

How Political Conflict Shapes Online Spaces: A Comparison of Climate Change Hyperlink Networks in the United States and Germany

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We examine how the political context in which actors are embedded relates to their online communication. We argue that the degree of contentiousness of an issue (high vs. low conflict) is a decisive factor in explaining the distinct network structures generated by the actors' hyperlink patterns. Comparing two such networks originating in the United States and Germany in the area of climate change, we found systematic differences between them that result in distinct political hyperlink topologies, which reflect the underlying issue context. These differences become visible in the reciprocity of the actors' hyperlink communication, the fragmentation of the networks along the political divide, the recognition issue opponents receive from the media, and the transnational orientation of climate advocates and skeptics. This research implies that hyperlink communication is responsive to the political context, and that countermovements, in particular, manage to reap the benefits from online communication mobilization efforts.

Keywords: hyperlink networks, issue contentiousness, climate change, Germany, United States, comparative research

Hyperlinks represent some of the basic building blocks of the World Wide Web (De Maeyer, 2013; Foot, Schneider, Dougherty, Xenos, & Larsen, 2003). They relate isolated documents and websites and

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thus shape the very structure that gives the Web its name. They allow users to access websites directly through their addresses or their Facebook and Twitter feeds and navigate between them; their connective properties feed into the algorithms of search engines such as Google (Page, Brin, Motwani, & Winograd, 1999), which are used to rank websites according to their relevance. Hyperlinks thus make Web communication accessible and organize and order it (De Maeyer, 2013; Pilny & Shumate, 2012).

Recognizing how they permeate online communication and shape a contiguous Web space (Foot et al., 2003), scholars such as Shumate and Lipp (2008, p. 179) have argued that hyperlinks and the networks they establish represent connective public goods. And although hyperlinks can serve different communicative purposes, ranging from signifying trust or support to articulating criticism or demands and conveying legitimacy, and so on, they essentially establish relationships between websites and thus confer visibility and relevance (Ackland, O'Neil, Bimber, Gibson, & Ward, 2006; De Maeyer, 2013; Pilny & Shumate, 2012). Yet, for all their ubiquity, hyperlinks are distributed neither at random nor evenly between websites, but rather are used selectively and represent conscious acts of connective choices (De Maeyer, 2013; Pilny & Shumate, 2012) that "establish the structure and boundaries of political communication on the web" (Ackland et al., 2006, p. 4). It is because of these properties that communication research has examined their role in shaping online communication spaces.

Understanding hyperlink relationships in this way has far-reaching consequences, as from this perspective, they are not only distinct features of online communication but also reflect the context in which linking patterns and their actors are embedded. Indeed, Adamic and Glance's (2005) analysis of the U.S. blogosphere prior to the 2004 presidential election, for instance, clearly displays a hyperlink network fragmented along the political divide between Republican and liberal bloggers; Pilny and Shumate (2012) show that hyperlinks between websites mirror the offline connections and alliances between nongovernmental organizations. Moreover, Barnett and Sung (2005) conclude that economic indicators and some aspects of national culture significantly shape the international linking patterns of country-specific domains.

We build on these approaches and expand them by relating the linking patterns of online actors to the degree of contentiousness of the issue in which they are embedded, a contextual factor that is often implied, but rarely explicitly addressed in existing work. Accordingly, the question we sought to answer was the following: To what extent are the differences in the contentiousness of political debates reflected in the hyperlink patterns of online actors?

This study used a comparative perspective, which is often lacking in the existing literature, and contrasted "high-contentious" and "low-contentious" settings in the area of climate change policy in the United States and Germany. Furthermore, we extend the analysis from specific actor categories, such as bloggers and nongovernmental organizations, to the variety of actor groups on the Web and how these structure the issue as a whole through their hyperlink relationships. Finally, we ground the analysis in the national configurations of the debates, as the nation-state is the main locus of political decision making (Bruce & Voas, 2004), but equally take into account that most issues, above all global ones such as climate change, have transnational dimensions that are of significance for how hyperlink issue spaces are

structured. Together, these elements introduce an additional layer into the analysis of hyperlink communication, which is relevant because it is tied more closely to the dynamics of the political context.

The article is organized as follows: In the next section, we draw on elements from concepts such as the political opportunity structure, movement-counter movement relationships, and agenda-building theory to present an account of issue contentiousness. Against this theoretical background, we develop hypotheses that relate low- and high-contentious issue settings to hyperlink communication patterns. We then introduce the research design and the methodology. The findings are presented in the following section and are summarized in the concluding section, where we also discuss their theoretical implications, address the limitations of the study, and sketch avenues for future research.

Theory: Issue Contentiousness

Issues come into being when problems and grievances are publicly articulated, taken up by relevant actors, resonate with public opinion, and are ultimately processed in the form of policy proposals by the political-administrative system (Habermas, 1996). From the viewpoint of agenda-building theory, issues differ to the extent that they are able to expand across different actor groups, arenas, and stages in the political process (Cobb, Ross, & Ross, 1976) and thus differ in their "scope" (Schattschneider, 1960). Issues that expand to different informal and formal venues push other potential conflicts to the margins of public attention (Schattschneider, 1957), while the number of participants in the debate increases and their mobilizing efforts broaden the oppositional alliance structures (Kriesi, 2004). Such strongly visible, multiarena debates that involve broad oppositional coalitions of comparable strength describe highly contentious issues, which can be distinguished from their low-contentious counterparts.

High-contentious issues are defined by opposing camps that consist of far-reaching alliances with similar strength across different actor groups that vie for public dominance in the different arenas of the political process. This is the case for deeply divisive debates such as abortion, which, in many countries, was and still is a fierce struggle between broad coalitions composing social movement organizations, churches, doctors, political parties, and other actor groups, which exchange highly divergent views on the reasons for abortions, women's right to self-determination, the authority of the state, the role of clinics, the moral nature of the problem, and so forth (e.g., Ferree, Gamson, Gerhards, & Rucht, 2002).

By contrast, low-contentious issues are debates in which one side holds a hegemonic position in the different arenas, whereas dissenting voices are largely unconnected and remain scattered at the margins of public visibility. The public debate about nuclear power up until the 1960s in the United States—and other countries—is a case in point. Originally, it was discussed almost entirely in terms of an affordable, clean, high-tech solution to growing energy demands, and therefore largely had a positive, noncontroversial policy image in the media, politics, and the public, and was carried by a broad alliance of political, social actors as well as scientists, as Baumgartner and Jones (1991) show in their detailed reconstruction.

We took these aspects of the political context to find reflection in the hyperlinking patterns of actors engaged in an issue and next we describe a set of hypotheses that capture their connective patterns.

Hypotheses

Reciprocity

High-contentious settings are characterized by a greater visibility and resonance of political conflict than low-contentious contexts (Koopmans, 2004). This is due to greater mobilization efforts of movement and countermovement actors geared toward garnering support for their viewpoints (Klandermans, 1984). From a collective action perspective (Edwards & McCarthy, 2004; Monge & Contractor, 2003), the greater degree of mobilization in contentious contexts centrally involves a higher degree of interaction within the camps to coordinate their views, frames, and arguments, and to enlarge the conflict and broaden the alliance structure. At the same time, the visibility and resonance of the action of one of the groups affect the actions of the other one, which means that actions of movements and countermovements become more interrelated as they confront each other more openly (Meyer & Staggenborg, 1996). Both the within- and the cross-camp dimensions therefore suggest that high-contentious settings demonstrate not merely a higher level of activity, but more specifically a higher degree of reciprocal interaction as more communication is directed toward coordination and contestation.

In one of the few studies employing a comparative design, Biddix and Park's (2008) network ethnographic approach shows a difference in communicative activity between phases of mobilization and latency. Most of the existing analyses focus on stages of heightened controversy, although here the patterns correspond to the general expectation that an increase in political conflict goes hand in hand with an expansion of communicative (online) engagement (Bennett & Segerberg, 2013).

H1: Debates in high-contentious issues display a higher degree of coordinative activity and therefore a greater degree of reciprocal hyperlinking (within and between camps) than do those in low-contentious issues.

Political Homophily

The position of an actor on a specific issue is not arbitrary, but is part of his or her social and political identity. To reduce the pressures and inconsistencies that may result from interaction with dissenters and to legitimize their political self-categorizations, actors tend to sustain communicative relationships with like-minded others (Monge & Contractor, 2003, pp. 223–239). However, this psychological mechanism is moderated by the level of contentiousness of a debate. As dissenting positions garner visibility and resonance, they threaten the status and legitimacy of established views and force movements and countermovements into greater interaction (Meyer & Staggenborg, 1996). We expected that these forms of homophily and heterophily would be reflected in the hyperlink patterns of online actors.

For online communication, Park, Thelwall, and Kluver (2005) argue that hyperlinking can be used to "cement" political alliances, and with some exceptions, most blog-linking studies have confirmed this view, revealing that connective preferences coincide with political affiliation (Adamic & Glance, 2005; Elgesem, Steskal, & Diakopoulos, 2015). At the same time, Zald and Unseem (1987) show that in the

offline world, references across the political divide increase in times of conflict and political segregation is stronger in low-contentious issues, as here the governing alliance of policy proponents can safely ignore the marginalized opposition.

H2: Linking across the political divide is greater in high-contentious settings than in low-contentious ones.

News Media Selectivity

News coverage has been shown to be strongly driven by news values (Shoemaker & Reese, 2013). Accordingly, the media are more likely to report political conflict when the prominence (status or visibility) of the actors involved is higher and the venue is important, such as with political institutions. The mechanism behind news reporting is essentially based on an exchange theory (Monge & Contractor, 2003, pp. 209–222), and in the context of this study, the newsworthiness of actors and events is traded for media visibility. In high-contentious settings, in which prominent actors in important venues articulate opposing views, the news media should therefore reflect the existing political divide, whereas in low-contentious debates, the media should ignore the marginalized dissenters as they command little prestige and are not represented in decision-making bodies.

Hyperlink studies of news websites generally find that they are caught in the dilemma of wanting to conform to journalistic standards of transparency by including external links to the sources of their coverage, but fearing that this undermines their gatekeeping status and advertising revenue, their use of hyperlinks remains sparse (Barnhurst, 2010; Chang, Southwell, Lee, & Hong, 2012). Despite these quandaries, research indicates that context and topic of coverage influence linking practices and that journalists primarily refer to established sources (Chang et al., 2012).

Bearing in mind the media's relational reluctance, their hyperlink patterns should still reflect the differential status and corresponding news values they assign to proponents and opponents according to the level of contentiousness of the context.

H3: News media websites reporting on highly contentious issues link to both sides of the debate more evenly than do those reporting on low-contentious issues.

Transnational Ties

Although the way we have defined high- and low-contentious issues means that we locate them primarily at the national level, political conflict tends to transcend national boundaries, and this marks a further distinction between the two debate types. In particular, Keck and Sikkink (1999) show that unsuccessful mobilization efforts and a failure to expand an issue or specific framings to the agendas of the media, politics, and the public lead domestic actors to intensify their transnational orientation. Several hyperlink studies support this view: Following Park et al. (2005), Ackland et al. (2006) argue that actors can use hyperlinks to compensate for the lack of critical mass and visibility in the "real world," and Ackland and Gibson (2013) showed that the linking behavior of political parties reflects their regional or

international orientation. Extending this view to right-wing extremist fringe groups, Caiani and Parenti (2009) make the point that their transnational hyperlinks are particularly important, as they serve to establish transnational solidarity networks. We expected similar transnational patterns to occur in low-contentious issues, as here the opposing alliance structure is largely marginalized and publicly invisible.

H4: Countermovement alliance structures display a higher degree of transnational ties in low-contentious issues than in high-contentious ones.

Data and Method

In this section, we present the single dimensions of a three-level research design that allowed us to compare issues between countries in terms of the hyperlink communication patterns of the (national) positional actors and the media. We first present the case selection, then explain in detail the process used to generate the hyperlink issue networks, and finally describe the network measures to test our hypotheses.

Case Selection: Climate Change in the United States and Germany

We examined the differences in hyperlink communication between high- and low-contentious issues in the debates about climate change in the United States and Germany, two countries that differ substantially in their stance on the issue, which is reflected in their policies, public opinion, media resonance of the positions, the alliance structure of the camps, and the problem definition. Furthermore, the climate change debate also has clear transnational dimensions and thus allowed us to extend the predominant country-specific focus of many studies.

As an issue, climate change presents clear-cut political divisions, the most fundamental of which runs between those who see the anthropogenic contribution to global warming as a problem—climate advocates—and those who, to varying degrees, dispute the extent to which human-related activities affect the climate and/or the seriousness of its consequences—the countermovement.

In Germany, this divide is virtually nonexistent, and climate change has a low degree of contentiousness. Taking a very progressive stance, Germany has been at the international forefront of cutting greenhouse gas emissions, has heavily promoted and exported green technologies, is transitioning from nuclear and fossil fuel energy to supplying electrical power from sustainable resources, and is embedded in supranational climate change policy frameworks through its Kyoto Protocol commitments and as a member of the European Union (Brunnengraber, 2009).

Compared with Germany, the United States is in many ways a starkly contrasting case: Fueled by antienvironmentalism as one of the cornerstones of the “Republican Revolution” in the 1990s (Jacques, Dunlap, & Freeman, 2008), climate change has deeply divided the political parties and the public. Clearly, the issue is highly contentious, and despite the Obama administration’s efforts to put climate change back on the political agenda, the United States has largely followed an isolationist course, seen by many on the conservative side as necessary to safeguard the country’s autonomy and its economic interests (McCrigh

& Dunlap, 2011). These differences between the two countries are reflected in public opinion, political and media agendas, and alliance structures.

Public opinion on climate change in the United States is substantially distinct from that in Germany. In the United States, 20% worry only a little and a full 23% do not worry at all about climate change (Saad, 2013). This is in stark contrast to a recent Eurobarometer study on Germany, in which the respondents were asked to indicate the perceived seriousness of climate change on a 1–10 scale: A combined 23% gave the issue a score of 5 or less, but only 2% gave it a 1 (*not a serious problem at all*; European Commission, 2011, p. 72).

These disparities are also reflected at the level of politics and the alliance structure. In the United States, an entire conservative movement, spanning bloggers to influential think tanks and members of Congress, prominently endorses climate skepticism in an effort to discredit scientific research on climate change and undermine environmental legislation (Dunlap & McCright, 2010). Conversely, climate skepticism as a veritable countermovement or continuing political campaign is largely absent in Germany. In fact, there is a wide-ranging consensus between the parliamentary parties about the importance of climate protection (Engels, Hüther, Schäfer, & Held, 2013).

The United States and Germany also differ in their coverage of climate change in terms of its overall salience and with regard to the resonance of climate-skeptical positions. Occupying 1.37% of the overall U.S. print media coverage—in contrast to 0.90% for German newspapers (Schmidt, Ivanova, & Schäfer, 2013)—the U.S. press gives significantly more space to climate skeptics than do German media outlets (Grundmann & Scott, 2014). At same time, our own data suggest that the discursive gap between the two countries has been diminishing in recent years (Schmid-Petri, 2017; Schmid-Petri, Adam, Schmucki, & Häussler, 2017).

According to our theoretical approach, the differences in the political context of highly (U.S.) and minimally (Germany) contentious issues should be reflected in the hyperlink networks based in these two countries.

Data Collection: Hyperlink Issue Networks

We proceeded in four broad steps, summarized in Figure 1, to generate the country- and issue-specific hyperlink networks by snowball sampling from selected pages, indexing, organizing, and coding the results of the Web crawls (see Adam, Häussler, Schmid-Petri, & Reber, 2016, for a detailed and more technical account).

We adopted a link-tracing approach to generate the issue networks and took the most prominent civil society actors in our issue field in the two countries as the “seeds” for the Web crawls. Their linking behavior has been shown to be more diversified than that of other actor types (Rogers & Marres, 2000), and their communication patterns are therefore more likely to reflect the existing alliance structures that shape the climate change issue. We conducted literature reviews, expert interviews, and country-specific Google searches with deleted search histories, employing appropriate keywords to describe the issue field

in English and German (see Appendix 1). The search engine queries were generally helpful for gauging the other sources, especially in the low-contentious setting, as here it was the only way to gain access to the marginalized issue opponents (i.e., the German climate skeptics).

Because the seeds should be comparable in terms of their online visibility between the camps as well as the countries, we chose the four most prominent national climate advocates and countermovement actors, that is, eight seeds in total for each country (see Appendix 2). The seeds included internationally operating nongovernmental organizations, such as Greenpeace and the World Wildlife Fund on the side of the climate advocates, as well as more country-specific organizations, such as the Worldwatch Institute in the United States and the Heinrich Boell Foundation in Germany. The U.S. skeptical perspective was represented by, among other organizations, the Heartland Institute, a conservative think tank, and Watts Up With That?, one of the most prominent climate-skeptical blogs on the Web, and Klimaskeptiker.Info and the European Institute for Climate and Energy were the German equivalents. Pretests showed that for both countries, the seeds captured the mainstream of the debate and formed an integral part of it, as measured by their average geodesic distance (see Appendix 2).

For each country, the hyperlink crawler software Issue Crawler (Rogers, 2013) started from the selected seeds and collected all links that pointed outside to other websites (the data were collected June 5, 2012). This resulted in a basic network structure, and the crawler then checked all websites identified in the first step for links that ran between them. Because the Web crawler followed hyperlinks irrespective of the content of the Web pages, the resulting hyperlink network did not necessarily include only Web pages that were related to the issue. Furthermore, we excluded social networking services, such as Facebook and Twitter, as they are online platforms rather than actors in the issue.

In a third step, we separated the relevant from the irrelevant pages by automatically indexing all of the crawled URLs according to our keywords with a minimum requirement of one keyword per Web page. This step helped to substantially reduce the "noise" in the data and transformed the basic hyperlink crawl into an online issue network. From this network, we extracted the largest connected graph, and further reduced it by requiring that each actor have at least one inlink, resulting in the "reduced" network (1,062 nodes in the U.S. network, 414 nodes in the German one). This ensured that all actors in the network were recognized by at least one other actor as being part of the debate. Furthermore, we dichotomized the networks into binary ones, in which a connection between two nodes was either present or not.

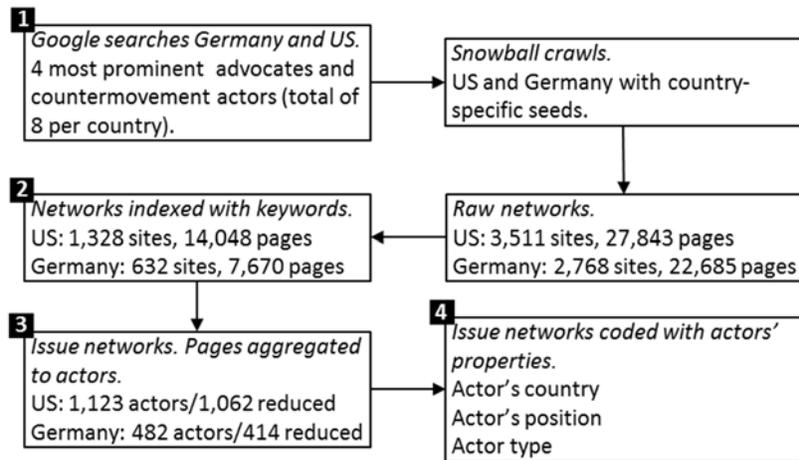


Figure 1. Hyperlink issue network-generation procedure.

Finally, we organized and coded the data. We aggregated the single Web pages that belonged to the same websites, and the websites, in turn, to organizations if they had more than one Web domain. Then, using the information usually found on the “About Us” page or a similar section of the website, we classified the organizations manually according to their position on the issue (advocates and the countermovement for the present analysis), the actor type (media and other actors for the purposes of this article), and their country of activity (national, that is, the United States or Germany, and transnational actors for this analysis).² The guiding principle was to take the actors’ perspectives and classify them according to their own views and definitions. To determine the news media’s position—genuine online media and legacy media—we classified at least three editorial articles sampled from their websites, if possible; otherwise, they were categorized as having “no explicit position.”

Hyperlink Issue Network Measures

The data collected represent a network in which the nodes are online actors connected by the hyperlinks that run between them, that is, the outlinks and inlinks of the single Web pages. Given that hyperlinks constitute communicative relationships between the actors, we used the methods of social network analysis to examine the hyperlink networks and test our hypotheses. Table 1 lists the basic structural parameters for the two networks.

² The actors’ attributes were classified by two coders. The reliability of their classification was assessed by comparing them with a master coding and was calculated using Krippendorff’s alpha, yielding .90 for the actor type (distinguishing a total of five categories), .90 for the position of the actors (distinguishing a total of five gradations in the actors’ position vis-à-vis climate change), and .93 for their country of activity (distinguishing a total of 199 categories), all of which were satisfying.

Table 1. Basic Network Parameters.

Structural parameters	U.S. network (1,062 nodes)	German network (414 nodes)
Density	.005	.006
In-centralization	.188	.091
Out-centralization	.681	.584
Transitivity	.111	.170
Average distance (hyperlink steps)	2.895	5.623
Diameter (hyperlink steps)	8	11

Many network measures are influenced by the size of the graphs, and even standardized alternatives are often based on a theoretical maximum where all nodes are assumed to be connected to one another, which rarely reflects the connective reality of the actors. We therefore employed measures that are less sensitive to differences in network size and were able to capture the existing communicative interactions. Accordingly, we measured the degree of mutual linking (H1) by the overall amount of reciprocity initiated by national actors. This measure counted the number of reciprocal dyadic relationships and compared them with the total of relationships that were one-sided, and thus takes an empirical rather than a theoretical maximum as the point of reference. We determined the degree of fragmentation between advocates and skeptics (H2) as well as the linking patterns of the media toward these two camps (H3) by the proportions of the corresponding outdegree distributions. Finally, we assessed the countermovement's degree of transnational orientation (H4) through the ratio of transnational to national hyperlinks using Krackhardt and Stern's (1988) E-I index (see the Results section for a more detailed explanation).

Results

General Description of the Networks

We first examine the general structure of the two networks and determine how the full networks differ from those restricted to national senders, which we used to test the hypotheses. Given that the theoretical framework outlines differences between national contexts and how they are reflected online, the analysis focuses on the national actors' hyperlink activity. At the same time, the side of the receivers of hyperlinks remains unrestricted, as we mapped the issue field that stretches well beyond national borders and reflects the boundless communication afforded by the Internet; H4 explicitly addresses this aspect. Table 2 presents the actor distribution in the networks. As we can see, although the U.S. and German crawls were based on the same number and kind of starting points, the resulting hyperlink issue spaces are quite distinct.

Table 2. Most Important Actor Types in the United States and Germany.

Network	Advocates	Countermovement	No position	Nodes (<i>n</i>)	Links (<i>n</i>)
U.S. basic, % (<i>n</i>)	38.3 (407)	40.2 (427)	21.5 (228)	1,062	6,000
U.S. national senders	38.0 (213)	45.3 (254)	16.8 (94)	561	3,901
U.S. media	58.2 (107)	28.3 (52)	13.6 (25)	179	475
U.S. actors	36.3 (37)	47.1 (38)	16.7 (17)	103	566
Global actors	64.5 (89)	9.4 (13)	26.1 (36)	138	483
German basic, % (<i>n</i>)	68.8 (285)	17.9 (74)	13.3 (55)	414	1,012
German national senders	75.6 (90)	14.3 (17)	10.1 (12)	119	577
German media	70.0 (21)	13.3 (4)	16.7 (5)	30	24
U.S. actors	51.1 (46)	37.8 (34)	11.1 (10)	90	106
Global actors	84.3 (91)	2.8 (3)	13.0 (14)	108	183

Note. The national sender networks compose all actor types, including the media.

The U.S. network (1,062 nodes) is not only substantially larger than the German network (414 nodes), it also contains an almost equal amount of advocates and countermovement actors, whereas the German network in this respect displays all the markers of a low-contentious issue. Here, advocates compose 68.8% of all actors, whereas the countermovement is pushed to the margins of visibility, occupying only 17.9% of the issue space. When restricting the networks on the side of the senders to national actors in both cases, the existing dominant view is further reinforced. The majority of national media in the restricted networks leans to the side of the advocates, although the trend is more pronounced in the German network. Other national actors and global ones related mainly to the United Nations also play a role and give the networks a transnational dimension.

Hyperlink Patterns and Issue Contentiousness

All the hypotheses relate to the “restricted” networks and examine the linking patterns of national actors in the networks. We first compared the degree of reciprocity, assuming that national actors in highly contentious settings display greater mutuality than those in low-contentious debates (H1).

Table 3 displays the reciprocal and nonreciprocal relationships in which the actors are engaged. The results support the hypothesis: Despite the fact that, in both settings, the degree of mutuality is rather low—9.6% in the United States compared with 3.8% in Germany—the difference between the two issues is still significant.

Table 3. Reciprocated Hyperlinks of National Actors in the United States and Germany.

Network	Reciprocal dyads	Nonreciprocal dyads
German national senders	22 (51.01)	555 (525.99)
U.S. national senders	344 (314.99)	3,219 (3,248.01)

Note. Expected values appear within parentheses. The bases are the national actors' total outlinks.

U.S. national senders, $n = 561$; German national senders, $n = 119$. $\chi^2(1) = 20.311$, $p < .001$.

H2 puts the relationship between the national advocates and the countermovement at its center. We generally expected more communication within the two issue camps than across the political divide. Due to the unequal status of the advocates and the countermovement in low-contentious issues, the fragmentation should be stronger here than in highly contentious settings (H2). The results shown in Table 4 confirm this assumption. Although in both cases the bulk of the linking patterns is primarily driven by homophily, the greater contentiousness of the U.S. climate change debate translates into almost twice as many hyperlinks (24.5%) crossing the political divided than in Germany (13.7%).

There is a marked difference, however, in the linking patterns once we disaggregated the overall figures. In both issues, the connective orientation of advocates corresponds to the general trend, but the countermovement reveals a different dynamic, as here German climate skeptics link more strongly to the opposite side than do their counterparts in the U.S. context. This does not necessarily contradict the theoretical assumptions about the linking behavior of positional actors, but it does suggest that they need to be specified in greater detail. Opponents in low-contentious issues can be expected to connect to a greater degree to proponents than those in high-contentious settings, as they have a greater need to become visible as relevant actors in the debate. Put another way, in high-contentious settings, issue opponents already occupy a strong position, which becomes apparent in the U.S. debate, where the climate countermovement is recognized to a greater degree by the advocate side than in the German context. Taking these additional cross-camp relationships into account, the chi-square tests reveal significant differences in the linking patterns on the level of the single alliance structures for the issue camps between both countries.

Table 4. Cross-Camp Linking Patterns in the United States and Germany.

Network, n (%)	Across camps	Within one's camp	$\chi^2(1)$		
			H2	Advocates	Counter-movement
U.S. positional actors	758 (24.6)	2,313 (75.4)	29.65 ($p < .001$)	26.12 ($p < .001$)	9.82 ($p = .0017$)
German positional actors	71 (13.7)	448 (86.3)			
U.S. advocates	74 (15.5)	402 (84.5)			
German advocates	17 (4.5)	363 (95.5)			
U.S. countermovement	684 (26.4)	1,911 (73.6)			
German countermovement	54 (38.8)	85 (61.2)			

Note. The bases are the total outlinks of the actors: U.S. positional actors, $n = 467$; German positional actors, $n = 107$; U.S. advocates, $n = 213$; German advocates, $n = 90$; U.S. countermovement, $n = 254$; German countermovement, $n = 17$.

H3 examines the role of the media in the two issue types, and we expected them to refer to both sides of the debate more evenly in high-contentious settings than in low-contentious ones. We assessed the media's connective balance by comparing the links to the two camps between the U.S. and the German context. The results in Table 5 confirm the hypothesis: The high contentiousness of the U.S. debate results in the media granting visibility not only to the advocate side, but in equal measure to the countermovement. The low-contentious setting in Germany in turn means that the issue opponents are nearly invisible and consequently hardly integrated into the online space through the media's linking behavior. However, the results also show that the German media generally demonstrate a low linking activity; they connect to only 24 actors in total compared with 356 in the U.S. case, which might limit our interpretation of the results, despite a clear trend.

Table 5. Linking Patterns of National Media to Positional Actors in the United States and Germany.

Network	Advocates	Countermovement	$\chi^2(1)$
German national media, <i>n</i> (%)	21 (98)	3 (2)	11.045 ($p < .001$)
U.S. national media, <i>n</i> (%)	179 (50)	177 (50)	

Note. The bases are the total of media outlinks to advocate and countermovement actors. German national media, *n* = 32; U.S. national media, *n* = 182.

Finally, H4 assumes that actors from the oppositional countermovement in low-contentious issues would show a more transnational orientation in their hyperlink communication than those in contentious ones, as the latter possess a critical mass at the national level. As with the previous hypotheses, we used the proportion of outlinks as the appropriate measure. However, in this case we combined the outlinks to the national and transnational actors into one measure, the E-I index, developed by Krackhardt and Stern (1988). It takes its name from the underlying idea of subtracting the number of internal links (national hyperlinks) from the number of external links (transnational hyperlinks) and dividing the difference by the total number of links (national plus transnational hyperlinks). This results in a figure that can take on a value between -1, when there are only national hyperlinks, and +1, when the linking pattern is exclusively transnational; 0 indicates a balance between national and transnational orientations.

Table 6. Transnationalization of the Countermovement and Climate Advocates in the United States and Germany.

Network	Links		E-I Index	$\chi^2(1)$	
	National	Transnational		Countermovement	Advocates
German national countermovement	50	103	0.346	24.37 ($p < .001$)	51.72 ($p < .001$)
German national advocates	160	262	0.242		
U.S. national countermovement	1,726	1,217	0.173		
U.S. national advocates	314	194	0.236		

Note. German countermovement, *n* = 17; German advocates, *n* = 90; U.S. countermovement, *n* = 254; U.S. advocates, *n* = 213.

As Table 6 shows, on balance, the U.S. countermovement displays a stronger national focus, whereas the opposite is the case for the German opponents of current climate change policy, whose emphasis on the transnational perspective outweighs the domestic orientation. Not surprisingly, the different patterns for the actors in high- and low-contentious issues are statistically significant; we can therefore confirm H4.

Table 6 also reveals a similar pattern for the linking preferences of the climate advocate camp in both issue types, however, which suggests that, on the whole, the issue configuration in low-contentious settings in general promotes outward-looking communication, whereas high-contentious issues are characterized by the actors adopting a more introversive perspective. Furthermore, the differing contexts lead to a specific connective dynamic between the issue types and confirm the status of U.S. actors in the German network, particularly for the skeptical side of the debate. In fact, German countermovement actors link more to their U.S. counterparts (34 links) than they do among themselves (33 links), whereas other transnational connections play only a minor role. For German climate change advocates, global institutions related to the United Nations (119 links) provide their main point of reference, whereas the U.S. advocate camp (41 links) is of only secondary importance. The contentiousness of the U.S. debate thus has the effect of propelling the countermovement to greater transnational visibility, and it acquires an expert status for German climate change skeptics, similar to that which United Nations institutions embody for the advocate camp.

Discussion

The purpose of this research was to examine the connection between the political context of an issue and the hyperlink communication patterns established by the actors embedded in it. The results of the analysis suggest that the specific constellation of an issue is reflected in the reciprocal hyperlink relationships between the actors, the amount of cross-camp linking between proponents and opponents, the media's orientation toward the two camps, and the camps' transnational orientation. What this study finds, in other words, is that the degree of issue contentiousness can help to explain the hyperlink behavior of the actors. We discuss each of these results in turn.

First, this study shows that differences in the degree of an issue's contentiousness translate into differences in the actors' mutual engagement. The results support the view that high-contentious settings are associated with a greater amount of interaction between the participants. Of course, the focus on reciprocity necessarily reduces the complexity of political debates to a very basic measure, but it is nevertheless able to highlight one of their central properties: Contentiousness is related to mobilization, which in turn translates into coordination within the own camp and contestation of the political opponent.

Second, the greater interactivity in highly contentious issues also has the effect of integrating the debate across the political divide to a greater degree than in low-contentious contexts. Confirming the results of previous research (Adamic & Glance, 2005), political homophily proves to be the strongest driver in the actors' connective choices, and their linking patterns split the issue along the main line of conflict. At the same time, the increased contentiousness in the U.S. case leads to greater orientation to the other side of the debate than in the German network. However, in a more detailed view, the German

countermovement appears to contradict the general trend, as it links more strongly to the advocate side than does its U.S. counterpart. This result requires us to take the status difference between the camps into consideration: As climate skeptics are largely marginalized in the German debate, countermovement-linking here is substantially higher (34.3%) than in the United States (10.9%).

Third, the media's linking orientation reflects the overall status of the camps in the debate, as they grant equal visibility to both sides in the U.S. case, whereas in the German context, climate skeptics are largely ignored. Whereas the low hyperlink activity of German media means that the results have to be treated with caution, for the United States, they suggest that climate skepticism benefits from online communication by being allocated even more media visibility than offline (Painter & Ashe, 2012) and it thus competes on an equal footing with the advocate side.

Finally, the perceived ineffectiveness of the climate countermovement in the German context leads to a greater transnational orientation than maintained by U.S. climate skeptics. Yet, a very similar pattern becomes apparent for the dominant German advocate side, which shows that the degree of transnationality is not merely related to the status of a camp in the debate, but to the overall structure of the issue (see McNutt & Wellstead, 2010, for similar results in the Canadian context), and that as a global debate, climate change therefore connects high- and low-contentious issue contexts. This is particularly evident for the German countermovement, which is strongly connected to U.S. skeptical actors, whereas German climate advocates link primarily to supranational institutions.

Implications

The results of the analysis conducted in this study have several substantial implications. The most important one is the general conclusion that context matters in the sense that hyperlinks reflect the configurations of the underlying political setting in which the actors are embedded. This adds another layer of explanatory factors that help us to understand not only the structure of hyperlink patterns but also, at least in part, the motivation behind them, and echoes a similar point made by Pilny and Shumate (2012).

Importantly, the focus on the political context does not invalidate other theories of network generation, but helps to integrate them. The different hypotheses incorporate theories of collective action (H1 and H4), homophily (H2), and news values, social status, and exchange theories (H3). The results thus broadly support the multitheoretical approach advocated by Monge and Contractor (2003) to analyze social networks, and this research expands the application to hyperlink environments. Adding to this view, the degree of contentiousness as an analytical framework attempts to explain the network relationships not only with regard to different theories or actor attributes but also in terms of how these are affected by the wider context in which they are located. It thus more fully takes into account the dynamic nature of the political process and allows us to formulate specific expectations about actor relationships for different political configurations.

The study also shows, however, that the responsiveness of hyperlinks to the political context does not mean that the Internet is an egalitarian space. Online communication is not a substitute for a lack of financial, political, organizational, and other resources, as illustrated by the German climate

countermovement, which is as invisible online as it is offline. Having said this, the online status of the U.S. countermovement suggests that once an alliance structure reaches a critical mass, it is able to reap more fully the benefits of hyperlinked communication, evidenced, for instance, by the fact that it receives media recognition equal to the advocate side of the debate.

One of the differences between hyperlinks and other forms of communication and the main challenge posed particularly for social movement actors—irrespective of their political leanings—is to be seen in their unobtrusiveness. Unlike more regular forms of collective action such as strikes and demonstrations, connective action is nonreactive in the sense that despite constituting public communication, the receiver of a hyperlink is largely unaware of it. Hyperlinks are therefore an ambiguous resource, as their universal availability as a connective good cannot automatically grant what lies at the heart of a political debate, namely, public visibility. Nevertheless, the U.S. skeptical movement enjoys a substantial amount of hyperlink recognition by the media—and more than offline (Painter & Ashe, 2012). Although a more comprehensive account would require additional analyses (see below), the results of this study suggest that the increased engagement of U.S. skeptics in the national debate and the recognition they receive from U.S. advocates might contribute toward explaining the status difference of the German countermovement. These dimensions not only reflect the political context, but importantly keep the focus on the domestic debate and accentuate the existing lines of conflict. Of course, the U.S. countermovement alliance is substantially larger than its German counterpart, but online it is mainly represented by bloggers, who show that although individually a hyperlink does little to change a debate; used collectively, it can alter the political topology of a network. How strongly this affects the political outcomes of the debate cannot be answered by this study, but the results show that the online environment is a venue that can be beneficial for successful (counter-) movement mobilization in terms of coordination, contestation, and (media) visibility.

Limitations and Future Research

The last point implicitly indicates some of the limitations of the present research and how it could be expanded to arrive at a more detailed and robust picture of the dynamics at work in hyperlink issue networks. First, this study focused on rather unambiguous, extreme stages of a debate, and the analysis should be extended to other, intermediary phases characterized by more complex, disjointed alliance structures in the opposing camps.

Second, we examined the extent to which hyperlink patterns reflect the issue context in which the actors are embedded. An important observation is that the relationship between hyperlink patterns and political context is not merely one of correspondence, but that they might affect each other to different degrees. This foregrounds a temporal aspect that needs to be examined further, and future research should move beyond single snapshots of issue networks and connect them in a longitudinal perspective to come closer to identifying significant changes in communication patterns and their mutual interdependence.

This also necessarily implies that we need to incorporate the contents that the actors communicate into the research design, as these ultimately provide the test for how deeply the fragmentation runs within the issue, who is able to set the different agendas, and how they are related to one another.

Finally, we focused on actors such as nongovernmental organizations, the media, political institutions, and so on, as constituting an issue and thereby explicitly excluded social media platforms from the analysis. Extending the research in this direction would not only complement the present approach, but may reveal whether these platforms are governed by the same dynamics or whether, for instance, marginalized voices such as the German countermovement receive a substantially greater uptake.

Conclusion

Explicating a notion of issue contentiousness that is often implicit in the existing literature, in this article, we have argued that hyperlink networks reflect the political issue context in which the actors are located, and that differences in contentiousness therefore should become visible in distinct network structures. The study contributes to the literature on hyperlink networks and specifically to approaches that seek to explain network patterns through actor attributes or macro-level configurations (Barnett & Sung, 2005).

The results show systematic differences between hyperlink networks embedded in high- and low-contentious settings, and they extend to the reciprocity of the actors' relationships, the degree of fragmentation between issue proponents and opponents, the visibility conferred on them by the media, and how transnationally they are oriented.

Supporting the results of hyperlink studies interested in political context factors (Caiani & Parenti, 2009; McNutt & Wellstead, 2010; Pilny & Shumate, 2012), this research shows that differences in the prominence of actor groups in the political process translates into selective linking patterns.

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Appendix A

Keywords Used for Seed Identification and the Indexing of the Web Pages

German keywords: *Klimawandel, globale Erwaermung, globaler Eerwaerumng, globalen Erwaermung*

English keywords: *Climate change, global warming*

Appendix B

Crawler Seeds and Geodesic Distances

Table B1. U.S. Crawler Seeds and Their Average Geodesic Distance in the Networks.

Seed	Average geodesic distance
Climate advocates	
Climate Central	2.1
http://www.climatecentral.org	
Greenpeace USA	2.7
http://www.greenpeace.org/usa/en/campaigns/global-warming-and-energy	

Worldwatch Institute	2.8
http://www.worldwatch.org/climate-energy	
World Wildlife Fund U.S.	2.9
http://www.worldwildlife.org/climate/index.html	
Countermovement	
The Heartland Institute	1.9
http://heartland.org/issues/environment	
Committee For A Constructive Tomorrow	1.9
http://www.climatedepot.com	
Watts Up With That?	1.3
http://wattsupwiththat.com	
C3 Headlines	1.7
http://www.c3headlines.com	

Note. Full networks, $N = 1,123$. Minimum average geodesic distance = 1.3, maximum = 3.9, $SD = 0.35$.

Table B2. German Crawler Seeds and Their Average Geodesic Distance in the Networks.

Seeds	Average geodesic distance
Climate advocates	
Heinrich Boell Stiftung	1.6
http://klima-der-gerechtigkeit.boellblog.org	
Greenpeace Germany	2.2
http://www.greenpeace.de/themen/klima/nachrichten	
Potsdam Institute for Climate Impact Research	2.6
http://www.pik-potsdam.de/aktuelles?set_language=de	
World Wildlife Fund Germany	2.4
http://www.wwf.de/themen-projekte/klima-energie	
Countermovement	
EIKE—Europäisches Institut für Klima und Energie	2.0
http://www.eike-klima-energie.eu	
Klimaüberraschung	2.8
http://www.klima-ueberraschung.de	
Klimaskeptiker	1.0
http://www.klimaskeptiker.info	
Analyse + Aktion	2.7
http://astrologieklassisch.wordpress.com/tag/klimawandel	

Note. Full networks, $N = 482$. Minimum average geodesic distance = 1.0, maximum = 4.5, $SD = 0.5$.