epistemic understanding of science communication. While explaining evidence and uncertainties is necessary, it appears insufficient for audiences to experience communication as constructive. However, emotional constructiveness emerged not primarily from positive imagery or optimistic narratives, but from **processes of social identification**: Audiences described communication as more

constructive when they recognized their own everyday realities, constraints, and possibilities for action, and when responsibilities for societal transformation were distributed across relevant actors rather than being implicitly assigned. Public communication may therefore benefit from integrating three complementary qualities:

1. **Epistemic resonance**: Explaining evidence regarding the impact and feasibility of potential solutions, as well as socio-economic conditions under which solutions probably work,
2. **Emotional resonance**: Enabling social identification with relatable actors from diverse social contexts,
3. **Mediated resonance**: Making solutions accessible and salient while preserving interpretive autonomy, especially regarding a balanced portrait (and assessment) of agency and responsibility of different societal actors.

Second, the future-orientation of constructive journalism is reflected in the audiences' anticipating how solutions could work in the future:

1. **Anticipation of consequences by**: Connecting solutions and their implications to the everyday lives of individuals and social groups (e.g., families, urban or rural communities), as well as to broader visions of societal change that these solutions may contribute to.

From this perspective, constructive climate communication is less about making solutions appear attractive than about enabling audiences to make sense of them. With respect to science communication, a focus on "solutions" risks being misinterpreted as a renewed emphasis on the linear transmission of scientific knowledge about predefined solutions. In contrast, the paradigmatic shift in science communication towards dialogic and participatory models explicitly conceptualizes science not as a provider of solutions but as a dialogue partner that contributes expertise to socially embedded processes of solution development.

However, journalistic practice, as well as parts of related (experimental) research, do not always adhere to these more comprehensive understandings of solution-oriented communication in the specific context of climate change, thereby contributing to persistent conceptual ambiguities across domains. Our findings underscore the ability and willingness of large audiences (including online users) to handle complexity and recognize pros and cons, which should not be underestimated.

Discussion

Although there is broad agreement that alarmist and apocalyptic messaging can be counter-productive, as it may lead to looking away and, in the worst case, to denial as a means of self-protection, the function of journalism remains to critically uncover the ill-workings of the social, political and economic status quo and point out where things may currently be stalling progress. In other words, pointing out current problematics and negative messaging will certainly remain the journalist's job - there cannot only be positive emotions. To shift and direct public attention towards time-dependent but latent risks (like extreme weather events or tipping points) and thus allocate the much-needed resources from a society of 'affectional publics' (Harbke et al., 2025), a combined communication strategy of "problem plus solution" framing is worth discussing. Similar to results on "gain-and-loss" frames, the most effective combination could be to combine negative frames on losses with solution-frames on how to prevent them (Bilandzic et al., 2017). Thus, we want to reiterate that CJ should understand itself as a *complementary* concept that combines the basic function of acting as 'watchdog' within society, with the additional role of looking for and presenting solutions to open up and foster broader public discussions across diverse societal groups. For future research, a better understanding of media dramaturgies that combine problem and risk definitions with solution-oriented components seems to be key.

Dual messages in environmental communication are found to be partly effective, underscoring this study's finding that both cognitive and emotional processing characterize audiences' sense-making. (Freytag & Possler, 2024). To further qualify the direction of this interrelation, specific stimuli could test the "limited capacity model of motivated mediated message processing", which assumes that cognitive and emotional processes can compete for mental resources, which could impede

or block each other (DiRusso & Myrick, 2021). The interrelation between the two components also aligns well with the other direction specified, e.g. by the “elaboration likelihood model”, pointing to the positive role of emotions in motivating a deeper cognitive elaboration of content and overcoming group-identity cues and ideological barriers. (Wong-Parodi & Feygina, 2021).

The indirect responsibilization of individual consumer-citizens through solutions proves particularly problematic, as it shifts the focus away from the structural causes of climate change, notably resource-intensive, growth-oriented economic processes. Given the influential role of progressive elites in climate journalism, it is vital to question their capacity to address and connect with segments of society experiencing different socio-structural realities, identities, and practices. Here, it is crucial to recognize that the term communication – whether solution- or problem-oriented – entails an exchange of ideas, questions, and arguments, not simply persuading audiences toward a specific frame or solution. Returning to the motivation for constructive journalism, this addresses the emancipatory and empowering agenda outlined by Haagerup (2017) and Hermans & Gyldensted (2019). Thus, the focus should be on fostering dialogue about the what and how of collective well-being, the commons, and the social values that should define a democratic society’s relationship with nature and natural resources. Thus, our results should be read as a strong call for science-oriented reporting (science journalism) on climate-related solutions.

However, audiences do not seek definitive answers but rather repeated opportunities to engage, reflect, and gradually reorient themselves. This closely resembles Rosa (2017) theory of resonance, which conceptualizes engagement not as passive reception, but as a responsive relationship between individuals, media, and the world (Kuhlmann, 2016). Media, in this sense, can serve as spaces that invite audiences into ongoing processes of deeper epistemic understanding and reciprocal positive engagement. The challenges of a transformative society are immense, increasing a massive demand for quality journalism as one of the core societal agents of change. However, journalism itself has to face and cope with the erosion of its traditional business model. Blending new financial concepts with new journalistic roles is still under construction, but it seems that new media models (e.g., the rise of podcasts) are emerging that combine these new journalistic concepts and roles with audiences’ demand for combined fact- and data-based science communication and empowering, solution-oriented content.

Methods

Field Period and Study Context

During the field period, climate change was not rated as the most pressing problem, but the Ukraine war, the related energy crises, and the rising cost of living. Additionally, extreme weather events were the dominant issue related to climate change, as several severe heatwaves and droughts hit Germany and Europe in the weeks leading up to it. It seems plausible that during fieldwork, people’s tolerance for climate mitigation measures was influenced by the rising cost of living, as many people faced financial problems, e.g., due to sharp increases in energy prices, and by the experience of extreme weather events during summer. TV is also in Germany the most popular medium for people to engage with climate change (Newman et al., 2023). A dual system of public and private TV stations with integrated online media characterizes the TV landscape.

Quantitative Audience Survey

The quantitative audience study assessed how people perceive climate change coverage with a specific focus on central elements of constructive journalism. A representative online survey was conducted from October 31 to November 4, 2022 (n = 1,145), with quotas for age, income, gender, and federal state. The questionnaire was fielded by the German online panel provider Bilendi (certified according to ISO standard 20252:2019). Perceptions of constructive climate journalism were measured using an item battery derived from the six core dimensions of constructive journalism proposed by Hermans and Gyldensted (2019): solution-oriented framing, future orientation, diversity and inclusiveness, audience empowerment, co-creation of knowledge, and contextualization through explanation (see Supplementary Information, Table 3). The items were further refined based on prior qualitative group discussions. All items were introduced by the stem “*Climate change coverage*

in the media I use …" and assessed with a bipolar five-point semantic differential ranging from 1 = highly solution-oriented (i.e., strongly constructive) to 5 = not solution-oriented at all. The solution-oriented framing dimension was operationalized using items assessing whether coverage focused on solutions rather than problems, conveyed a positive rather than negative perspective, repeated already familiar solutions, and presented solutions in a concrete rather than overly general way. *Future orientation* was measured by items capturing whether reporting directed attention toward the future and fostered optimism about future developments. *Diversity and inclusiveness* were represented by an item assessing whether coverage introduced new, rather than repeatedly familiar, public figures. *Audience empowerment* was operationalized through items measuring whether reporting encouraged respondents to contribute personally to climate protection and whether it conveyed that the situation was solvable rather than hopeless. *Providing context and explanation* was measured by items assessing whether coverage was sufficiently factual, set appropriate thematic priorities, focused on the most relevant aspects of climate protection, provided information respondents considered important, generated learning effects, and helped them understand how more ambitious climate action could succeed. Finally, *co-creation of knowledge* was conceptually reflected in items that emphasized the role of ordinary citizens in contributing to climate solutions. However, these indicators did not load strongly enough to be retained in the final factor structure.

Qualitative Group Discussions and Sampling

The empirical objective is an in-depth examination of audience perspectives and their responses to climate solutions presented on TV using a qualitative methodology. We opted for group discussions as a *relational* method that offers analytical insights into how meaning is created through social interaction. Thus, the logic of the sampling approach of this study is nested in the paradigms of qualitative research(Flick, 2023) and applies the idea of quota-based sampling (Kelle & Kluge, 2010). From the current state of research, we have derived the following key variables to realize this quota-based sampling approach (see Supplementary Information, Table 8): (1) climate change engagement (Global Warming's Six Americas), (2) TV use preferences (public versus private TV) and (3) generation/age. The age variable was divided as follows: Baby Boomer Generation (born 1946–1964), Generation X (born 1965–1979), Generation Y (born 1980–1994) and Generation Z (born 1995–2019). These three variables are integrated through three sampling steps (see Supplementary Information, Table 8), which then yield eight focus groups of 5–7 people (see Supplementary Information, Table 9). For the pre-screening, climate-related attitudes towards climate change were measured using the short-scale for Global Warming's Six Americas (Leiserowitz et al., 2022). Depending on their answers, participants were assigned to one of the five groups according to the 'Global Warming's Six Americas' scheme: Alarmed, Concerned, Cautious, Disengaged and Doubtful. Additionally, groups were differentiated by their TV preferences (public versus private, plus mixed preferences) and their generations, as both factors differentiate TV audiences. The TV preference variable was dichotomized into private or public channels. The age variable was divided into the following groups: Baby Boomer Generation (born 1946–1964), Generation X (born 1965–1979), Generation Y (born 1980–1994), and Generation Z (born 1995–2019). The three criteria were measured using a short screener questionnaire. After evaluating the pre-screening results, individuals who met the criteria were invited to participate in the online group discussions. Overall, we deemed five to seven people per group appropriate, as the sample size was sufficiently large to enable group-wise comparisons while remaining manageable for the discussions. The group discussions were carried out in Germany in late September 2022 online (via Zoom, around 90 min each), and a semi-structured interview guide (see Supplementary Information, Table 10) translated the theory-driven categories into guiding questions.

Qualitative Group Discussions and Data Analysis

The focus groups, transcripts, and data were analyzed using a qualitative content analysis (QCA) approach (Kuckartz & Rädiker, 2024), integrating existing theoretical perspectives (via deductive categories) while also ensuring sufficient openness to new perspectives and unforeseen aspects introduced by participants (via inductive categories). Our theory-led, triangular group approach to QCA (Flick, 2011) included Data preparation, Group-wise analysis, and Inter-group comparison (see Supplementary Information, Table 11). To enhance the robustness of the findings, we conducted a cross-validation by comparing the frequency of codes assigned to each category across segments. This procedure ensured that the identified

patterns of perception were not merely individual interpretative impressions but systematically characteristic of specific audience groups.

Measurement of the Epistemic Dimension

To enable a comprehensive understanding of which elements of constructive climate journalism audiences perceive during the stimulus dimension, the quantitative survey operationalized Hermans and Gyldensted's (2019) definition of six core characteristics of constructive journalism: solution-oriented framing, future orientation, diversity and inclusiveness, audience empowerment, co-creation of knowledge, and contextualization through explanation. Crucially, this definition overcomes a one-dimensional understanding of solutions (Mack et al., 2025). Moreover, this is thus applied in this study. The results demonstrate that all dimensions of perceived constructiveness of climate coverage are rated around the midpoint of the scale, indicating that constructive features were recognized. However, none emerged as particularly prominent (see Supplementary Information, Table 2 for mean values and standard deviations). Whereas the six characteristics of constructive journalism proposed by Hermans and Gyldensted (2019) describe the media stimulus, it remains unclear whether audiences also process them as separate dimensions in their reasoning. We therefore explored, using Exploratory Factor Analysis (details see Supplementary Information, Table 2), whether these characteristics remained distinct or instead converged into broader latent sense-making dimensions (Ryghaug et al., 2011). The main finding is that audiences indeed integrate these specific content dimensions into two reasoning dimensions (in line with broader dual-process models used in environmental communication, e.g. Freytag and Possler (2024)): one more cognitively oriented dimension we name "Epistemic Constructiveness", and one more emotionally oriented dimension we term "Emotional Constructiveness" (see Supplementary Information, Table 2).

The first factor ("Epistemic constructiveness") includes e.g. assessments of whether coverage is fact-based (loading = .78), sets appropriate thematic priorities (.77), focuses on the most important aspects of climate mitigation (.76), provides information respondents consider relevant (.75), generates learning effects (.72), is emotionally engaging in a meaningful way (.62), helps respondents understand how stronger climate action could succeed (.62), identifies concrete next steps (.56), directs attention toward the future (.46), and encourages personal action (.44). Taken together, they indicate that audiences interpret constructive climate coverage as reporting that enhances understanding, clarifies causal and practical pathways, and increases perceived orientation. To test whether this factor differed across climate engagement groups, we report both the classical ANOVA ($F(5, 1439) = 41.03$, $p < .001$) and Welch's ANOVA, which is robust to violations of the homogeneity-of-variance assumption ($F(5, 176.08) = 38.99$, $p < .001$). Both tests confirmed the same substantial group differences. Table 1 shows the values for this factor across the different climate engagement groups.

Table 1
Epistemic Constructiveness in different climate engagement groups

	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Epistemic Constructiveness (M; SD)	3.43 (0.86)	3.18 [a c] (0.65)	2.9 [b c] (0.61)	3.0 [a b c d] (0.57)	2.59 (0.63)	2.59 [c d] (0.79)

Note: Respondents indicated their agreement with both statements on a scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Means sharing the same letter are not significantly different (ANOVA with Games–Howell post hoc test, $p < .05$).

The qualitative findings help to unpack further "Epistemic Constructiveness". Results across all engagement groups illustrate which of the underlying survey items participants prioritize: Across climate engagement segments, climate solutions were primarily assessed in terms of the perceived impact of proposed solutions, the assessment of their practical feasibility, and an understanding of responsibilities for realizing solutions – means according to whether they met audiences' epistemic criteria. Particularly among Alarmed participants, solutions perceived as isolated or symbolic "mini solutions" (e.g., avoiding plastic straws) failed to resonate because they were considered insufficient to address the systemic drivers. These

participants expressed a strong demand for high-impact solutions embedded in broader societal transformation, including clearer accounts of how individual actions relate to collective efforts by companies, municipalities, and governments. At the same time, they expressed frustration with political statements and media discourses perceived as superficial, emphasizing that many solutions were already known but lacked implementation. Across these segments, participants expressed a strong interest in scientific expertise that could explain not only which solutions exist, but under which conditions they become effective. Although technological solutions were generally perceived as important, evaluations varied substantially: Disengaged and Doubtful participants particularly welcomed technologies that promised progress without major disruptions to everyday practices, such as affordable innovations improving comfort or safety.

Thus, **Impact** emerges as a cognitive need to understand the effectiveness of solutions across different levels of social action. At the micro level, impact is primarily defined through individual agency ("*Every household can save a cubic meter of water a month - that is 1,000 liters. It is not about washing a dirty car; it is about meaningful contributions*." ALARMED). At the meso level, participants wonder how solutions can move beyond individual changes and upscale into broader practices of societal groups ("*The farmer did something to his fields so that he needs less irrigation – that is a very good approach. But it would need to be spread much more widely*." ALARMED). At the macro level, many participants expressed a critical stance towards what they described as "mini solutions," meaning solutions perceived as insufficiently attentive to systemic drivers such as administrative barriers or globalization. Some participants also expressed frustration with what they perceive as an over-reliance on technological solutions, such as electric cars or smart home systems, as they are seen as contradictory or even counterproductive due to their environmental trade-offs and side effects: "*The constant push for e-cars while promoting smart devices just adds to the problem*," one participant criticizes (ALARMED). Those participants are worried about narratives suggesting that technology alone can solve climate issues without ongoing political effort and substantial investments in emissions reduction, as these narratives downplay the seriousness of climate change for human life on Earth. Thus, it is rather unlikely that covering climate solutions solely in technological terms will resonate with Alarmed.

While Concerned and Cautious participants similarly valued explanations of how solutions could generate meaningful impact, they placed greater emphasis on feasibility aspects, including costs, accessibility, and implications for everyday life. Notably, older participants within these groups were particularly attentive to financial barriers associated with implementation ("*But ultimately, I also think that this is impossible to achieve, and who is supposed to pay for everything they proposed there*?" CAUTIOUS). While all groups demand impactful solutions, they differ in their views of what constitutes a **feasible** approach. Systemic change is a very common demand, but the route to achieving it - whether through innovation, economic reform, or political actions – varies, e.g., due to ideas of the broader societal picture ("*What I am also deeply concerned about is the deforestation of primeval forests. In Brazil, with this president (Bolsonaro) who also ignores it. So I think that is pretty bad, what has been going on for decades simply because of the capitalist industry, which just wants to make profit and does not even think about what this means for our planet*" ALARMED). Some are skeptical about the feasibility of technological solutions, especially when these are presented in an overly optimistic or simplified manner, and prefer practical, low-tech solutions that are immediately actionable, valuing their ease-of-use and realism ("*I have never thought of this before. It is so easy now, when I hear that, to save water: when you wash your vegetables, collect the water, and water the flowers with it. I have never done that before.*" CAUTIOUS).

Participants varied not only in whether they considered solutions as feasible, but also in whom they regarded as **responsible** for achieving societal change. This category subsumes all participants' statements that relate to actors and/or areas of action, again ranging from the micro to the macro level. If responsibility is seen on an individual level, it is often contextualized with the desire to understand better one's own contributions ("*Hans mentioned earlier that strange guy in Brazil who is having the rainforests cut down. Why is he doing that? Because we want the timber. Right. Moreover, why is plastic being produced? Because, of course, we insist on buying everything wrapped in plastic at the supermarket*." CAUTIOUS). Alarmed and Cautious often worry about the observed inactivity of the "others" about an individual contribution to climate protection ("*And I get angry about all of it, about taxi drivers, truck drivers, DPD delivery drivers, everyone who needlessly leaves their engines running. And they do not think about it at all. As someone said earlier, it is the ignorant people. And, um... there really cannot be enough programs about it*." CAUTIOUS). Those participants are calling for stricter regulations and sanctions to limit the quest

for consumption and convenience ("*I think that is absolutely terrible. If you really think about it, simple things like patio heaters and leaf blowers should have been banned a long time ago*." CAUTIOUS), and insist that systemic actors, such as governments and large corporations, should move forward with more regulations (instead of incentives).

Measurement of the Emotional Dimension

The explorative factor analysis revealed a second factor ("Emotional Constructiveness") as key, which includes whether reporting fosters optimism about the future (.78), presents a positive perspective (.69), focuses on solutions rather than problems (.66), communicates that the situation is solvable (.66), and introduces new personalities (.43). Emotional Constructiveness indicates that audiences associate journalistic elements of constructive journalism with a broader emotional climate characterized by hope and openness rather than despair and repetitiveness (*„Do I feel (hope, optimism,..) that transformation is possible?").* For Emotional Constructiveness, a Welch ANOVA indicated statistically significant but substantively small differences between the mean values of segments ($F(5, 180.84) = 4.54$, $p < .001$). Table 2 shows the values for this factor across the different climate engagement groups.

Table 2
Emotional Constructiveness in different climate engagement groups

	Alarmed	Concerned	Cautious	Disengaged	Doubtful	Dismissive
Epistemic Constructiveness	2.7[a] (0.8)	2.7 [b] (0.7)	2.7 [c] (0.7)	3.0 [a b c d] (0.4)	2.6 [d] (0.6)	2.8 (0.8)

Note: Respondents indicated their agreement with a bipolar scale ranging from 1 ("strongly disagree") to 5 ("strongly agree"). Means sharing the same letter are not significantly different (ANOVA with Games–Howell post hoc test, $p < .05$).

Our qualitative findings underscore that the general emotional responses to climate communication remain strongly shaped by the **perceived** overdominance of catastrophic framing in public discourse. The Alarmed reported intense feelings of issue fatigue and helplessness due to the constant stream of negative news ("*Yes, of course I do not like hearing all the bad news either, especially when you have children, you cannot really bear it*") and a deep frustration about the failure of past attempts to tackle climate change and the observed apathy and non-learning from prior mistakes on all societal levels: "S*o the subject is totally serious. But I have had it. Because it is the same thing over and over again. We want to, we have to. But nobody ever just starts....*" (CAUTIOUS). The motivation to learn about more positive future pathways is also expressed by less engaged audience segments (DISENGAGED): *"…and we no longer turn to the past to see how bad it is, but look to the future to see what we can change, how we can adapt our lifestyle so that we can cope with it"* who emphasizes that hope is a feeling directed to future developments, and thus opens a motivation to learn how positive change could be realized.

Across all engagement groups, emotional constructiveness is closely linked to processes of **social identification**, which serve as an additional sense-making device that shapes emotional and affective responses to climate solutions. When participants perceive a high degree of social similarity with portrayed protagonists, this tends to facilitate emotional appraisal and openness towards the proposed solutions. Conversely, perceived social distance from solution-related actors can lead to emotional rejection. Among the Alarmed and Cautious, identification with actors whose practices and values are perceived as relatable often enables positive emotional engagement with climate solutions. In contrast, solutions associated with actors perceived as socially distant, such as affluent elites or activist groups, can evoke emotional rejection: "*I have mixed feelings because I do not need (...) rich forest owners crying about how bad things are for their forest. They are upset that their forest is suffering, and they have to sell their SUV.*" (CAUTIOUS). Rather than rejecting climate action per se, participants express feelings of exclusion and lack of resonance with dominant communicators such as activist movements, as they are doubtful that they understand their everyday life needs and constraints: "*I do not think I feel quite so well represented (…) Fridays for Future is not for me, so I cannot identify with it (…) no thought is given to solutions, and whether they are feasible.*" (DISENGAGED).

Measurement of the Mediated Dimension

Mediated Constructiveness does not emerge as a distinct latent factor in the quantitative analysis, likely because the survey items primarily capture evaluations of solution characteristics rather than qualities of the communicative environment itself. The qualitative findings, however, consistently point to mediated constructiveness as a cross-cutting interpretive dimension that relates to both cognitive and emotional sense-making. Mediated Constructiveness refers to audiences' perceptions of the extent to which media communication enables or constrains constructive engagement by striking a good balance between cognitive and emotional engagement, neither overwhelming audiences with complexity and emotional intensity nor reducing climate solutions to a level that is too simplistic or too complex and intertwined. Overall, the findings show that Alarmed participants do reflect extensively on the potential and actual impact of climate solutions. They expressed a desire for this impact to be communicated more clearly, ideally through concrete examples and connections to their everyday lives, to strengthen motivation to act and avoid feeling "paralyzed". In this context, participants emphasized the importance of providing evidence and confirmation for already existing and widely discussed climate solutions (*"How much sense it actually makes to reduce meat consumption, that it really does have something to do with climate protection. I think it is important to talk about such things."* ALARMED). At the same time, participants expressed concerns when solutions were presented in the media as too abstract, too distant, or as primarily dependent on external actors, as this could reduce the perceived need for individual action. They also expected media coverage to provide a comprehensive contextualization of impacts across different societal levels and to explain how these levels interact: *"I would generally like to have more structure in such reports (...). That you first show the problem at both the individual and macro levels. What kind of influence does it have on everything? And then move towards solutions. So that you do not just give me a personal tip, but also think about: 'Okay, what can we as a society do? What can politics do? What can companies do?'…that you look at the issue more holistically."* ALARMED). Thus, participants expected media coverage to prioritize and differentiate solutions based on their potential impact, giving greater visibility and prominence to those perceived as having substantial transformative potential.

In particular, participants from the Disengaged group describe many solution-oriented contributions as remaining too abstract or lacking practical explanations of how they can be made feasible. As a consequence, solutions are perceived as distant from everyday life, and their practical relevance remains unclear. Closely related to understanding is the extent to which media connect climate solutions to audiences' own social contexts. Participants repeatedly describe concrete examples and **local success stories** as characteristics that make climate solutions easier to understand and follow over time ("*That you also report on changes … like renewable energy and how it has developed … so that you are always kept up to date. I miss that*." ALARMED). Likewise, local examples are perceived as particularly relevant because they reduce psychological distance and facilitate imagining future societal change ("*From my perspective, projects from the local area… from the immediate surroundings are always interesting. If I read about something in my own neighborhood that has been successful, I find that more interesting than a project from (…) somewhere*." DISENGAGED).

A first aspect concerns the balance between **complexity and reduction** appropriate for the respective media space. For example, reading a news feed in public transport requires a different degree of complexity ("*I like it when it is short, concise, and to the point. Getting things across clearly and directly."* versus "*But I thought the brevity packed in so much information that it was actually quite good. With some things, especially the graphics, I could hardly keep up.*" DISENGAGED) than a documentary during evening times, which gives more time for complexity, but still requires too much. Across engagement groups, participants appreciate reporting that explains climate solutions concisely and accessibly while still providing sufficient information to understand their relevance. Constructive coverage is expected to explain not only what solutions exist, but also how they work and why they matter ("*Of course, as I said, proposed solutions would be the main reason for me actually to watch it. It is something where I feel that someone has really thought about how one can somehow live with it, or perhaps find an innovative solution for dealing with it differently. I personally always find that interesting.*" CAUTIOUS).

Participants also evaluate the constructiveness of climate coverage with respect to the emotional quality of the reception experience. Across engagement groups, constructive communication is described as **emotionally engaging** without becoming emotionally overwhelming or persuasive.

Participants from the Cautious and Alarmed groups are particularly sensitive to dramaturgical exaggeration, sensational storytelling, and emotional persuasion ("*With that video, I found it really, really awful. I think it was not 'we are reporting on a really important topic', but rather 'we are now telling an exciting story'. The way it was introduced was geared towards suspense, and behind it, the background music, that was all designed for tension*." CAUTIOUS). Likewise, participants reject both strongly fear-oriented and overly optimistic framings ("*Yes, but I... the possible solutions also seem to me, at least in part, maybe overly good to be true. And I mean, not everything that's... uh... going to come has been resolved either.*" ALARMED), especially when these are perceived as reducing credibility ("*Yes, that it is not fact-based, but instead aims at emotions. And I think that has no place in news*." CAUTIOUS). Participants do not reject emotional engagement itself. Rather, emotional responses are considered constructive when they support reflection without creating feelings of overwhelm ("*The first contribution also left me with a very different feeling. I did not really like it, because this emotional level rather gave me a feeling of paralysis*." DISENGAGED).

Declarations

Funding Declaration

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Author Contribution

I.H. and I.N. co-led the study's conception and overall design of the audience studies. I.H. developed the questionnaire, conducted the analysis and interpretation of the audience survey data and the qualitative group discussions. I.H. wrote and edited the manuscript. H.R., IN and S.K. co-wrote parts the manuscript and contributed to the data analysis. All authors discussed and interpreted the results and contributed to the final version of the paper.

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Data Availability

The datasets generated and analysed during the current study are available from the corresponding author upon reasonable request.

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Figures

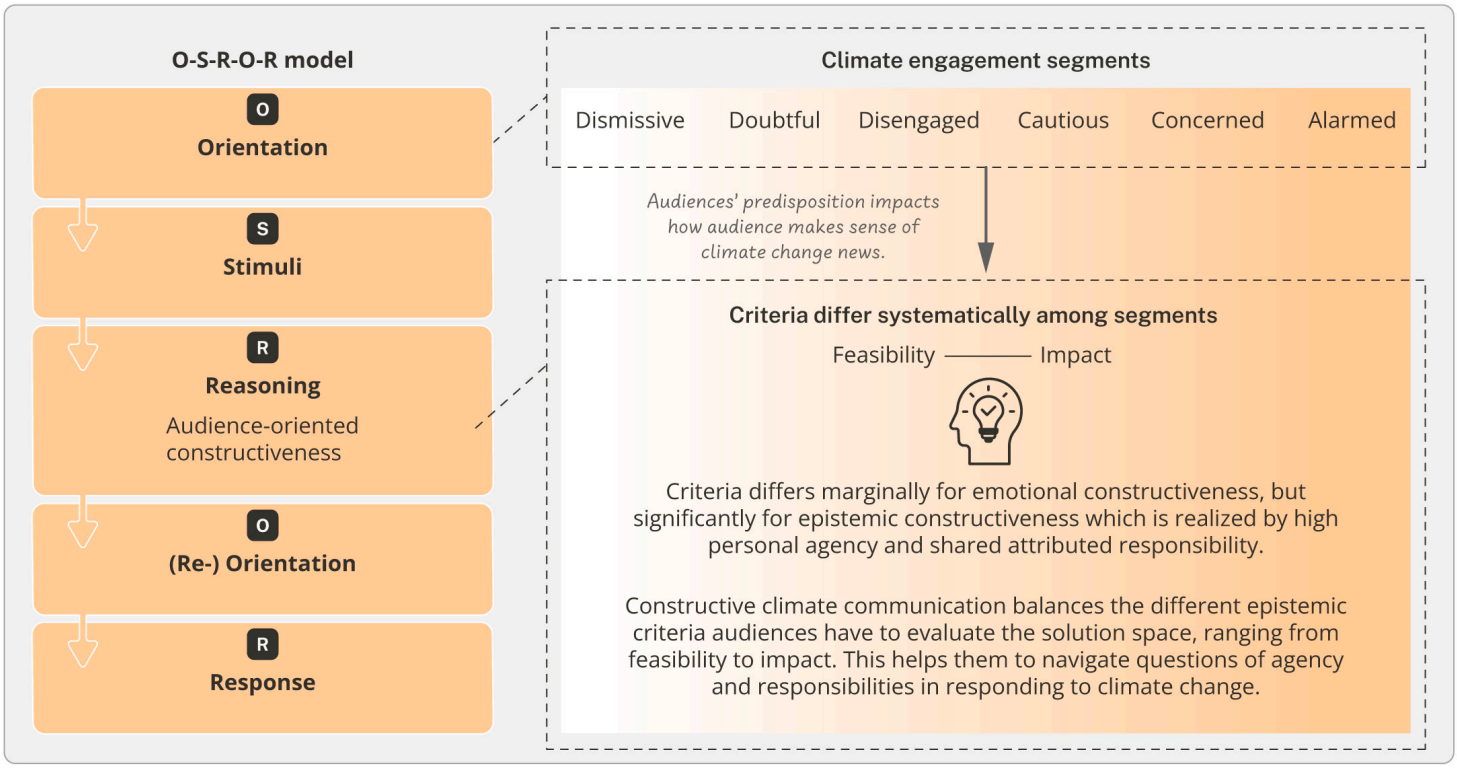


Figure 1

Reasoning about climate solutions with respect to different climate engagement segments

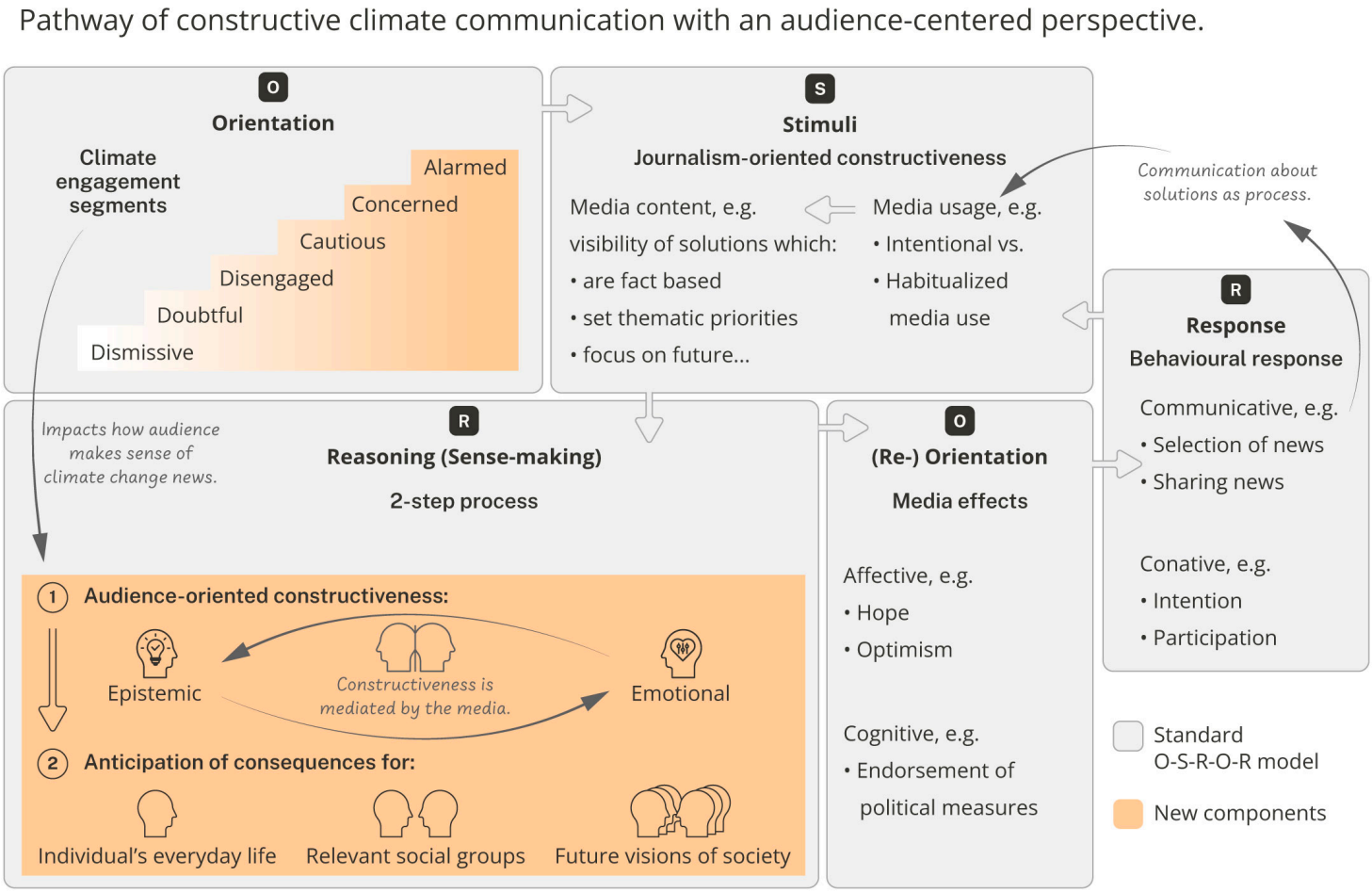


Figure 2

Pathway of constructive climate communication with an audience-centered perspective

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