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Climate Communication in the Hybrid Media System: Media and Stakeholder Logics on Social Media

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Abstract

Climate change is a major political challenge affecting millions of people worldwide. Journalists—while following media logic—have a strong responsibility to inform the public of the scientific evidence on the causes and consequences of climate change and to explain the motivations driving the climate policies under discussion. However, within hybrid media systems, journalists increasingly compete for attention with climate stakeholders, who tend to follow a political logic in climate communication and bypass journalism to share their perspectives on climate change. Despite this dynamic, the extent to which the climate communication of media organizations and stakeholders diverges in terms of content and focus remains largely unexplored, as does whether their topics and communication styles show signs of convergence. This article addresses these gaps by comparing how journalistic media and climate stakeholders communicate about climate change on social media and by examining the user engagement their content creates. We conducted a manual quantitative content analysis of visual posts about climate change published by media organizations and climate stakeholders in Germany on Instagram, Facebook, TikTok, and YouTube during the 2023 UN Climate Change Conference in Dubai (N = 1,050). The results deepen our understanding of the national climate discourse in Germany and show that journalistic content in climate communication adheres strongly to media logic, presenting climate change in a more event-oriented, personalized, and negative manner. However, climate stakeholders' communication is characterized by political logic, using strategic framing and focusing less on current climate events.

Keywords

climate change; climate journalism; hybrid media system; media logic; political logic; social media; stakeholders

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1. Introduction

Climate change is a major political challenge that affects millions of people worldwide (Guenther et al., 2023; León et al., 2022). Effective climate journalism plays a crucial role in informing the public about the causes and consequences of climate change and in discussing appropriate action (Schäfer & Yan, 2023). However, climate journalism faces two major challenges that complicate achieving this goal. First, climate change is not an inherently newsworthy issue. Due to its complexity, long-term nature, and the fact that it is not a new phenomenon, climate change has a comparatively low news value (Comfort, 2019; León et al., 2023). As a result, it is often overshadowed in coverage by other political issues (Wozniak et al., 2015). Second, journalists must compete in the climate discourse of the hybrid media system with a growing number of climate stakeholders, such as climate activists, politicians, and alternative media, all striving for attention and interpretive dominance (Chadwick, 2017). These climate stakeholders are individuals or organizations that influence the discourse on climate change and climate policy decisions and that can bypass journalists to communicate their perspectives on climate change in different arenas of the hybrid media system, primarily on social media. Yet, they often pursue political objectives distinct from those of journalism and employ a different logic in the selection and presentation of political messages (Hopke & Hestres, 2018). Accordingly, climate stakeholders can use social media not only to raise awareness but also to challenge dominant narratives or criticize (a lack of) coverage (Molder et al., 2022; Schäfer, 2024). Given these differences between media logic and political logic in climate change communication, the hybrid media system has been described as a "battlefield for climate politics" (Eilders, 2023, p. 13).

However, the extent to which the climate communication of media organizations and climate stakeholders actually differs in terms of content and focus remains largely unexplored. Assuming that their communication is rooted in different logics, we expect distinct thematic structures and presentation mechanisms in their climate communication. At the same time, the competition for attention within discursive arenas of the hybrid media system could lead to the hybridization of these logics, resulting in similar communication efforts and minor thematic differences (Guenther et al., 2021). Yet, empirical studies comparing these aspects in the climate discourse are still scarce. Moreover, there is limited research on whether the popularity of content from media organizations and stakeholders in the climate discourse differs and how features of media logic and political logic influence the reach of climate change content.

This study aims to address this research gap by examining climate communication within the hybrid media system and comparing the climate communication of media organizations and climate stakeholders in Germany across different social media. Given the importance of visual content for political communication and especially in climate change discourse (Mooseder et al., 2023), we focus on visual and multimodal social media content. Using a manual quantitative content analysis, we analyze the characteristics and popularity of climate change posts published during the 2023 UN Climate Change Conference on profiles of media organizations and climate stakeholders in Germany on Instagram, Facebook, YouTube, and TikTok (N = 1,050).

Our study contributes to climate communication research in several ways. First, it offers insights into the thematic structures of the current visual climate discourse on social media. Second, it sheds light on different competing logics of news selection and presentation within the hybrid media system by comparing the climate communication of media organizations and climate stakeholders. Third, the study deepens our

understanding of the national climate discourse in Germany, where, after a long period of consensus, alliances of more skeptical actors are emerging (Ruser, 2022). Finally, the study advances our understanding of how audience attention to climate content is distributed.

2. Climate Change Communication in the Hybrid Media System

The concept of the hybrid media system originates from Andrew Chadwick (2017) and has become a widely used umbrella concept for studying various processes in the current digital media environment. In his book, Chadwick (2017) observes that digitization and the advent of new communication technologies have led to a system in which traditional and new media coexist, compete, and adapt to one another.

A central argument in Chadwick's work is that within the hybrid media system, traditional and new media logics collide, interact, and partially merge. He broadly defines media logics as "bundles of technologies, genres, norms, behaviors, and organizational forms" (Chadwick, 2017, p. 285). They encompass traditional, new, and hybrid methods of selecting, prioritizing, and presenting topics and messages in political discourse. These old and new logics are often associated with different political actors that converge in the same digital arenas of the hybrid media system and influence each other (Guenther et al., 2021). Journalism must now compete for the attention of the public with other political and social actors and groups, many of which operate according to different logics (Büchi, 2017). These political actors include, for instance, social movements that use social media to generate attention to an issue and their goals (Eilders, 2023). Politicians and political parties can also rely on social media to bypass traditional journalism and directly communicate their agendas and perspectives to the public (Hopke & Hestres, 2018). According to Chadwick (2017), political actors within the hybrid media system often seek to control information flows in ways that serve their objectives while simultaneously enabling or constraining the agency of other (competing) actors.

2.1. Comparing Media Logic and Political Logic

A key assumption of the hybrid media system is the presence of various logics that coexist, influence one another, and compete for dominance. In our interpretation, Chadwick's (2017) broad concept of "logic" also encompasses the different principles by which various actors select political messages and the ways in which they present them. Two prominent traditional logics commonly distinguished in political discourse, and on which we focus in our article, are media logic and political logic.

The distinction between media logic and political logic originates in part from mediatization research, which argues that politics, on a macro and meso but sometimes also on a micro level, adapts to the conditions imposed by the media (Kepplinger, 2002). Following this view, politics can also be said to be oriented towards media logic (Strömbäck, 2008, p. 235). The term "media logic" describes a form of communication that can encompass formats and content but also processes (Altheide & Snow, 1979). As such, the term is used to analyze how media organizations select, organize, and present information. Scholars have assumed that these journalistic rules are shared by nearly all media organizations (Haßler et al., 2014) and serve democratic functions such as ensuring transparency and accountability (Esser, 2013). Key features of institutional media logic are the selection of events for reporting based on their newsworthiness (Galtung & Ruge, 1965) and the use of recurring narrative techniques such as simplification, personalization, or stereotyping (Strömbäck, 2008, p. 233).

In contrast, the concept of political logic refers to how information is selected and presented by political actors. The original conception of political logic has focused primarily on the communication strategies of political parties (Esmark & Mayerhöffer, 2014). Unlike journalism, politics is concerned with collective decision-making and the implementation of those decisions (Strömbäck, 2008). Therefore, political actors often emphasize societal problems and propose solutions to address them in their messaging (Strömbäck, 2008). In contrast to media logic, political logic essentially aims to set the political agenda and establish certain perspectives on political events (Chadwick, 2017; Esmark & Mayerhöffer, 2013).

Considering these different logics, Strömbäck (2008) concludes that political communication within a society can be shaped to varying degrees by either media logic or political logic. In their work in this field, Haßler et al. (2014, pp. 328–330) identified five key aspects that allow for the differentiation and comparison of media logic and political logic. First, it is assumed that journalism tends to focus on the procedural (politics) and structural (polity) dimensions of democracy, whereas political actors would rather address policy issues (Strömbäck & van Aelst, 2010). Second, journalism is thought to focus intensely on individuals, while political actors emphasize political groups in their communication, such as governments or parties (Strömbäck & van Aelst, 2013). Third, it is assumed that journalism uses a more negative tone compared to political actors (Galtung & Ruge, 1965). As an important caveat, research on negative campaigning shows that political actors also often use negative statements to criticize their political competitors, especially during election campaigns (Klinger et al., 2023). Fourth, Haßler et al. (2014) argue that the media tends to focus on short-term events, while political actors generally—but not exclusively—focus on long-term processes (Kepplinger, 2002). Finally, journalists strive to deliver information that is clear and precise, whereas political actors may employ ambiguity for strategic reasons (von der Wense & Hoffjann, 2023).

2.2. Media Logic and Political Logic in Climate Change Communication

The different goals and logics of the media and political spheres lead to differences in their respective political communication. Previous research comparing the content of journalistic media with that of stakeholders supports this claim (Chen et al., 2023). However, only a few studies directly compare media and stakeholder communications simultaneously. In contrast, much of the research in the field compares independent studies that focus on only one of the two logics. As this approach relies on different time periods and methods to compare media and political logics, its conclusions may lack precision. Second, much of the research has focused on election campaigns and rarely examined other political discourses. As a result, it remains unclear whether these different logics manifest in communication channels in other contexts, such as the climate debate. Another limitation of prior research is its focus on the content level, which ignores the question of how popular these different logics are among audiences.

This research gap also applies to the climate change discourse—an issue of great political importance that often struggles to attract sustained media attention (León et al., 2023). Public focus on climate change typically peaks during severe weather events or major political conferences such as the UN Conference of the Parties (COP; Mooseder et al., 2023). As such, the COP event serves as an ideal example to explore the differences between media and political logics in climate communication. Furthermore, it can be hypothesized that the five content-related dimensions distinguishing media logic from political logic can also be used to identify communication differences in climate-related discourses. Drawing on Haßler et al. (2014), we propose an interpretation of these five aspects in the climate discourse to observe potential differences between media and political logics.

First, climate change is a complex political issue with multiple political dimensions. To address climate change, individual aspects such as causes, effects, and climate actions can often be emphasized in the discourse (Wessler et al., 2016). A focus on policy issues in climate discourse could manifest in an emphasis on climate action and strategies rather than structural or procedural dimensions. Second, climate change is an inherently abstract issue and is often considered to have low news value due to its complexity (León et al., 2023). However, climate conferences bring together leading politicians and climate stakeholders, such as climate activists, offering opportunities for personalization (Haßler et al., 2014; Molder et al., 2022). Visual personalization, emphasizing the significance of the involved actors, could make complex negotiation processes less abstract. Third, the level of negativity in climate discourse is reflected in a focus on the consequences of climate change, such as extreme weather events and environmental degradation, rather than a positive vision of the future (Molder et al., 2022). Fourth, climate discourse is influenced by short-term events that draw attention to the broader, long-term climate change process. Indicators of topicality might include explicit references to events like climate conferences (Wozniak et al., 2021). In contrast, general discussions of climate change without such references would indicate lower topicality. Finally, climate change discourse is often marked by ambiguity, as there is no single, universally accepted solution to combat climate change, and various actions and responsibilities coexist (Post et al., 2019). Assigning responsibility for addressing the crisis offers a way to inject clarity into an otherwise vague discourse. Against this backdrop, we pose the following research question:

> RQ1: To what extent do climate stakeholders and media organizations follow different logics when discussing climate change on social media?

Furthermore, we investigate how audience attention to climate discourse content is distributed between media organizations and climate stakeholders. We aim to understand whether the potential use of specific logics in climate discourse also explains variations in the popularity of content on social media. This research interest is inspired by scholarly arguments suggesting that a distinct social media logic exists "which remixes traditional media logic" (Mooseder et al., 2023, p. 2). Social media logic refers to the processes, principles, and practices through which these platforms process information, news, and communication (van Dijck & Poell, 2013). A key aspect of social media logic is the quantification and diffusion of content based on its popularity, which is reflected in user engagement statistics (Mooseder et al., 2023). For example, profiles with a higher number of followers have the chance of a greater reach on platforms, which in turn can lead to higher engagement rates (Eslami et al., 2022). These user interactions influence the algorithmically determined relevance of posts and their reach so that popular content quickly receives even more attention (Bucher, 2012; Klinger & Svensson, 2015). It can, therefore, be assumed that media and stakeholders adjust their content to improve the reach of their current and future messages by increasing their number of followers (Jost, 2023).

Various studies have thus identified characteristics of social media logic as opposed to traditional media logic (e.g., Haim et al., 2021; Hendrickx & Vázquez-Herrero, 2024). However, the aim of our study is not to identify elements of posts that adhere to the original social media logic, such as specific sentence structures, emojis, or calls to action (Haim et al., 2021). Instead, we are interested in understanding whether and to what extent the traditional media and political logics persist and converge on social media. Accordingly, we interpret social media logic as a combination of various traditional logics and expectations in a new environment. In line with the hybrid media system approach, this hybridization can manifest as actors adopt elements from other

logics and integrate them into their social media communication. For example, climate stakeholders may use elements of media logic by personalizing their climate communication visually to attract more attention on social media. This behavior raises the question of whether the popularity of content from different actors remains tied to traditional logics and whether social media users reward different logics across profile groups through likes. We ask:

> RQ2: Which content characteristics explain the popularity of climate change posts by media organizations and climate stakeholders?

3. Climate Change Communication in Germany

This study examines climate change communication in Germany and considers the German case as particularly interesting for several reasons. First, Germany was the highest-ranked G7 country in 2024 according to the Climate Change Performance Index, thereby assuming a leading role regarding climate change mitigation in the global context (Burck et al., 2024). Second, Germany is the most populous country in the EU, giving it significant weight in European politics. Germany is also the country with the highest greenhouse gas emissions in the EU, which means that action against climate change would target one of the main contributors. Third, climate change occupies a prominent position in German political discourse. For example, Olaf Scholz, who was chancellor at the time of COP28 but lost a vote of confidence before the end of his legislative period, successfully ran his election campaign in 2021 with the title "Climate Chancellor" ("Berlin calls climate," 2022). Finally, there has long been a public consensus in Germany that climate change is human-made and requires action (Moreno et al., 2022). However, skeptical voices are increasingly emerging on social media, particularly fueled by the rise of the far-right party Alternative for Germany (AfD), which publicly advocates climate-skeptical positions and is highly active on social media (Kuner, 2024; Ruser, 2022).

4. Method

To answer our research questions, we conducted a manual quantitative content analysis of posts published by German media organizations and climate stakeholders on Facebook, Instagram, TikTok, and YouTube. The four platforms were selected in accordance with the German leg of the Reuters' *Digital News Report 2024* (Newman et al., 2024), which covers the most-used social networks in the country. The data from the platforms was collected during the UN Conference of the Parties (COP28) in Dubai, which took place from November 30 to December 13, 2023. Previous research has shown that the amount of social media content on climate change has peaked annually during previous conferences, making it a key event for climate change communication (Mooseder et al., 2023). We collected data from all of these days as well as three days before and after the conference. Due to ethical concerns, we analyzed only publicly available posts.

To compare the climate communication of media organizations and climate stakeholders, we first compiled lists of relevant media and stakeholder categories for the German climate debate based on existing literature and our background knowledge (Hopke & Hestres, 2018). We have selected accounts from high-reach media and from individuals and institutions that influence climate discourse and climate-related political decisions in Germany: (a) news agencies (e.g., *dpa*), (b) public broadcasters (e.g., *tagesschau*), (c) quality newspapers (e.g., *Zeit Online*), (d) tabloids (e.g., *BILD*), (e) political magazines (e.g., *Spiegel*),

(f) alternative news (e.g., *Compact TV*), and (g) satire formats (e.g., *extra 3*). The media profiles we selected represented the outlets with the widest reach in each category. As in previous studies on German media coverage, we ensured that the most important quality newspapers were included, as well as outlets with different political orientations (e.g., Magin et al., 2025). Climate stakeholder accounts include profiles of (a) federal politicians (e.g., Olaf Scholz), (b) political parties (e.g., Christian Democratic Union of Germany), (c) federal institutions (e.g., the federal government), (d) climate activists (e.g., Fridays for Future Germany), (e) environmental NGOs (e.g., Greenpeace), (f) scientific institutions (e.g., GFZ Potsdam), and (g) climate skeptics (Europäisches Institut für Klima und Energie). We included the accounts of all politicians from the government, parliamentary party leaders, and members of the parliamentary committee on climate protection and energy. We also collected posts from the profiles of parties represented in parliament and their parliamentary groups. In addition, we included the environmental NGOs with the greatest reach. An overview of all profiles can be found in the Supplementary Material (Appendix 1).

A total sample of 14,879 social media posts was collected from the four platforms, representing all posts published on the selected profiles during the study period. We used official APIs to collect posts from TikTok and YouTube and relied on CrowdTangle to access Instagram and Facebook posts (see Supplementary Material, Appendix 2, for details on data access and limitations). We tracked the number of likes for each post 10 days after it was published as an indicator of popularity. Likes are an effective means of analyzing the communication of the actors under study as they represent a measure of user engagement that users are likely to interpret similarly across social media.

Approximately 80% of these posts were published by media organizations, while about 20% were from various climate stakeholder groups. For the manual analysis, we selected all 2,978 stakeholder posts and a weighted random sample of 6,000 media posts. We manually analyzed these 8,978 posts to determine whether they contained at least one image or video. Due to our research focus on visual climate communication, we excluded posts containing only text from the analysis. Additionally, we excluded posts that only included a link to an external website, as they did not represent original social media content. After applying these criteria, 5,152 original visual social media posts remained, which included posts on a range of political topics.

To ensure that only social media posts on climate change were included, we coded whether the post contained any reference to climate change. Posts were considered relevant when they addressed the causes or consequences of climate change or depicted or mentioned measures to combat climate change. Posts were also included when they implicitly referred to climate change by discussing topics such as climate protection and protests related to environmental or energy issues. A reference to climate change was also considered present if, for example, the causes, consequences, and/or measures related to climate change were criticized or denied (e.g., questioning the need for renewable energy). This filtering step resulted in a final sample of 1,050 visual social media posts on climate change, of which 34% were media posts and 66% were stakeholder posts. An overview of the filtering and data preparation steps is provided in the Supplementary Material (Appendix 3).

To analyze the use of different logics in climate communication, we coded multiple categories corresponding to the five aspects of media logic proposed by Haßler et al. (2014). Most of these categories focused on the entire post, considering the caption, the image or video, and any text within the image or video. The account name and profile were used for further contextualization during the coding process. For videos, the first minute was

coded. For posts with multiple images (so-called carousel posts), only the first visible image was coded. Most of the following categories were coded in binary form for each post, indicating whether it was included in the post (=1) or not (=0). The categories were coded independently so that several categories could be coded for each post.

To examine the thematic focus of the posts and thereby assess the focus on policy issues, we coded several categories. These categories aim to test whether climate posts focus more on negative climate change consequences (media logic) or causes of climate change and mitigation strategies (political logic). First, we identified thematic priorities within the posts by capturing various causes, consequences, and mitigation measures related to climate change. We applied an operationalization by Wessler et al. (2016), which we expanded inductively. For the statistical analysis, we aggregated all causes, consequences, and mitigation strategies into three indices. Additionally, we analyzed the dominant themes of the posts using a smaller subset of climate change frames that had been identified in a systematic review by Guenther et al. (2024).

The authors of the review compiled the 16 most salient frames from different frame locations, such as communication research (e.g., Daub, 2010), journalism research (e.g., Engesser & Brüggemann, 2016), and audience research (e.g., van Eck et al., 2020). The original list of 16 predefined frames was reduced to five frames during the coding process: climate action and policy, populism and scientific uncertainty, negative consequences, human touch, and protest. This step was necessary to ensure reliable coding of the frames and was also theoretically reasonable, as the initial list also included frames derived from frame locations that were not necessarily relevant to our content study (Guenther et al., 2024). Based on the theoretical considerations, the climate action and policy frame, and the focus on negative consequences and human touch would be more in line with media logic. The use of strategic political frames, such as protest and populism frames, would be more in line with political logic.

For visual personalization in climate change posts, we first used a binary measurement to determine whether at least one person was depicted in the image or video (Haßler et al., 2024). If a person was present, we further coded the types of individuals in the visual material, categorizing them as, for example, politicians, activists, journalists, or ordinary citizens. The visual personalization dimension is closer to the logic of the media.

To measure negativity as an indicator of media logic, we captured different variables. First, as described above, we identified the predefined frame labeled negative consequences. Additionally, through the thematic focus analysis, we identified posts that highlighted at least one (negative) consequence of climate change.

Topicality and the focus on short-term events were described as a tendency in climate journalism and an indicator of media logic. We tested the topicality of posts based on whether they explicitly referenced COP28, marking it as a current event. More specifically, we coded whether posts (a) referenced climate change without mentioning COP28, (b) mentioned only COP28, or (c) addressed both the COP28 and climate change as a broader topic. The latter two were categorized as COP-related and thus coded as topical content.

Since the use of political logic is considered to employ more ambiguity for strategic reasons, we analyzed the extent to which posts explicitly attributed responsibility for addressing the climate crisis at a particular societal level. This assessment involved determining actors or institutions that should take action against climate change (e.g., implementing environmental protection or reducing emissions). Responsibility could be

explicitly assigned or implied through the listing of measures targeting specific groups. Initially, responsibility was categorized into three levels: micro (e.g., individual politicians and citizens), meso (e.g., individual companies and governments), and macro (e.g., society and humankind). However, since the comparison of ambiguity between media logic and political logic only asks about the presence of attribution, we calculated a binary index for the analysis indicating whether or not posts explicitly assigned any responsibility.

Two coders were extensively trained to code the posts from all four platforms. To ensure reliable coding of the data, each annotator independently coded a random selection of 100 posts, some of which were part of the final sample. For the calculation of the intercoder reliability tests, we used the R package tidycomm (v0.4.10; Unkel et al., 2024) and achieved satisfactory values for three reliability indicators (Brennan & Prediger's κ, Holsti's CR, Fretwurst's Lotus) and almost all variables (>.70, see Supplementary Material, Appendix 4). The codebook, data, and analyses are publicly available at: https://osf.io/82khj

We share all data necessary to reproduce our analyses. This corpus does not include raw data, as the sharing of raw data might infringe upon privacy rights, social media terms of service, and, in the case of imagery, copyright. Raw data is available upon request.

5. Results

RQ1 examines whether climate journalism and climate stakeholders employ different logics when discussing the topic of climate change on social media. In the first step to answer this question, we aggregated posts from all media organizations on one side and all stakeholder profiles on the other. In the second step, we calculated mean values for the dichotomous content analysis categories in the dataset, reflecting the relative frequency of specific features. This process allowed us to perform tests to compare the mean values of posts between the two groups. An example of this metric is the share of climate change posts with an explicit reference to COP28. An explicit reference to COP28 was coded as either absent (value 0) or present (value 1). The share of posts with an explicit reference to COP28 among stakeholders was 20.6%, which corresponds to a mean of 0.206 on a scale of 0 to 1. Figure 1 shows these mean values, along with confidence intervals, for each category and separately for media and stakeholder profiles.

The results of the statistical tests were calculated with tidycomm (v0.4.10; Unkel et al., 2024) and revealed significant differences between journalists and stakeholders in their use of social media platforms for climate communication. Effect sizes for Cohen's d were interpreted as small ($d = 0.2$), medium ($d = 0.5$), and large ($d = 0.8$) based on benchmarks suggested by Cohen (2013). To ensure the robustness of the findings, we also calculated Mann-Whitney U tests in each case using rstatix (v0.7.2; Kassambara, 2023). This nonparametric procedure yielded the same test decision as the t-tests for each mean comparison. The t-tests show that stakeholders use Facebook ($t(814) = 7.99$, $p < 0.001$, $d = 0.5$), Instagram ($t(783) = 3.70$, $p < 0.001$, $d = 0.23$), and TikTok ($t(917) = 2.55$, $p < 0.05$, $d = 0.15$) significantly more frequently for climate communication than journalistic media. Conversely, we find a significant effect showing that media organizations publish climate-related content significantly more often on YouTube than stakeholders ($t(525) = -12.6$, $p < 0.001$, $d = 0.93$).

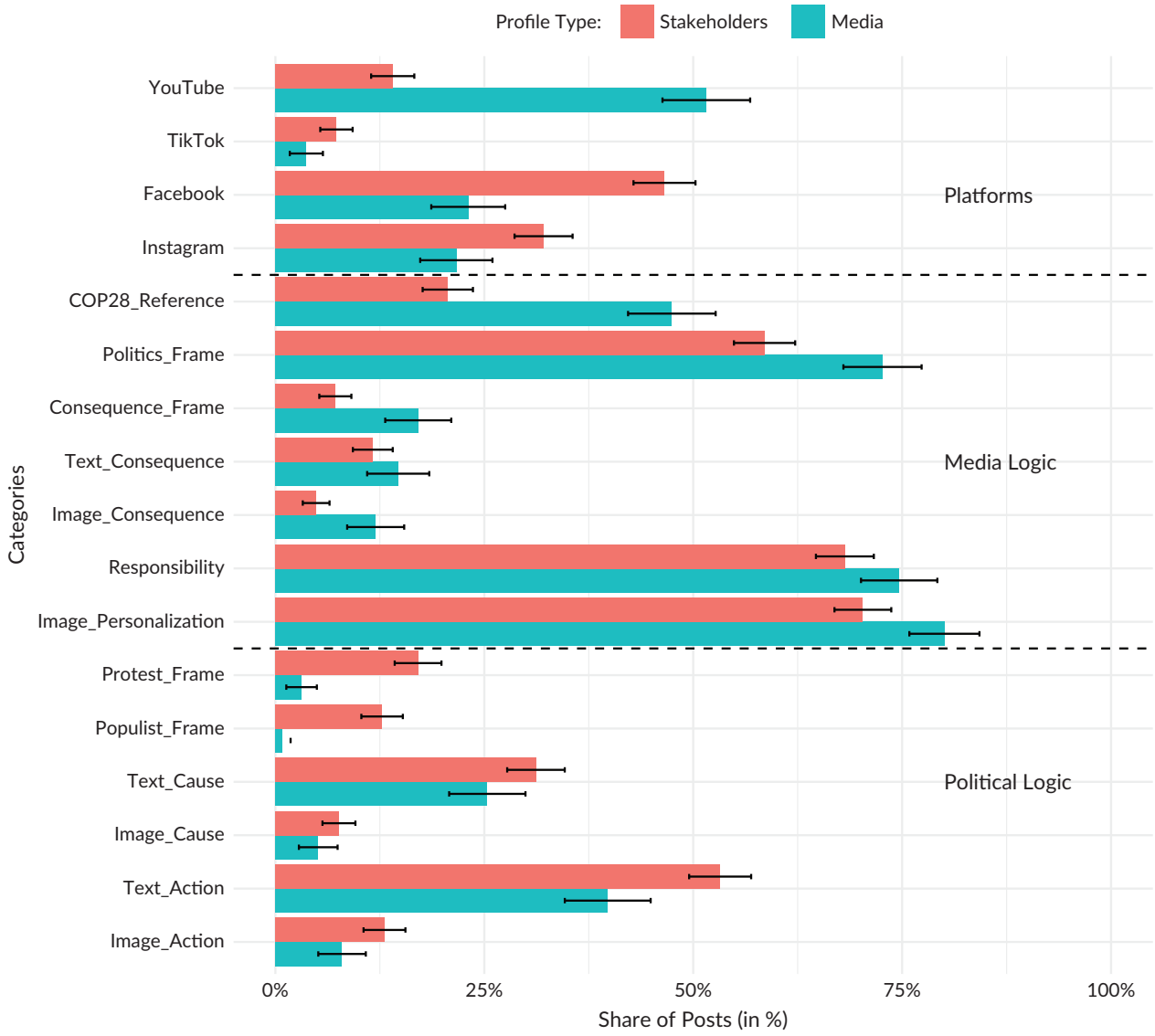


Figure 1. The share of climate-related posts from stakeholders and media profiles on social media platforms and with different content features. Notes: Mean values are shown as percentages (i.e., on a scale from 0 to 1) with the corresponding confidence intervals; the figure is based on the table in the Supplementary Material (Appendix 5).

Moreover, the climate communication by journalism and stakeholders differs across all content dimensions outlined in the theory section, albeit the effect sizes tend to be small. Regarding policy issues, climate journalism is more likely to frame climate change as a political issue that involves political negotiations between different nations or politicians. The politics frame is employed significantly more frequently by climate journalism (72.6%, $n = 262$) than by stakeholders (58.5%, $n = 408$; $t(767) = -4.66$, $p < 0.001$, $d = 0.30$). At the same time, stakeholders' visual ($t(848) = 2.63$, $p < 0.01$, d = 0.16) and textual climate communications ($t(717) = 4.10$, $p < 0.001$, $d = 0.27$) focus significantly more often on concrete strategies for combating climate change compared to media posts.

A second area of divergence between the climate communication of journalism and stakeholders is the degree of personalization. Social media posts by media organizations exhibit a higher level of visual personalization

than those by stakeholders ($t(790) = -3.55$, $p < 0.001$, $d = 0.22$). While roughly 70% of stakeholder posts feature at least one person (70.3%, $n = 490$), this figure rises to 80% in media posts (80.1%, $n = 281$).

Regarding negativity, we find that journalistic media are significantly more likely to use the negative consequences frame compared to stakeholders ($t(520) = -4.43$, $p < 0.001$, $d = 0.33$). While climate change is regularly framed as an issue with negative consequences in journalistic media (17.1%, $n = 60$), this framing plays only a marginal role in stakeholder communication (7.2%, $n = 50$). This result is further supported by the emphasis on climate change consequences in visual content in climate journalism, which is significantly more common in media profiles than in stakeholder communication ($t(507) = -3.71$, $p < 0.001$, $d = 0.28$).

We also find a medium effect for differences in climate communication by media and stakeholders in *topicality* ($t(589) = -8.72$, $p < 0.001$, $d = 0.61$). Our indicator for topicality was how frequently posts made explicit references to COP28, a short-term media event within the climate debate. Almost half of the media organizations' posts about climate change in our sample also referenced COP28 (47.4%, $n = 167$). In contrast, stakeholder posts were less likely to refer to COP28 (20.6%, $n = 144$) and instead focused more on the general phenomenon of climate change without mentioning the conference.

Finally, the fifth content aspect is the absence of ambiguity. As an indicator of low ambiguity, we examined the explicit attribution of responsibility for taking action against climate change. The content analysis shows a minimal but significant difference in explicit responsibility attribution between media and stakeholders ($t(745) = -2.22$, $p < 0.05$, $d = 0.14$). Posts by media organizations are slightly more likely to include explicit responsibility attributions (74.4%, $n = 262$) compared to stakeholder communication (68.1%, $n = 475$).

RQ2 investigates features of climate change posts that explain the popularity of content on various social media platforms. This analysis allows us to examine the extent to which audience attention in the hybrid media system also operates according to specific logics. A first analysis of the like count reveals that media profiles, on average, received significantly more attention for climate-related content ($M = 2{,}538$, $SD = 9{,}189$, $Md = 168$, $n = 352$) than stakeholder profiles ($M = 967$, $SD = 3{,}951$, $Md = 59$, $n = 698$; ($t(418) = -3.07$, $p < 0.01$, $d = 0.25$).

Figure 2 illustrates the distribution and median of the like variable for climate change posts across different profile types on the four social media platforms. The platform comparison shows that climate posts on Instagram receive more likes than those on the other three platforms. Additionally, media profiles tend to receive more likes for climate change posts than stakeholder profiles on three of the four platforms. The exception is Facebook, where the mean number of likes for climate change posts from stakeholder profiles is higher than for media profiles. This overall tendency is probably due to the generally higher follower numbers of media organizations compared to stakeholder profiles in the sample.

However, to address the question of how platform contexts and the use of specific content features in climate change posts contribute to the popularity of posts by media and stakeholders, we ran two multilevel negative binomial regressions in R using the glmmTMB package (v1.1.10; Brooks et al., 2017). Negative binomial regression is appropriate for dependent count variables, which are typically not normally distributed (Cameron & Trivedi, 2014). Since the observed variance in the dependent variables for both actor groups is larger than its mean, which confirms the overdispersion of the data, we considered the negative

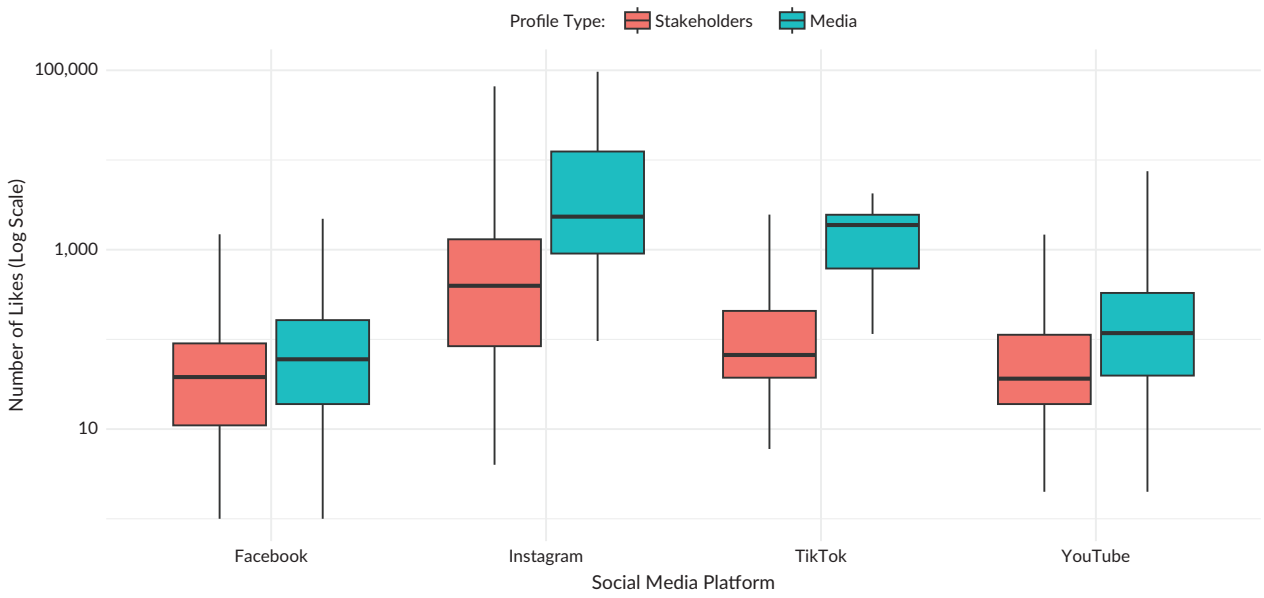


Figure 2. Number of likes per climate post from media and stakeholders on social media. Notes: The *y*-axis is displayed on a logarithmic scale to visualize a wider range of data and to better compare both small and large values proportionally; to improve readability, outliers are not depicted.

binomial model as more appropriate than a Poisson model. In these models (see Figure 3), we predicted the number of likes that climate-related posts received by independent variables like platform use and post features. We also integrated the user profiles as random intercepts to account for the fact that some accounts receive more interactions due to their different numbers of followers.

The results underscore the influence of platforms on post popularity. We used TikTok as the reference category for the different platforms in the model using incident rate ratios (IRRs). Posts on climate change from media (*IRR* = 11.79, 95% CI [5.89, 23.59], $p < 0.01$) and stakeholder accounts (*IRR* = 4.83, 95% CI [3.39, 6.88], $p < 0.01$) receive more likes on Instagram compared to TikTok. Stakeholder posts on YouTube receive fewer likes than on TikTok (*IRR* = 0.54, 95% CI [0.36, 0.82], $p < 0.01$), whereas there is no difference in the number of likes for YouTube and TikTok posts for media profiles. For media (*IRR* = 0.24, 95% CI [0.12, 0.49], $p < 0.01$) and stakeholder profiles (*IRR* = 0.46, 95% CI [0.32, 0.66], $p < 0.01$), using Facebook for climate communication was associated with lower popularity of climate-related posts compared to their posts on TikTok.

Our analyses of the effects of content characteristics on likes find significant effects for the different actor types. For climate stakeholders, the use of two thematic frames is consistently associated with higher like counts. When stakeholders frame climate change as a protest issue (*IRR* = 1.91, 95% CI [1.11, 3.34], $p < 0.05$) or apply a populist perspective (*IRR* = 3.02, 95% CI [1.55, 5.90], $p < 0.01$), it is linked to an increase in likes, with a more potent effect observed for the populism frame. The populism frame is the only frame significantly associated with higher popularity for media profiles (*IRR* = 9.36, 95% CI [1.10, 79.32], $p < 0.05$); all other frames have no significant effect on the like count for media posts.

Visual personalization exhibits no significant effect regarding media and stakeholder posts. However, posts by media profiles that include at least one person in their visual content on climate change show a tendency to have fewer likes compared to those without personalization (*IRR* = 0.73, 95% CI [0.52, 1.03], $p = 0.07$).

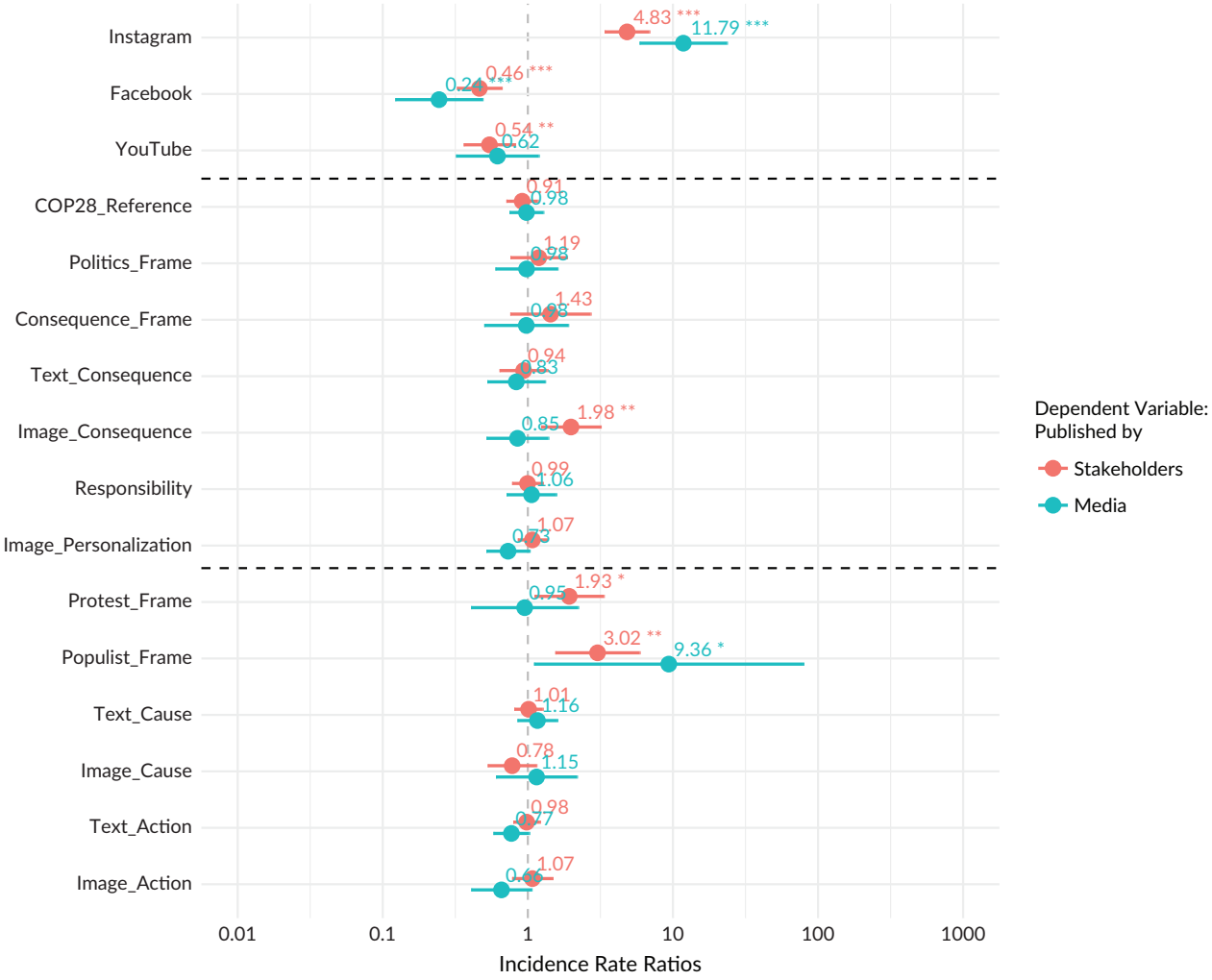


Figure 3. Multilevel negative binomial regressions for the number of likes received for climate posts from media profiles and climate stakeholder profiles. Notes: Independent variables include the social media platform with TikTok as a reference category and post features; the *x*-axis is log-scaled to better visualize differences in incidence rate ratios; Model 1 media—$n = 346$; Model 2 stakeholder—$n = 649$; the figure is based on Model 1 and Model 2 in the Supplementary Material (Appendix 6); * $p < 0.05$, ** $p < 0.01$, $p < 0.001$.

For stakeholder posts, however, visual personalization is not associated with post popularity (*IRR* = 1.07, 95% CI [0.85, 1.35], $p = 0.54$).

The use of negativity does not show significant effects on the number of likes for either of the two actor types. Neither the use of the negative consequence frame nor discussing the consequences of climate change in post texts and visuals is related to the popularity of posts on climate change.

Topicality, measured through explicit references to COP28, did not affect the popularity of posts for the two actor types.

Finally, the absence of ambiguity, measured as the explicit attribution of responsibility for actions against climate change to a specific group or actor, does not affect the popularity of climate posts from either of the two actor groups. Posts that attribute responsibility from media organizations (*IRR* = 1.06, 95% CI [0.72, 1.57],

$p = 0.77$) and stakeholders (*IRR* = 0.99, 95% CI [0.78, 1.27], $p = 0.97$) receive neither more nor less likes than those without an explicit attribution of responsibility.

6. Discussion

The comparative analysis of climate communication by German media organizations and climate stakeholders on social media reveals several differences but also some similarities between groups. The actors differ in how frequently they post about climate change on different social media platforms, the thematic aspects of climate change they address, and the types of posts that generate higher audience engagement. Our findings suggest that media and political logic persist in hybrid media systems, as evidenced by the different choices communicators from both groups make regarding platforms, styles, and thematic aspects.

To start with, we observe differences in the platform prioritization for climate communication by journalistic and political actors. Climate stakeholders tend to use Facebook, Instagram, and TikTok more frequently, whereas media organizations publish a higher share of climate-related posts on YouTube. This pattern likely reflects the tendency of media organizations to repurpose or re-upload pre-aired video content on YouTube, adhering to a traditional media logic in format selection and production. In contrast, climate stakeholders favor platforms with original social media content and conform to a newer media logic.

Furthermore, climate communication by journalists and stakeholders differs across the five thematic dimensions we applied to compare communication logics (Haßler et al., 2014). Consistent with the dichotomy suggested in the literature, climate change posts by media organizations are more likely to exhibit features consistent with media logic. Climate communication by media organizations shows higher levels of visual personalization (e.g., Strömbäck & van Aelst, 2013), greater emphasis on the negative consequences of climate change (e.g., Galtung & Ruge, 1965), greater topicality related to the climate conference as a specific event, and less ambiguity, indicated by explicit attribution of responsibility (e.g., Galtung & Ruge, 1965). Media organizations also frame climate change more often in terms of institutional contexts (polity) and negotiations (politics) than concrete policy solutions (e.g., Strömbäck & van Aelst, 2010).

In contrast, stakeholders publish climate content that is more closely aligned with political logic. Posts by climate stakeholders are more likely to discuss concrete strategies to combat climate change, are less visually personalized, use less negative framing, and are less event-driven. Instead, they tend to frame climate change more in the context of protests or simplify and critically question the issue using populist rhetoric. The lower levels of negativity and topicality, as well as the strategic framing of climate change aligned with stakeholder interests, are interpreted as clear evidence of political logic. This finding supports the assumption that political actors within the hybrid media system control information flows in ways that serve their own objectives (Chadwick, 2017).

However, there are also aspects where media organizations and stakeholders show minimal or no differences, suggesting a partial convergence of logics in the hybrid media system. It should be noted that both groups use all four social media platforms we investigated for their communication on climate change, creating a common space for opinion formation and discussion among actors and competition for interpretive authority (Sultana et al., 2024). We find that stakeholders also use elements of media logic, engage in event-driven communication, and frame climate change in terms of the negative consequences.

Other similarities are evident in the use of visual language. While the proportion of visually personalized posts is slightly higher among media organizations, posts from both groups show a generally high level of visual personalization. Moreover, there are only minor differences in how often the visual content of their posts addresses different aspects of climate change, such as causes, consequences, or mitigation strategies. In terms of presentation style, we find fewer differences between the two groups, which can also be interpreted as an adaptation to the practices on social media (van Dijck & Poell, 2013) and a blurring of the strict distinction between media and political logic.

Despite this convergence in different elements, the overall analysis of climate communication in Germany reveals that media organizations and actors still mostly adhere to their respective logics in selecting and presenting climate change aspects. Journalistic content on climate change reflects a selection and emphasis based on newsworthiness criteria, favoring event-driven, personalized, and negative coverage. Climate stakeholders, on the other hand, communicate within the framework of political logic by strategically framing climate change according to their positions and emphasizing the broader issue of climate change rather than specific events. Our findings indicate a continued adherence by journalism and political actors to their respective logics, even within the hybrid media system. Despite the competition journalism faces from other actors in this hybrid system, it remains true to its principles in climate reporting. Therefore, in answering RQ1, we find evidence that climate stakeholders and media organizations still follow different logics when discussing climate change on social media. Our results thus confirm findings from earlier research on climate change communication that investigated climate stakeholders (e.g., León et al., 2023) and climate journalism (e.g., Hase et al., 2021) separately.

Furthermore, we also examined the extent to which post characteristics influence the popularity of posts by both journalists and stakeholders. Our results for the popularity of climate communication show a less consistent pattern compared to the content dimensions. In a few cases, the audience rewards the use of specific logic, while in others, it does not. We find that in the same media environment, specific content characteristics have different effects on the popularity of climate communication depending on which actor uses them. One possible assumption that can be derived from this is that audience attention in the hybrid media system may also operate according to different logics depending on the communicator rather than following a unified or fully hybrid logic. A notable tendency here is the influence of visual personalization on the popularity of media posts. While personalizing climate change in visuals does not lead to more likes for stakeholder posts, the same feature tends to decrease the popularity of media posts. This distinction may be due to the types of people depicted in the posts. An additional descriptive analysis of the categories of individuals depicted in images and videos shows that the proportion of visual content featuring political actors is similar in both groups. However, we observe that stakeholder posts more often depict activists and members of NGOs, while media representatives, ordinary citizens, and economic actors are more often depicted in climate journalism. Another interpretation is that these numbers reflect different audience expectations regarding the logic of communicators.

We also find that framing climate change as a political issue or a protest topic positively affects the number of likes for stakeholder posts but has no effect on the popularity of media posts. We hypothesize that stakeholders' strategic framing of climate change within a political logic resonates more strongly with their social media audiences and meets followers' expectations for content on these accounts.

The populist frame positively affects the popularity of both stakeholder and media posts. Posts that criticize current climate policies and, in some cases, challenge the consensus on human-induced climate change receive significantly more likes. This result aligns with the observation made by researchers that there is a recent increase in climate-skeptic voices within Germany's climate discourse (e.g., Ruser, 2022). While there has long been a cross-party consensus on human-made climate change in the German climate debate and the need for climate action, the rise of the AfD has amplified skeptical positions in the public sphere. According to our analysis, posts that convey these skeptical positions by both media and stakeholders, such as the profiles of the AfD and the think-tank Europäisches Institut für Klima und Energie (Moreno et al., 2022), attract considerable attention on social media platforms. This finding has implications for the visibility of these skeptical perspectives in the digital climate discourse, as liking increases their visibility for a broader audience.

Overall, and answering RQ2, which asks about content characteristics that explain the popularity of climate change posts, we find that the use of media and political logic alone does not explain the popularity of posts. Additional expectations of climate communication towards communicators by users, e.g., adopting the affordances of individual social media, are a possible explanation for this finding.

7. Limitations and Conclusion

This study has some limitations that affect the generalizability of our findings and may be addressed in future investigations. First, our analysis focuses on the content of social media posts, which we interpret as indicators of communication strategies. Our approach is, therefore, limited to the analysis of the visual features in social media posts. Our analysis also focused only on the first image and the first minute of each video. To gain a deeper understanding of specific communication strategies and the motives behind them, researchers could hold interviews with journalists and stakeholders (León et al., 2023).

Second, we analyzed the climate discourse on social media based on visual posts that have been published during COP28 in Dubai. This does not only limit our findings to the communication of actors that rely on visual content but also to the social media content surrounding this specific event. The results of our analysis may have been influenced by events or circumstances surrounding COP28. These include, for example, the fact that the event was hosted by the United Arab Emirates and that one of the key conference topics was the transition away from fossil fuels. As a result, there may have been specific discussions and criticism of the events in the United Arab Emirates that cannot be generalized beyond COP28. It is also likely that the prominence of climate change decreases outside such events, both among climate stakeholders and in climate journalism. Future studies could examine climate communication outside of key events to determine the level of attention that the issue receives and whether media and stakeholders discuss other aspects of climate change more frequently.

Third, we focused exclusively on the content characteristics of posts based on our content analysis when explaining the popularity of content. As a result, the analysis lacks consideration of other factors that could also influence reach and popularity, such as algorithmic ranking or the different audiences on each platform.

Fourth, we had to use different data access points to collect data from the four platforms which have their own biases (e.g., Corso et al., 2024). As a result, we were limited to the content available through the respective

tools at the specific times of access. A detailed explanation of the data access methods and their limitations can be found in the Supplementary Material (Appendix 2).

A fifth limitation is the selection of media organizations and stakeholders for our sample. We aimed at selecting the key outlets and stakeholders for the German discourse. A broader range of profiles or relevant other groups in future studies may provide an even more comprehensive understanding of the different issues and actors shaping climate communication in the hybrid media system.

Finally, our analysis focuses on climate change communication in Germany. The specific national context and political culture in Germany likely influenced our findings. Therefore, our results may differ from climate communication in countries where the debate on climate change is more polarized (Wang & Huan, 2024), and where some of the social media platforms we analyzed may play a different role in political discourse.

Despite these limitations, our study makes an important contribution to the literature on climate change discourse and the use of different logics by media organizations and climate stakeholders in the hybrid media system. It is one of the few studies in the research field that systematically analyzes social media data from multiple social media, thereby addressing the lack of cross-platform research in communication studies (Hase et al., 2023). Our findings reveal differences in climate communication strategies between media organizations and climate stakeholders within the hybrid media system, which can be attributed to distinct and sometimes competing logics. Despite the competition for attention in discursive arenas and the assumption of a hybridization of these logics, climate communication by media organizations and interest groups remains clearly distinguishable in many discourse dimensions.

Our findings have important implications for strategic climate change communication by different actors, as well as for the general understanding of the political discourse on climate change in Germany. We find that media and climate actors tend to favor certain social media platforms for climate communication, while using others less frequently for climate-related content. As a result, users of certain social media are less likely to encounter climate-related posts and a less diverse range of perspectives on climate change. This raises the risk that climate stakeholders and media organizations may not be able to reach some audiences. At the same time, it is desirable that both groups of actors frequently address not only the consequences but also the causes of climate change and measures for climate action. This can promote public understanding of the issue and facilitate political discussion about appropriate climate action. However, our findings also indicate a positive correlation between the use of populist framing by media and stakeholders and higher engagement metrics. This suggests that climate change content on social media receives more attention when it criticizes mainstream climate policy or subtly questions the urgency of the issue. This raises the question for future research of how these patterns and trends in climate communication influence public attitudes toward climate change and the support for climate policies.

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Conflict of Interests

The authors declare no conflict of interests.

Supplementary Material

The supplementary material for this article (Appendix 1–6) is available online as an additional file. The codebook, the data, and the analyses are publicly available at: https://osf.io/82khj

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