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Countering the "Climate Cult" – Framing Cascades in Far-Right Digital Networks

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ABSTRACT

In many contemporary democracies, digital networks on the far-right have established themselves as "alternatives" to liberal institutions. Within this nexus of parties, hyper-partisan news, and social media channels, opposition to climate change mitigation has emerged as a central cross-cutting issue. Despite the prominence of these trends, we still know relatively little about the hierarchies that govern these communicative ties. This study draws on the concept of cascading frame activation to trace communication flows between four distinct actor types within the German far right. We apply a mixed-methods approach across social media and websites over a period of 19 months. First, we conduct a time series analysis via a vector autoregression model, to assess potential causal relationships between the issue agendas of far-right actor types. Automated text analysis then inductively generates a lexicon exclusive to far-right posts about climate change, which we qualitatively assess and manually cluster into distinct frame categories. We conclude by tracing framing cascade sequences across the various actor types. Our results reveal significant associations between the issue agenda of far-right actors, especially among right-wing news sites (RNS) and hyperactive accounts. Within this network, the most dominant frames demarcate out-groups, such as the Green Party or climate activists. Notably, RNS play a central role in shaping this discourse, initiating 42% of the identified frames before they find wider dissemination. These findings expand our understanding of hierarchies and new communication pathways among partisan media, political parties, and their extended digital networks on the far right.

Introduction

In many democratic systems, the transition to digital media environments has been accompanied by the rise of far-right informational networks, consisting of political actors, right-wing news outlets, and highly active social media channels. These form in open antagonism to established democratic institutions, aiming to position themselves as viable alternatives. Yet we still know relatively little about the hierarchies that shape information

flows within these digitally enabled networks. Our research identifies frames specific to far-right[1] actor types and traces how these spread among them. We present a mixed-methods case study of the emergence of a new issue area in far-right digital networks forming around the German party "Alternative für Deutschland" (AfD). The 19-month time period under study (01/01/2018–07/31/2019) and the lead-up to the 2019 EU parliamentary elections was marked by a notable reorientation from messaging by the AfD and its digital networks, previously focused mainly on anti-immigration, to an increasing issue salience of climate-related topics. This allowed us to observe a relatively sudden agenda shift by various far-right actors and the expansion of their collective frame repertoires.

We draw on the concept of "cascading frame activation" (Entman, 2003; Entman & Usher, 2018), which refers to the process by which certain interpretative frames are introduced and shape subsequent information processing across various communicative levels. To do so, we monitored public communications output containing the term "climate" (i.e. "Klima") via social media channels (Facebook; Twitter) and websites of five distinct actor types. These consist of (1) the official AfD party organization and its leaders, (2) lower-ranked AfD party members and supporters, (3) right-wing news sites (RNS), and (4) unaffiliated social media accounts that had previously been observed as highly active in amplifying far-right messaging. (5) Legacy press articles served as an additional benchmark that enabled us to identify and isolate specificities of far-right versus more centrist forms of public communication.

To assess how the agenda of climate spread across these actor types, we inspect the frequency of climate-related content for each of the five actor types over time. In addition, we apply a Vector Autoregression (VAR) model followed by tests for Granger causality between these time series. For a more in-depth inspection, our content analytical approach consists of an inductively generated dictionary that first isolates terms and phrases *specific* to the German far right in this context. We then combine this with a qualitatively informed frame analysis, in which we classify terms or phrases that appear across the four far-right actor types into frame categories. Lastly, we parse potential dynamics between these actors by analyzing the sequences of when and where these frames first emerged and how they subsequently spread to other actor types.

Our analysis will show that time series analysis reveals intricate predictive relationships based on the agenda item of climate change predominantly among the far-right actor types, with hyperactive accounts and RNS exhibiting significant influence on others. In contrast, the legacy press displayed minimal predictive relationships from the far-right actor types, with the exception of the AfD's top level. Our content analysis provides a dictionary of n-grams (meaningful combinations of one to three words that repeatedly appear in texts) exclusive to the far-right and a total of ten distinct frame categories. The most prevalent of these are references to a "climate cult," disparaging social activism and the Green party. We also find a denialist framing, characterized by terms like "the climate lie," albeit much more confined and limited. A total of 71% of frames emerge either from RNS (42%) or top-level AfD accounts (29%). Once these frames were introduced, they were quickly disseminated by low-level AfD and hyperactive social media accounts. The relative distribution of frames is fairly even and similar across all levels of actor types. Along with the predictive relationship based on the overall agenda item, we take this to be indicative of a process whereby far-right actors take discursive cues from one another. Our findings thereby help to empirically illustrate hierarchies in far-right digital networks, where party elites can shape how specific

issues are framed. More importantly, however, they also show how new actor types like RNS and hyperactive accounts can act as "pump valves" (Entman & Usher, 2018, p. 302) in such framing cascades, by introducing shared interpretative reference points. Next to a party-led top-down dynamic, this introduces a more horizontal pathway of frame circulation, by which ideologically aligned actors and media organizations can co-produce far-right party messaging.

Below, we introduce the larger research context, connecting ongoing shifts in democratic media systems to the rise of information networks on the far right. We then introduce the theoretical concept of framing cascades, which provides the building blocks for our main research questions. Next, we explain our case selection and methodological approach, before moving on to the presentation of our empirical findings. Finally, we offer a discussion and concluding thoughts on further research and the limitations of our approach.

Context: Far-Right Connectivity in Digital Networks

Along with the rise of illiberal or authoritarian political actors (Norris & Inglehart, 2019), recent years have seen shifting discursive power dynamics in increasingly hybrid media systems (Jungherr et al., 2019). Previous structural features of the public sphere and modes of political communication have become "disrupted" (Bennett & Pfetsch, 2018), as emergent populist elites and parties have utilized digital affordances to challenge the political establishment. New forms of communicative order (Bennett & Livingston, 2018) have begun to emerge as these actors learn to utilize digital analytics (Karpf, 2016) and harness networking effects for political mobilization (Benkler et al., 2018; Wells et al., 2020).

Such effects are not equally distributed across the political spectrum. In recent years – and across democratic systems – the ability to translate ties between political party organizations and mobilized publics into electoral success has been especially pronounced on the far right (Bennett et al., 2017; García-Sánchez et al., 2021; Larsson, 2020). Here, the potential of digital connectivity has been effectively tapped into by populist political actors and emergent forms of "movement parties" (Mercea & Mosca, 2021; Pirro, 2019). These rely on new communicative pathways, which are often directly predicated on the premise of collectively providing an "alternative" to the established modes of public communication (Holt, 2020).

Yet these emerging communication networks are not static nor do they appear to be characterized purely by top-down hierarchies. Whether or not political actors are receptive to social media input has been shown to be dependent on the specific issue areas and degrees of mobilization efforts around them (Gilardi et al., 2022). Meanwhile, research on the radicalization processes specifically of right-wing parties has pointed to the role played by movement-oriented inner-party factions (Blum & Cowburn, 2023; Pytlas & Biehler, 2023) in combination with extended party networks (Cowburn & Knüpfer, 2023), which might push partisan actors to adopt more ideologically extreme positions. Such findings suggest that it is increasingly difficult to meaningfully distinguish between "radical" and "extreme" formations within the umbrella of the contemporary far-right (Mudde, 2019; Pirro, 2022), especially when considering the broader information environments shaping their political agenda.

Indeed, research into the dissemination of information within larger networks of far-right "echo-systems" (Starbird et al., 2018), has mapped out how forms of connectivity provide a low-threshold potential to elicit crowd-sourced modes of connective action, flowing from movements to political parties (Klinger et al., 2023). Such new actor constellations disperse formerly more clear-cut forms of elite-driven communication into multidirectional communicative networks. Recent scholarship highlights the diffuse and participatory nature of conspiracy theories related to the Q-anon movement (Hoseini et al., 2021) or COVID-19 misinformation (Zhang et al., 2022). Meanwhile, far-right networked framing efforts have been observed in regard to a variety of highly contentious issues, including recent election cycles in the US (Wells et al., 2020), Black Lives Matter activism (González-Bailón et al., 2022), or mass shootings (Starbird, 2017). Other studies have pointed to strategic interaction with progressive activism, whose messaging far-right networks might deliberately "hijack" to extend their communicative reach (Knüpfer et al., 2020). Beyond political elites and hyperpartisan media, these dynamics include a set of recurring actor types that typically form key nodes in far-right digital networks, such as ideological media and highly active social media accounts.

These complex interactions between novel actor types present a set of challenges for empirical research studying emerging communicative dynamics on the far right. How can we pinpoint the specific networks and nodes where far-right communication on a topic occurs? How do we define and trace meaningful communication across these spaces? As of yet, our understanding of the hierarchies and directionalities within these new actor constellations and informational networks remains limited. However, established theories of political communication can provide roadmaps for studying them. Here, we turn to Entman and Usher's (2018) updated concept of *cascading frame activation*. Their framework not only provides a method to analyze "networked communication pathways and impacts on power hierarchies" (Entman & Usher 2018, p. 303), but also offers an analytical lens to differentiate between various *actor types* based on their communicative roles, operationalize a communication-based unit of analysis (*frames*), and trace meaningful sequences (*cascades*) between them.

Core Concept and Research Questions: Tracing Far-Right Framing Cascades

In the context of political communication, framing has generally been understood as a way of reducing the complexity of reality via modes of communication to draw focus on specific aspects of the object depicted (whether this be an event, person, policy, agenda item, etc.) Going beyond issue salience or agenda setting, frames typically also convey a specific problem definition, provide a causal analysis and moral evaluation, and promote a particular treatment remedy (Entman, 1993, p. 52). Within a mediated environment, the capacity of a political actor to "project" a preferred frame can therefore also serve as a yardstick for their relative positionality within the communicative arena that affords them this ability (Entman, 2003). Empirically observing "whose" frames are amplified and disseminated further can therefore let us infer underlying structural features, hierarchies, and power dynamics (Jungherr et al., 2019). One analytical tool that has been proposed in this context is that of *cascading frame activation* (Entman, 2003; Entman & Usher, 2018).

In its updated version, this "proposes guidance for conceptualizing and researching whether, how, and under what circumstances digitalized communication of frames actually

redistributes power" (Entman & Usher, 2018, p. 303) by enabling less unidirectional information flows. Landis and Allen (2022) empirically employ the model, for example, in examining the effects of Facebook comments on German public television news. Their research demonstrates how audiences can significantly influence cascading frame activation, especially concerning highly contentious issues. Here, the model also considers partisanship in fragmented media landscapes. It recognizes the potential for distinct framing cycles across the political spectrum, with the "conservative subsystem [having] tighter connections among elites, media, and publics than the less commercially successful liberal subsystem" (Entman & Usher, 2018, p. 304). And indeed, research on US politics has underscored strategic network ties between far- and center-right sources on issues also espoused by Republican candidates (Benkler et al., 2018; Kaiser et al., 2020). Such symbiotic relationships between right-wing political actors and hyper-partisan media can be seen as part of a longer historical trajectory (Benkler, 2020; Hall Jamieson & Cappella, 2010). While these may predate the digital era, the affordances of social media have amplified selective engagement between politicians and ideologically extreme media sources (Cowburn & Knüpfer, 2023). Meanwhile, in Germany, these new informational networks have emerged more recently. Here, notable differences in frame circulation between the broader public and far-right networks as been observed, particularly in "expressing hostility toward immigrants, the German government, and mainstream media" (Klawier et al., 2022, p. 1400) – i.e. frames closely aligned with those espoused by the newly-founded, far-right party AfD.

Within such subnetworks, Entman and Usher's (2018) update of Entman's (2003) earlier *cascading activation framework* not only assumes top-down or bottom-up directionalities between elites and audiences but also introduces the concept of "pump valves" (Entman & Usher, 2018, pp. 303–305). These may consist of affordances of digital platforms, algorithms or digital analytics, which co-determine which frames ultimately reach a wider audience. In addition, Entman and Usher see new forms "ideological media" and "rogue actors" (p. 302) as potential pump valves that utilize digital connectivity to influence the range of available frames. Within this context, the relationship between political elites and their audiences is increasingly intertwined with such new actor types. Instead of merely acting as information conduits, these "pump valves" can also serve as horizontal entry points, introducing new frames into communication cycles. Such dynamics thereby also exemplify partisan media's role in producing "networked" or "interactive propaganda" (Benkler et al., 2018; Yang & Bennett, 2021), and "trading up the chain" (Marwick & Lewis, 2017), whereby ideologically aligned media content may be strategically amplified by political elites, before finding wider circulation.

To observe such dynamics within far-right digital networks, we conceptualize various far-right actor types as four potential entry points for frame initiation: these consist of (1) official party communication by the German far-right party AfD and its leadership, (2) lower-level accounts affiliated with the AfD, (3) right-wing news sites (RNS), and (4) highly active social media accounts that had previously been in pushing far-right messaging. While these actor types to some degree correspond with the various "levels" highlighted in Entman and Usher's model, it is important to note that it is not clear ex-ante, which function they actually take on within the networks we are observing. In previous studies, for example, far-right media have played "a dual role, initially as intermediaries bridging the extremist faction and the party, and later as amplifiers of the party" (Klinger et al., 2023, p. 1899).

And while it seems plausible to assume that the AfD's leadership is going to hold sway over lower-level actors from the same party, its populist vein might also make the top level more receptive to bottom-up information flows. Likewise, both RNS and hyperactive social media accounts might serve various functions, either as conduits for connecting the top to lower levels and vice versa – or as a means of "pumping in" information and initiating new framing cycles, which party actors may then adopt. To isolate the specificities and potential relationship of these actor types, we analyze the timelines of a specific agenda item and compare it to more centrist sources of information during the same time period and ask:

RQ1:   How does the overall volume of "climate" topics differ between various far-right actor types and legacy media, and do these influence one another?

Gauging the volume of a specific topic provides a first metric that lets us infer potential connections between actor types, as well as providing initial indicators for the hierarchies that govern who leads and who follows whom. Here, we expect distinct attention cycles among the far-right that may well take cues from the legacy press but collectively form a separate informational network, marked by diverging patterns of how often and when they focus on climate-related issues.

   Beyond evaluating topic volume across levels and time, we are ultimately also interested in a more granular view of the communicative dynamics at play within far-right networks. Hence, we seek to isolate specific frames by focusing not just on *whether* and *when*, but also on *how* an issue is depicted within these networks. To do so, we ask:

RQ2:   Which distinct frames do we find across a variety of far-right actor types?

Here, we seek to isolate those frames that are common to all far-right actor types and yet would be missing from more mainstream or centrist media formats. This helps us identify the unique content connecting various far-right actor types through a shared mode of depicting and perceiving salient issues. Given our focus on far-right ideological actors, we anticipate such common frames to reflect a collective worldview or strategic stance.

   Beyond this descriptive dimension, focused on similarity between the various actor types, we are ultimately also interested in gauging a process of cascading frame activation to infer hierarchies and directionalities that shape information flows between. To do so, we return to a temporal dimension by asking:

RQ3:   What sequences do we observe in the initiation of framing cascades between various far-right actor types?

Here, we are primarily concerned with the beginning of a distinct framing cycle among far-right actors. We investigate which actor types introduce the frames previously identified and how these then cascade onto other communicative levels. These would likely either be characterized by a top-down or a bottom-up dynamic: While the former would be marked by a high degree of elite-driven framing

processes (initiated by the AfD top-level), the latter would entail the emergence of frames within a more dispersed network of low-level actor types (AfD low-level). A third possibility is a more horizontal introduction of frames via ideologically aligned media (i.e. the collection of RNS) or hyperactive social media accounts. While these might certainly function as conduits between the other levels, they can also act as "pump valves" that introduce their own or external actors' frames into the cascades we analyze.

By addressing these questions, we apply the cascading activation framework to a burgeoning, highly ideological informational network, further extending its relevance beyond the US context in which it was conceived. In doing so, we also offer a comprehensive roadmap for empirically studying information flows and discerning discursive hierarchies among novel actor types within digital networks. Before explaining our approach, we first highlight the additional relevance of the case and issue studied here.

Case Selection: The AfD's Pivot to Climate Change

Our case study focuses on a communicative realignment among the German far-right, away from the agenda item of immigration and toward that of climate change. This was most prominently visible through election campaign messaging by the by the German far-right party AfD. Focusing on this particular case to study cascading frame activation within far-right digital networks has several advantages:

First, climate change has only recently emerged as an increasingly contentious political cleavage issue in various European democracies (Gardiner, 2019). Here, the far right has adopted contrarian and often explicitly anti-green positions (Forchtner & Lubarda, 2022; Vowles & Hultman, 2021). Within German politics, the issue of carbon-emissions-induced global warming has generally been regarded as a scientific fact (Brüggemann & Engesser, 2017, p. 65). It was therefore notable when the newly emerged, far-right party AfD shifted away from its former anti-EU rhetoric and the subsequent focus on xenophobic anti-immigration within the 2019 EU election campaigns (Otteni & Weisskircher, 2022).[2] The timeframe therefore allows us to observe the initial emergence of framing cascades, as the party and its extended networks shifted toward a relatively new agenda item.

Second, beyond the case of climate change, the focus on this particular party enables us to more clearly home in on the particularities of emerging far-right communicative networks. Founded in 2013, the AfD is a relatively young party that has seen a rapid rise in electoral success (Bieber et al., 2018). Early in its lifecycle, the party shed its elitist roots in a populist turn, adopted a fierce stance on immigration and aligned with the demands and strategies of far-right protest movements (Arzheimer, 2015; Weisskircher & Berntzen, 2019). Within the German party and media landscape, it has (deliberately) taken on the role of a pariah, presenting itself as the "alternative" to an implied, otherwise homogeneous mainstream. This has been accompanied by its active promotion of new media channels via digital platforms where it tends to be significantly more active than other German parties (Serrano et al., 2019). Taken together, the novelty of these multi-level formations along with their outsider status makes it easier to isolate these forms of communicative networks than it might be in other national contexts, where far-right actors might be more intertwined with the conservative center-right or look back on a longer history of hyperpartisan media sources, as would be the case in the US, for example. As noted earlier, these formations

of "alternative" information networks have not been limited to top-down party communication, but rather involve a variety of new actor types, functioning as information providers or co-producers of political content. Here, we were able to draw from and build on previous research, which had identified collections of relevant actor types, by observing communicative networks emerging around far-right anti-immigration campaigns (Klinger et al., 2023).

Finally, choosing a German case study offers practical advantages for text-based content analysis aiming to identify and trace terms and phrases that might be indicative of larger frames. The German language's grammatical structure, with its propensity to form nuanced compound nouns and specific neologisms ("is there a German word for . . . ?"), provides an optimal linguistic backdrop for our research. This increases the chance of pinpointing novel frames specific to this agenda and far-right actors, as single words can encapsulate intricate implications, often sidestepped by mainstream politics. We delve deeper into this relevance in the subsequent data and methods section.

Data Collection & Methodological Approach

We collected text-based data from five distinct actor types, via a combination of public communication sources, including tweets, Facebook posts, and website articles texts that featured the term "climate*" ("klima*") from 01/01/2018–07/31/2019. This timeframe spanned 19 months and included the 2019 EU parliamentary election campaigns (May 26).

For the AfD top-level, our data consisted of a combination of Facebook posts, which is where the party has traditionally been the most active, as well as Tweets by members of its leadership, and articles collected from the official party website and media outlet (*AfD Kompakt*). The sample of German right-wing news sites (RNS) was taken from previous studies examining right-wing news infrastructures (Heft et al., 2020, 2021). To compare the four far-right actor types to other modes of public communication, we collected legacy press articles from the websites of three of the main leading print newspapers in Germany, *Sueddeutsche Zeitung*, *Zeit*, and *Frankfurter Allgemeine*, which are typically seen to present a center-left, centrist, and center-right viewpoint. For all websites, we used a combination of the Media Cloud database, which let us identify URLs of articles that featured the term "klima*," and the Python library *Newspaper3k* (Ou-Yang, 2020) to scrape text-based content.

The samples of AfD low-level and hyperactive far-right Twitter accounts were based on a previous study mapping far-right discourse around the topic of immigration in Germany (Klinger et al., 2023). Here, accounts that spread far-right anti-immigration messaging were collected and manually classified. Within this network, accounts that featured references to AfD memberships in their names or bios were included as "low-level AfD," typically featuring backbenchers or local politicians. The study further identified highly active social media accounts unaffiliated with the party within these networks, which formed connective nodes between far-right movement actors and party leadership. We refer to this collection as "hyperactive" accounts (initially 100, of which five were no longer functional at the time of data collection). All social media posts were collected via Crimson Hexagon.[3]

Table 1 shows the collected data by actor type. It illustrates how both the type of platform and the type of actor play a role in shaping the corpus' structure and how these can be seen as fulfilling distinct communicative functions: As the data on AfD low and

**Table 1.** Collected posts, articles, and wordcounts per actor type.

Actor type	N$_{sources}$	N$_{posts}$	μ$_{posts}$	Σ$_{wordcount}$	$\frac{words}{posts}$
Legacy Press	3	6,816	2,272	4,095,126	600.8
AfD top	17	649	38	139,033	214.2
AfD low	200	2,906	15	98,052	33.7
RNS	13	3,323	256	3,010,237	905.9
Hyperactive Accounts	95	15,153	160	455,675	30.1

hyperactive accounts are based on a larger sample of actors' tweets, the average text length is similar. Yet, hyperactive accounts, as their name might suggest, were much more prolific in terms of their post volume. RNS and legacy press, feature the highest overall word count and the longest texts, as they usually post full-length news articles. Yet, they differ quite strongly in the overall number of posts. This may reflect the more professionalized nature of these established news organizations in providing daily periodicals. The fact that AfD top-level data was comprised of a mix of social media posts and website articles is also reflected in these metrics, where it occupies a middle ground between the two data formats.

Before we engaged with the content of far-right climate framing, we addressed the question of the overall volume of climate topics across actor types (RQ1). To do so, we inspected the frequency of climate-related content for each actor type over time. To assess dynamics and interdependencies within and between the activity of different actors, we apply several techniques of time series analysis: We apply ADF and KPSS tests to test each time series for non-stationarity, to identify potential trends underlying the observed data. Where these occurred, we first-differenced the series, and subsequently estimated a Vector Autoregression (VAR) model with the differenced stationary time series that treats all other time series as endogenous.[4] Finally, to understand the interactions between time series, we applied Granger causality tests postestimation of the multivariate VAR (cf. Searles & Smith, 2016). We thereby follow established approaches in similar communication scholarship (Gilardi et al., 2022; Vliegenthart & Damstra, 2019; Wells et al., 2019). After selecting an appropriate number of lags, Granger causality tests indicate whether the value of a time series x at time t, in addition to its own previous values, is significantly better explained by adding previous values of other time series y (Neuman et al., 2014). Granger causality explicitly allows these to mutually influence each other, which accounts for a "parallel dynamic responsiveness" (Neuman et al., 2014, p. 204) to be expected in processes of (social) media attention and influence. As the strength of Granger-causation is not well expressed by its coefficients (Vliegenthart & Damstra, 2019), we restrict our interpretation to the significance tests between the time series of each actor's agenda-attention.

To then delve deeper into the framing of climate change that is mutually shared by all actor levels of the far right and at the same time exclusive to them (RQ2) as well as into the sequences of frame initiation (RQ3), we apply a content analytical approach. Following Muddiman et al. (2019) guidance, we generate a dictionary "organically" from the content we are studying, which rests on a combination of automated frequency analyses with repeated manual validation by the authors.

As illustrated in Figure 1, we undertake several analytical steps here: We begin by (1) comparing far-right actors' content to that of the legacy press and inductively generating a lexicon of far-right terms and phrases, followed by (2) categorizing these into meaningful
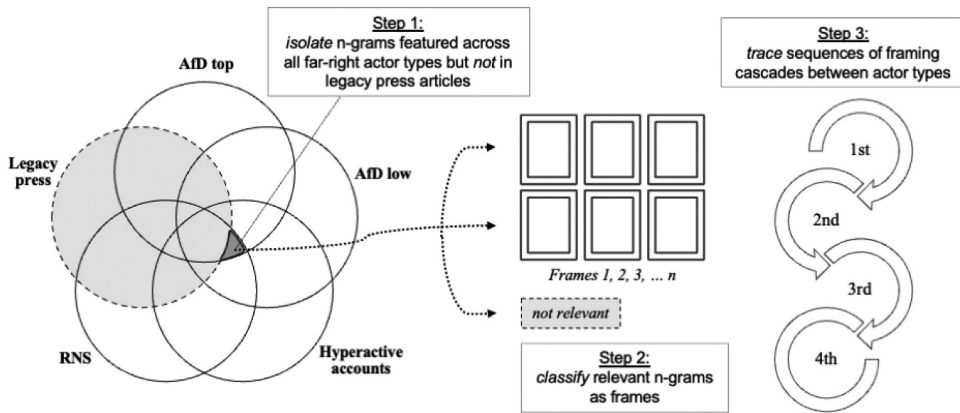
Figure 1. Main content analytical research steps to isolate far-right n-grams, classify frames, and trace cascades between actor types.

frame categories, and (3) tracing sequences by which they appear across the four far-right actors. Beyond the case study presented here, the three steps depicted in Figure 1 may also serve as a potential roadmap for future studies, seeking to replicate our research or apply a cascading activation framework to similar contexts.[5]

We began by removing stop words,[6] hyperlinks, and longer digit combinations from the text data in order to generate meaningful n-grams (combinations of between one and three words). We then isolated those n-grams that appeared across *all* four far-right actor types but were *not* featured in legacy press articles. This ensured that we only kept those terms and phrases that were exclusive to far-right actors, while also ensuring that these were salient enough to be featured across various communicative platforms. We thus reduce our data to the terms and phrases that provide a common language for framing climate change among the far right and which do not overlap with legacy press content. It also significantly reduced the number of terms that appeared randomly or had no immediate connection to the agenda item of climate change. This process initially produced an inductively generated list of 459 n-grams. For further cleaning, we removed all references websites or social media accounts, along with single verbs or adjectives, keeping only terms or phrases that consisted of proper nouns or full names with a potential connection to the overall theme of climate change. This initially resulted in 91 terms, which were validated by first running them as a dictionary across the entire corpus and then manually sampling from randomly chosen passages in which they occurred, using the qualitative coding software MAXQDA. This process helped to ensure that the terms we identified were used in the context we expected them to. The final result was a lexicon of 69 relevant terms or phrases unique to the German far-right's climate discourse.[7]

Next, we qualitatively assessed and classified all 69 n-grams into a total of ten inductively generated frame categories. An additional group of three human coders with no prior knowledge of the data were provided with a codebook (see Appendix A.4) and asked to assign each term to one of the categories. The initial round of coding led to an average pairwise agreement of 77% (Krippendorf's Alpha: 0.74).[8] Terms that led to disagreement were openly discussed by the team and re-coded where a consensus was reached, or

otherwise classified as under category 0 – *Other*. Using this categorization of terms and phrases as a dictionary allowed us to create a dataset of the occurrence of each framing category in each document of the corpus.

In a final step, we ran the n-gram dictionary across all data, to identify where and when terms or phrases belonging to these frame categories appeared. We then used timestamp data in order to identify the first instance of appearance per actor type, which subsequently let us compare the sequences by which they spread. For each n-gram in our lexicon, each actor type was assigned a value of 1–4, indicating their placement in this sequence. In a second step of manual validation, the authors checked each of the passages identified in the corpus, additionally following the original URLs contained in the dataset and hand-recording corrections where applicable. This was necessary, to ensure that specific frames were used in the same context across actor types or where the timestamps for the specific actor type were not granular enough. We go into more detail as we present our findings below.

Findings

RQ1: Volume of "climate" topics among actor types over time

We began our initial analysis with an inspection of climate related content across actor types over time. Figure 2 illustrates the monthly aggregate observations, showing an almost even distribution in the legacy press, with a slight increase toward the end of our observation period. In contrast to this, for all far-right actor types, coverage increased quite dramatically and almost simultaneously. This synchronicity is reflected in high levels of correlation in the weekly climate-related content produced by all far-right actor types, whereas the association with legacy press remains relatively weak in comparison: the cross-correlation distance of legacy press activity is higher in relation to each far-right actor type (.38–.57) than the distances between any pair of far-right actor type (.10–.26).[9] Simply put, this supports the visual impression from Figure 2 of rather similar activity among far-right actors – and a different temporal dynamic in legacy media. Due to the diversity in data structure and multiplicity of sources, this is unlikely to reflect a mere platform effect. Instead, we take this to be reflective of the observed shift in messaging by the AfD during this time period and note that this also appears to be a feature of both hyperactive social media networks as well as RNS.

In order to dive deeper into these initial impressions, we rely on techniques of time series analysis for the daily frequency counts of each actor type, as discussed above. In a first step, stationarity tests revealed that only the time series of legacy press is not following a clear trend – whereas all far-right actor types do.[10] Our cautious interpretation is that different dynamics drive agenda-setting processes on the level of legacy press as opposed to the far-right actors types. These test results support the interpretation of timelines and correlation values and led us to use first-differencing for all far-right time series to perform further analytic steps with the differenced time series (Wells et al., 2019). We build on similar methodological approaches (Gilardi et al., 2022; Barberá et al., 2019; Guggenheim et al., 2015; Neuman et al., 2014) in estimating a VAR model and determining the optimal length of lags through a mix of theoretical expectations and empirical tests (Liew, 2004), which
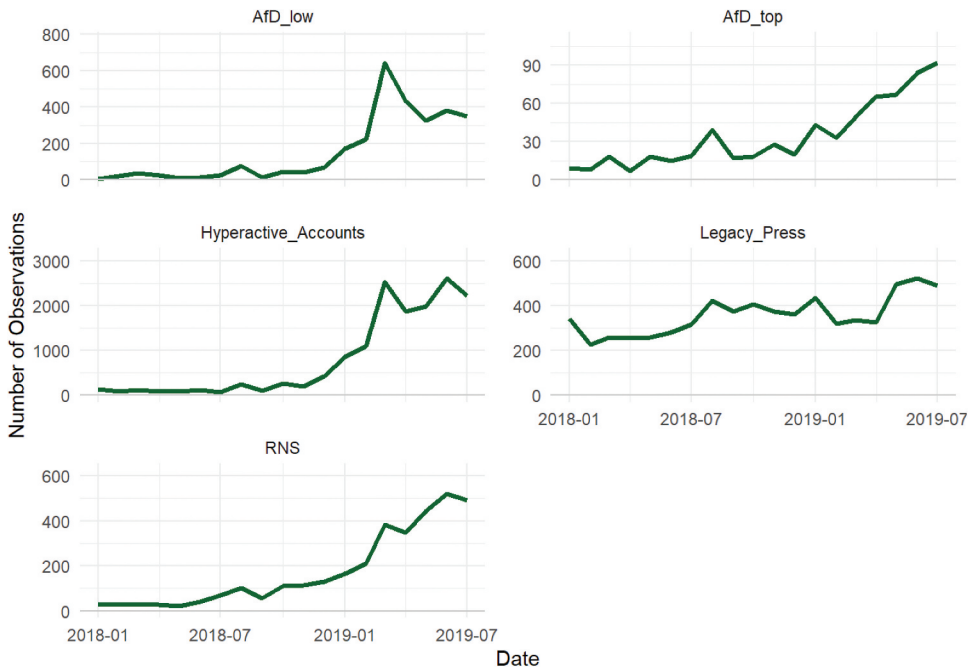
Figure 2. "Climate" topic volume across actor types over time (01/2018–08/2019).

results in a lag of three days, thus accounting for the mix of print media that requires longer reaction times and the "speedy" nature of social media in our dataset.[11] Ultimately, we assume that within this interval, social media accounts and digital media could reasonably be expected to respond to one another and shape the communicative interaction effects we are interested in here. Table 2 sums up the results of the subsequent Granger causality tests, indicating six significant Granger-causing effects at a level of $p < .05$.

First, we observe a mutual Granger-causation between the AfD top-level and the legacy press. Again, this may denote a temporal more than a causal relationship, as both actor levels may be driven by exogenous processes. However, it does imply a pattern of mutual influence, which may reflect that a) legacy press reports on top politicians' statements regarding climate change and b) politicians take cues from the press. At the same time, the absence of other significant relations from or to the legacy press reifies its relative detachment from far-right processes of climate agenda-setting. Second, another mutual dynamic of attention can be observed between the RNS and hyperactive accounts actor types. The latter also Granger-cause the time series of both AfD top and AfD low, indicating potential processes of agenda-setting that function beyond a mere top-down or bottom-up logic. This is also emphasized by the sparse significance of Granger-causality between the two intra-party levels.

Overall, the results suggest intricate interrelationships between the time series specifically of the far-right actor types, with certain series like hyperactive accounts and RNS having notable predictive power on other far-right actors. This is contrasted by the legacy press time series, which only has a barely significant effect on the AfD top-level. We take this to indicate that the legacy press likely does not take cues from the far-right actor types

Table 2. Results of multivariate granger causality test for time series. Arrows indicate "granger-causes." coefficient based on wald-test.

Time series (following)		Time series (leading)	Chi²	p-value
AfD-top	⇐	AfD-low	6.94	.074 †
AfD-top	⇐	Hyperactive accounts	7.88	.048 *
AfD-top	⇐	RNS	0.58	.901
AfD-top	⇐	Legacy press	7.89	.048 *
AfD-low	⇐	AfD-top	3.29	.350
AfD-low	⇐	Hyperactive accounts	33.11	<.001 ***
AfD-low	⇐	RNS	4.96	.175
AfD-low	⇐	Legacy press	2.11	.550
Hyperactive accounts	⇐	AfD-top	4.30	.231
Hyperactive accounts	⇐	AfD-low	5.28	.153
Hyperactive accounts	⇐	RNS	20.10	<.001 ***
Hyperactive accounts	⇐	Legacy press	3.74	.291
RNS	⇐	AfD-top	0.82	.844
RNS	⇐	AfD-low	2.83	.418
RNS	⇐	Hyperactive accounts	18.17	<.001 ***
RNS	⇐	Legacy press	4.48	.214
Legacy press	⇐	AfD-top	10.54	.014 *
Legacy press	⇐	AfD-low	2.10	.552
Legacy press	⇐	Hyperactive accounts	2.37	.500
Legacy press	⇐	RNS	2.17	.539

p-values: †<.10, * <.05, **<.01; ***<.001.

in our sample – and to the degree that it would, this would be limited to the AfD leadership level. In addition, we take the complex interrelations and the role of underconceptualized actor levels like hyperactive accounts and RNS as cues to dive deeper into far-right communicative framing of a salient policy issue, leaving the mere *when* and *where* behind to inspect the distinct ways of *how* this is framed specifically among far-right actors.

RQ2: Far-right climate frames

The combination of inductively building categories and deductively applying them in a dictionary, as discussed above (see chapter Data & Methodological Approach), generates the results illustrated in Table 3. Here, the *n*-counts refer to a specific term indicating one of the frame categories, whereas column percentages point to the relative distribution of frames across an actor type. We primarily find frames that are focused on disparaging proponents of climate change mitigation and similar distributions across all actor types.

Since the dictionary was generated via word frequencies found across all far-right actor types, it is not surprising that all categories are featured across all groups. Still, the fairly even relative distribution of categories stands out. The most prominent category overall, *Religion/Cult*, frames climate change mitigation efforts in religious terms by speaking of a "climate cult," "Greta's disciples," or by referring to leaders of the Green party as "high priests" of the "climate fanatics." This was not only the overall most prominent frame, but also the most frequent across all actor types, except for the AfD top-level. Here, *Ideology* was slightly more prominent, consisting of references to political opponents as "eco-populists," "climate ideologues," or a focus on a so-called "left-green" agenda. This focus is likely a direct result of the more campaign-driven nature of top-level posts. A starker iteration of this

Table 3. Inductively generated frame categories featured per actor type (count & column percentage).

Frame Categories	AfD low		AfD top		Hyperactive Accounts		RNS		Σ	
	n	%	n	%	n	%	n	%	n	%
Ideology	36	8%	27	17%	49	7%	72	13%	184	10%
Totalitarianism	15	3%	16	10%	40	6%	72	13%	143	8%
Insanity/Irrationality	29	7%	20	13%	97	13%	48	8%	194	10%
Religion/Cult	169	39%	24	16%	181	25%	102	18%	476	25%
Hysteria/Fearmongering	49	11%	11	7%	104	14%	83	15%	247	13%
Hypocrisy/Moral superiority	27	6%	13	8%	30	4%	57	10%	127	7%
Patronizing FFF/Thunberg	24	6%	15	10%	105	14%	40	7%	184	10%
Denialism	45	10%	10	7%	86	12%	25	4%	166	9%
Costs	6	1%	3	2%	2	0%	9	2%	20	1%
Other	35	8%	16	10%	33	5%	62	11%	146	8%
Σ	435	100%	155	100%	727	100%	570	100%	1887	100%

general sentiment was expressed via the *Totalitarianism* frame, which was especially prevalent on right-wing news sites and included references to Nazi Germany and the GDR regime via terms like "Eco-Stasi," "climate nazis," or an "indoctrination" into the "Greta-Youth."

This also illustrates that a focus on Greta Thunberg or Fridays for Future activism was a theme that transcended frame categories. Nonetheless, references to "school-skipping students," or "little Greta" fed into a larger dominant category, which frames climate activism as an immature endeavor led by children, summarized in the *Patronizing FFF/ Thunberg* frame. The hyperactive accounts were especially "hyper" here[12]: Frames like *Hysteria*, most prevalent among RNS and hyperactive accounts, or *Hypocrisy*, most prevalent among RNS, used terms implying that the threat of the crisis was deliberately overblown or that activists or opposing politicians were not practicing what they preached, respectively.

The category of *Denialism* did not feature as prominently as one might expect, given the rather pronounced nature of opposition to potential political plans for climate mitigation from these same circles. We see that this category only accounted for 9% of the found frames overall, ranking relatively high (12%) for hyperactive accounts, and lowest for RNS (4%). Meanwhile, it was also one of the least featured categories for the AfD's top level, indicating that an outright denialist stance may not be a popular position there.

Overall, what stands out about the identified frames, is the degree to which they point toward disparaging existing policy approaches or political opponents. Other than the category of *costs*, which alludes to the problem of high energy prices, we find no problem definitions focused on climate change itself. This is perhaps an artifact of the approach we have taken here, which is focused on neologism and hyperboles that are unlikely to be featured in more mainstream discourse. Nevertheless, it is striking how few of the identified terms point to actionable policies. Instead, these frames stress that political opponents are ostensibly trying to create a problem where there is none. This finding corresponds with existing research on far-right climate communication in the EU, which finds that "most arguments are skeptical not towards the existence of anthropogenic climate change, but the ways in which it is addressed" (Forchtner & Lubarda, 2022, p. 1).

RQ3:   Sequences in framing cascades among far-right actor types

To find out more about sequences by which these frames cascaded into the far-right network, we analyzed the timestamps of posts or articles. For each of the 69 n-grams, we used time-stamp data contained in the initial dataset to identify the first instance it was mentioned among one of the four actor types. This process initially relied on an automated analysis by which we employed the term dictionary to autocode the first mention of each entry across all actor types. We then manually checked each "first" mention, ideally going back to the online version of the content (where still available) to manually validate the results. In a few instances, we made adjustments to the initial results, when timestamps alone were inconclusive.[13] We then plotted out the sequence this created for each n-gram, meaning each was assigned a four-digit combination of the numbers 1–4, indicating the progression by which the four actor types first featured it. Table 4 shows the overall results of this analysis. Here, the heat map colors indicate which actor types tended to introduce specific frame-indicating n-grams and which were more likely to follow.

What would such a sequence look like? One example: on February 24, 2019 the RNS *Junge Freiheit* posts an article warning of false prophets and "Greta disciples" (*transl.* "Greta-Jünger"). Three days later, the same term is found a first retweet by one of the hyperactive accounts. In March, a low-level AfD account uses the term, and on April 3rd, while at the top-level, the official AfD Facebook page gleefully announces that schools have started issuing fines for striking "Greta disciples."

The row percentages reveal that 12% of frames on AfD low-level and 19% on hyperactive accounts begin such a sequence. 29% do so for the AfD top-level and 42% for RNS. This distribution shows that AfD low-level and hyperactive accounts tend to function as frame transmitters or recipients more often than not. Few as they may be, some of the sequences are still initiated here. This seems in line with the cascading activation framework which might lead us to expect mostly a top-down dynamic between higher and lower organizational levels – with some leeway for bottom-up dynamics. In this case, the AfD's official channels and leadership could generally be expected to sit at the top of the communicative hierarchy. However, while the AfD's top level does seem to initiate some of the cascade sequences as we measure and observe them, it is equally often also the last level to feature a specific frame. We take this to be indicative of the party's willingness to draw in information flows from its lower-level and peripheral networks, as has also been observed in previous research (Klinger et al., 2023). Meanwhile, RNS clearly stand out as the main initiator of framing cascades.

These findings become more apparent in Figure 3, where we plot out the sequences of appearances for each of the frame categories per actor type. Here, each dot represents the first mention of a specific lexicon term within a given category. The prominent category of *Cult/Religion*, illustrated in the second row, for example, would feature six instances of when a frame was introduced by RNS. As becomes clear via

Table 4. Sequence of appearances of frame-indicating n-grams by actor type (% by row).

	1st		2nd		3rd		4th	
	n	%	n	%	n	%	n	%
AfD low	8	12%	19	28%	24	35%	18	26%
AfD top	20	29%	15	22%	14	20%	20	29%
Hyperactive Accounts	13	19%	16	23%	27	39%	13	19%
RNS	29	42%	18	26%	6	9%	16	23%
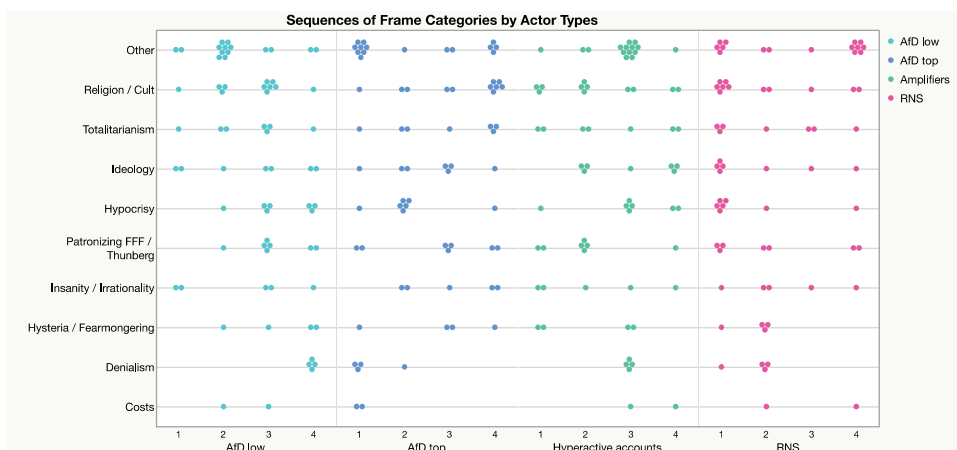
Figure 3. Frame categories by actor type, clustered by sequences of their appearance.

this visualization, these findings become even more pronounced if we were to exclude the category of "Other" which is composed out of various n-grams that were not clearly associated with a specific frame category. With the exception of "costs," RNS are influential across all of the observed categories. This underscores the importance of their role, when it comes to giving impulses for the larger agenda item of climate change within these networks.

Discussion of Results

Why did the AfD pivot toward the topic of climate change during the 2019 EU election? Part of the explanation may certainly be attributed to strategic decisions by party leaders and the evolution of far-right "movement parties" toward mainstream party dynamics (Meguid, 2005; Pirro & Gattinara, 2018). However, our research demonstrates that only looking at the platforms of political parties or the rhetoric of political elites is likely to miss an important part of the puzzle: in digital media environments, emergent forms of partisan actors are embedded in communicative networks with other ideological actor types, which come to co-determine how issues are framed and political positions subsequently shaped.

Our research set out to shed light on the communicative roles of various actor types and to trace directionalities between them in observing this new focus on climate change within the German far right. Utilizing time series analysis, we were able to infer specific relationships among these far-right actor types, discerning patterns of influence and leadership. Notably, our findings highlighted the significant roles of RNS and hyperactive accounts as potential catalysts for the AfD's shift in focus toward this issue. To delve deeper into the specific frames employed by these actors, we conducted a large-scale quantitative text analysis, identifying terms or phrases that signified distinct framing of the climate change issue. These terms were subsequently grouped into 10 distinct frame categories, which distinctly represent far-right perspectives on climate change.

Drawing on Entman and Usher's (2018) cascading frame activation framework, we explored power dynamics between far-right actors in their functions as communicative

levels. Tracing the sequences by which exclusive frames appear across these actor types, reveals complex hierarchies: all actor types play diverse roles, acting as initiators, mediators, or recipients of framing cascades. Some discernible trends include hyperactive and low-level party accounts typically acting as followers or mediators, while the AfD's top-level often appears at the start or end of a cascade. This suggests the party's discursive influence, yet also its general openness to more bottom-up information flows. The main finding here, however, is the role of RNS, initiating 42% of the sequences we observed. Next to the observed up- or downward information flows, this indicates a notable third dynamic whereby ideologically aligned media organizations act as "pump valves" (2018, pp. 303–305), contributing to framing cascades horizontally, rather than acting as mere conduits for top-down or bottom-up dynamics.

This case study therefore highlights the importance of RNS in initiating frames that may come to serve as common reference points shared throughout far-right networks. The issue of climate change presents a complex and broad discursive field. Any re-orientation by a political party into this space would have been sure to be accompanied by deliberation processes and frame competition as the network negotiates a common ideological focus. In this specific case, the observed pump-valve function of RNS may have helped the AfD reduce the complexity of a political issue and craft out-group dynamics via a shared narrative lens through which to view political opponents.

In highlighting these communication-based actor constellations, our analysis reveals how far-right entities communicate in public forums. While they may certainly seek to engage broader audiences, much of their communication remains insular, fostering an in-group dynamic. This separation from mainstream narratives likely reinforces their "alternative" identity. And as the case study analyzed here also shows, more reputable, "legacy" sources of news might exclude frames circulating in these spheres for good reason: the categories identified via our approach offer little in terms of constructive input that might serve as the basis for fact-based policy debate. Instead, they are rife in incivility, name-calling, ad-hominem attacks, ableism, and generally disparaging of perceived political adversaries.

While digital media systems make it increasingly unlikely that audiences will be completely confined to informational silos, the affordances of digital networks still enable the sharing of ideologically extreme content among fairly homogeneous co-partisans. This enables forms of ideological sorting around shared perceptions and monitoring of opposing out-groups (Törnberg, 2022). The ongoing radicalization of far-right alternative informational ecosystems has been marked by such dynamics of crafting in-groups while stoking resentment against perceived others. In doing so, these informational networks form around core ideas and markers of identity (Tripodi, 2022). Yet while communicative ties such as the ones outlined here are generally publicly accessible, too little is known about the specificities that make up their structural features and ultimately govern the flow of information within them. Meanwhile, fact-checking efforts directed against disinformation by right-wing actors tend to focus on specific sets of (false) information. However, purely focusing on such dynamics might not be able to capture the modes of connectivity driving this circulation. As we see here, far-right actors might come to mobilize not only around a particular agenda item, but collectively generate an entire stock of vocabulary that is employed to condition how reality is portrayed, perceived, and, ultimately, acted on.

Limitations & Conclusion

A central limitation of our work is that it does not capture the full extent of a potentially much more spread out far-right information ecology and assumes forms of sustained connectivity only among actors where these had been previously observed. To the degree that the low-level and hyperactive accounts studied here form a network, this would merely consist of a sample of one that had manifested previously (in regard to anti-immigration frames). The connections between these and among top-level and RNS actors can meanwhile only be inferred via the communicative links we have highlighted here. However: analyzing agenda trends and isolating frame categories in the manner explained and discussed above might lend itself well to expanding this initial network. In future research, the dictionary we assembled could be used for a larger sweep of online environments and to identify further actors engaged in these framing cycles.

The point here is not necessarily to determine when a specific term was coined or introduced as a neologism, as this may well also have happened outside of the sample of cases we are observing, but rather to infer the general directionality in a process of cascading information flows. We would assume that the various levels are in contact with one another and therefore focus on the same frame sequentially and at roughly the same time. Of course, we cannot completely rule out that a specific term or frame may not have been first circulated by other actors or within the same network, prior to our data collection. However, taking all analytical steps into account, it becomes clear that we are dealing with a certain degree of synchronicity, wherein specific frames pop up and become part of the same cycle for the span of a couple of days. To this effect, the results we see in the much more fine-grained frame-sequence analysis, mirror the larger agenda pattern uncovered by our initial time series analysis. It is also important to reiterate both the uniqueness of the dictionary terms used, which remain exclusive to the four far-right actors when compared to the much larger corpus of legacy news articles spanning the same time period. Furthermore, we are dealing with a fairly new form of discourse among these actor types and the AfD's peripheral networks – the start of which we should mostly cover with the timeframe we have analyzed here.

Our analysis here is deliberately limited to dynamics among the far-right. We do not trace these frames in their capacity to impact broader discourses or mainstream media framing, nor do we measure potential overlap – which would have been substantially more difficult to achieve, both conceptually and empirically. Yet, it is entirely feasible that other forms of information flows, such as different sets of frames, topics, or sources circulate by similar or different dynamics among these partisan actors and alternative media formats and might build active bridges to the mainstream by following the larger public's agenda. Our approach is clearly limited to those terms exclusive to the right and does not capture such potential dynamics.

However, the work we present here might serve as a jump-off point to study the subsequent diffusion of these frame markers. A plausible way of doing so would be to employ the far-right-climate term dictionary we developed here to other forms of political communication, e.g. by other parties and their ideologically aligned organizations. It stands to reason, for example, that as discursive boundaries and alliances shift, these terms and frames will cascade onto more center-right party platforms of the Christian Democrats or Liberal parties, both of which have taken decidedly oppositional

stances against the German Greens in recent elections. In this article, we have deliber-ately examined the inner dynamics of emerging far-right information networks. Future research building on these findings can begin the spread of these frames into larger discursive environments, to trace and empirically illustrate forms of far-right normal-ization and the mainstreaming of initially more contained and fringe framing cascades.

Lastly, the question of the role of RNS within digital networks deserves further scrutiny. Based on our findings here, it seems that two a substantial degree, far-right frames are cultivated there and then "pumped" into wider circulation. Yet we acknowl-edge that media conditioning likely cuts both ways: these websites might well be engaged in forms of digital analytics by which they cater to audiences' demands. We believe that more meso-level work is needed to better understand the specific motivations driving these new actor types.

Notes

1. In using this term to describe the AfD and its peripheral networks, we draw on Andrea Pirro's work which proposes this as an "umbrella concept" capturing the increasingly blurred bound-aries between the "populist radical"- and the "extreme right" (Pirro, 2022).
2. This became apparent in the party's official campaigning, for example, where a prominent slogan read "Annoy Green? Vote blue!" (transl. "Grün ärgern? Blau wählen!"). See Appendix A.6.
3. See Appendix A.1 for more info on the accounts and websites contained in each actor type and on the data collection process.
4. See Appendix A.2 for details on stationarity tests, lag selection, and VAR results.
5. In our supplementary material, we provide a script for data analysis in R-Markdown format, which corresponds with the steps outlined here.
6. List of German stop words provided via: https://github.com/stopwords-iso/stopwords-de.
7. See Appendix A.3 for the complete list and details on data cleaning.
8. See Appendix A.5 for details on reliability scores, calcualted via Freelon (2010).
9. For correlation tests and exact values, see Appendix A.2.4. (pp. 23–24).
10. For detailed results of this and other steps of our analysis see Appendix A.2.
11. However, running our analysis on lags ranging from one day to ten days did not significantly change the results.
12. This intense focus by hyperactive accounts also becomes apparent via the simple search query for "Greta Thunberg" within the collected data. The activist's name was featured in 5.749 posts there, compared to 64 times in AfD top-level posts, 1.252 in low-level posts, 1.595 in RNS, and 998 in the legacy press.
13. Manual validation was also necessary because we did not have timestamp data beyond the day for all AfD top-level accounts, resulting in a few inconclusive sequences in the initial auto-mated round. In three cases, where timestamps did not include minute-level info and manual validation of the specific posts did not produce clarity, it was not possible to discern which actor type posted first. In these cases, both would be put into the same category.

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Data availability statement

The anonymized data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to GDPR regulations that do not allow us to publicly share data generated on social media that can be linked back to specific accounts.

In addition, they will be submitted to the journal's Data Editor for inspection and review.

Open scholarship

This article has earned the Center for Open Science badge for Open Materials. The materials are openly accessible at https://dx.doi.org/10.17169/refubium-42537.

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