

Coalitions and counter-coalitions in online contestation: An analysis of the German and British climate change debate

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Coalitions and counter-coalitions in online contestation: an analysis of the German and British climate change debate

Mobilization goes along with counter-mobilization, ideas trigger counter-ideas and coalitions struggle with counter-coalitions. Political contestation is – at least – a two-sided process. However, the strength of the competing camps in pushing forward their agenda varies along an axis of different conflict configurations. At one extreme, the political contest is defined by opposing camps with equal potential to influence public opinion, mass media and the institutional process. At the other extreme, political conflict is characterized by a dominant coalition and their master frame, while counter-voices are hardly visible and lack institutional access. Such a situation is labelled a 'policy monopoly' (Baumgartner and Jones, 1993: 6f.).

Traditionally, political contestation has been shaped by national elites. Policy studies have primarily focused on political elites and their impact on policy formulation whereas studies on mass media have revealed that media follow the constellation among the political elite: they tend to neglect issues not raised by national political elites (Author) and hardly articulate dissenting positions if there is a consensus among the elite (Bennett, 1990). If social movements and other 'challengers' (Kriesi, 2004) have come into focus of research, they have been shown to face difficulties entering the political process as well as traditional media (Bennett, 1990; Wolfsfeld, 1997).

Today, however, the Internet opens up a new venue for political contestation that has been associated with hopes for a 'democratic reconfiguration and redistribution of traditional sources of news and information on a global scale' (Kellner and Pierce, 2008: 393). This reconfiguration is based on the idea that the Internet with its low access barriers breaks the monopoly of traditional media to decide what is relevant for a society and opens up new possibilities for non-elite actors to raise their voices (Benkler, 2006). In such a 'hybrid media system' (Chadwick, 2013) the different channels of communication are intertwined and civil society ac-

tivists and public officials try to promote their positions and frames both through traditional media as well as through all types of online media. As a wide variety of different actor types are connected in such a networked public sphere, ideas from outside the political elite may have a chance to diffuse more easily (e.g. Benkler et al. 2013). However, recently, it has been noted that this shift of power in public contestation away from traditional media and political elites may also spur anti-democratic, anti-liberal as well as post-factual voices (e.g. Benkler et al., 2017).

In our study we seek to understand the role of the Internet in settings characterized by policy monopolies. Policy monopolies consist of a dominant coalition of elite (and non-elite) actors that is able to define the agenda, whereas the counter-coalition is weak and invisible. As the Internet expands the public sphere, does it allow counter-coalitions to successfully challenge the status of dominant policy constellations or does it reflect traditional power constellations? To answer this question, we seek to (1) identify coalitions and counter-coalitions on the Web and to analyse (2) how these coalitions differ resource-wise and where these differences come from. To do so, we rely on a unique dataset on actor relationships in hyperlink networks, as well as on the content discussed within these networks, which helps us describe the political position, type and geographical location of the actors. We compare such networks originating from German and British civil society actors over the course of 11 months in the field of climate change – two countries in which those warning of the negative consequences of man-made climate change hold a policy monopoly.

The contributions of this study are two-fold: First, instead of studying mobilization and contestation among a specific actor type (e.g. for blogs Adamic and Glance, 2005; Elgesem et al., 2015; e.g. political elites Park et al., 2004; Shumate, 2012; e.g. for NGOs Simpson, 2015) we adopt a link-tracing approach that incorporates a variety of these actors. Such an approach allows us to analyze how elite and non-elite actors mobilize together or against each other and

how national and transnational dimensions are intertwined (see also Elgin, 2015). Second, our study contributes theoretically and empirically to defining coalitions on the Web and to measuring their resources taking the two- or multi-sided nature of political contestation into account. We thereby follow an approach that starts out from actors' political positions asking whether they are underpinned by linking behavior instead of relying on community detection algorithms that take hyperlinks as their starting point (e.g. Elgesem et al., 2015).

Online (Counter-) Coalitions

In recent times, coalitions have been analysed online. Benkler et al. (2013) for example study the emergence of a coalition against the online piracy act in the US and Bennett and Segeberg (2013) also interpret movement networks as coalitions. In this vein, also Pilny and Shumate (2012) show that NGO hyperlinks are used to collective identity formation reflecting offline alliances among the involved actors (also Simpson, 2015). All of these studies, however, analyse online coalitions without taking the opponent side of contestation into account. Consequently, while these studies are able to shed light on the mobilization processes of social movement organizations, their one-sided focus fails to reveal the more complex dynamics generated by the interplay of proponents and opponents. These configurations have only recently been given attention. Based on community detection algorithms, Elgesem et al. (2015) for example show that climate change skeptical and advocate communities exist in the blogosphere. Yet, such an approach – if used for coalition identification – is based on the premise that links reveal coalitions. As links may have different meanings (for summaries De Maeyer, 2012; Pilny and Shumate, 2012), Elgesem et al. (2015) question in how far the identified communities fully present communities in a social sense. Building on but also departing from these studies, we start out from a theoretical notion of coalitions that describes them in a social sense demarcating them based on their ideological core that is then underpinned by their connective fabric. To do so, we draw on Sabatier's advocacy coalition framework (Sabatier,

1988; Sabatier and Weible, 2007) as it offers a definition of coalitions that can well be adapted to online settings (see also Elgin, 2015) and is fully interpretable in a social sense. Following this framework, a coalition is formed (1) in response to concrete policy issues and (2) comprises different types of actors such as political actors, lobbyists and administrative agencies, but also journalists, scientific representatives, non-profit organizations and private consultants. It is constituted by a shared belief system (3) which is characterized by core (policy) beliefs defining the general direction in which a coalition seeks to push policy programs. Coalition allies agree on such core beliefs (which are very hard to change) whereas variation occurs as regards the secondary strategic aspects, i.e. the instrumental decisions and framings surrounding these core beliefs. The ideological core of such coalitions is underpinned by (4) a non-trivial degree of internal coordination and by (5) some stability over time.ⁱ

This approach is well suited to study coalitions in online contestation as web researchers also apply an issue-specific logic (1) to draw boundaries for the investigation of the potentially endless web (e.g. Ackland and O'Neil, 2011; Rogers and Marres, 2000) and as online contestation is shaped by a multitude of actors (e.g. bloggers, NOGs, politicians or media) (2). Beyond, core beliefs (3) are clearly formulated by actors on the web (e.g. Elgin, 2015) and become visible in the documents published. In addition, hyperlinks being part of the connective fabric of the web (Gerlitz and Helmond, 2013) indicate public expressions of affiliations (Fu and Shumate, 2016) or citation links (Adamic and Glance, 2005) and as such might be useful to analyse coalitions' coordination (4). Although there is evidence that such hyperlinks carry many meanings in different settings, researchers have shown that they are especially frequent among like-minded actors. It is actors with similar political positions, who stem from the same party, work on similar issue or come from the same geographical area that are more closely connected (e.g. Ackland and O'Neil, 2011; Adamic and Glance, 2005; Gonzalez-Bailón, 2009; Himelboim et al., 2013; Kim et al., 2010; Park et al., 2004;

Tremayne et al., 2006). As a consequence, coalition allies should also be more closely connected to each other than to the opponent side. As links thereby partially decide on the attention allocation on the web, this form of internal coordination makes sure that the link economy plays in favour of the own camp (Fisher et al., 2013). Finally, it is an open question (as longitudinal studies of the web are rare) whether online contestation has a stable core (5) – a last criterion for coalitions.

A Coalition's Resources and their Origin

Coalitions differ in their access to different resources such as financial means, important allies and their degree of support which influence their ability to push forward their core ideas (Sabatier and Weible, 2007). We focus on two resources: a traditional one stemming from the composition of allies and an online-specific resource, namely online visibility. A coalition is regarded resourceful if it involves allies from the classical venues, i.e. media and political actors into the coalition structure and if these allies are rooted on the national level. Such actors have the capacity to push and accelerate the issue (Benkler et al., 2013). As most studies concerned with online coalitions or networks analyse only one type of actor our knowledge on the composition of (counter-) coalitions is sparse.

A second important resource of a coalition is its online visibility which allows 'to include and exclude issues, frames and contributors' (Bennett and Segerberg, 2014: 424). Online visibility is shaped by various forms of web connectivity (Gerlitz and Helmond, 2013). Hyperlinks – the focus of this study – are one of the first, yet still important mechanisms shaping this connective fabric of the web which today, however, have been complemented by more participatory connective fabrics originating in the recommendation systems of social media (Gerlitz and Helmond, 2013). Hyperlinks play a dual role in shaping online visibility: they decide the pathways a surfer can follow and shape the algorithmic selection (Gonzalez-Bailón, 2009). Search algorithms are based on the idea that sites receiving many links are

more important than those that gather only few of them. Moreover, if these links then stem from highly visible actors, the importance is further increased (Brin and Page, 1998). Following this line of reasoning, links influence on the web 'who gets the pole position' (Gonzalez-Bailón, 2009: 271) or as Ackland and O'Neil (2011) put it who receives authority. It has to be noted, that this attention economy is independent of the evaluation a link contains. Thus, also critique links foster visibility. As visibility is even more important in the multi-channel information environment online compared to traditional mass media (for which researchers claim that even negative visibility fosters success (e.g. Ellinas, 2010)), we regard the receiving of links as an important resource of a coalition.

Studies that focus on the overall hyperlink structure of the web have revealed that visibility online is unequally distributed. They have shown that few very popular actors receive most links whereas the bulk of actors within the networks are marginal (Barabási, 2003; Gonzalez-Bailón, 2009; Hindman, 2009; Kim et al., 2010). These hierarchical structures resemble scale-free power-law distributions and are the result of linking behaviour that preferences sites that are already well connected (preferential attachment, see Barabási and Albert, 1999). As an often overlooked consequence, hyperlinks are just as concentrated as traditional media (Hindman, 2009) and in the end only few actors are able to profit, in terms of visibility, from the advantages of online communication.

Thereby, research points out that it is not necessarily the elites that turn most visible online (yet, for evidence of online elite dominance, see e.g. Gerhards and Schäfer, 2009; Gonzalez-Bailón, 2009), but it may well be those challenging a societal master frame (we will refer to them as counter-movements here). Benkler et al. (2013) for example illustrate how a countermovement online wins against one of the best-funded lobby organizations in the US in the case of online piracy regulations whereas Bennett and Segerberg (2013) analyse how movements like the Occupy or Indignados profit from online communication. Kaiser et al.

(2017) show that the far-right in the US managed to influence the more traditional conservative media via Breitbart during the US election campaign 2016. The significance of the Internet for counter-movements, however, has not only been shown for established democracies, but also for countries which experience more governmental control. Looking at China, for example, Peng has shown that online discourse has contributed to trigger governmental actions (Peng, 2005) whereas Zhou and Moy's study (Zhou and Moy, 2007) indicates that online communication helps pushing neglected issues on the traditional media agenda. Further on, it is revolutionary periods (like the Arab spring), in which online communication has contributed to sustain and accelerate the countermovement's protests (e.g. Wolfsfeld et al., 2013).

Based on such studies, authors have formulated their hope that the online world leads to a democratic power reconfiguration (Bentivegna, 2002; Kellner and Pierce, 2008): 'The networked public sphere is an alternative arena for public discourse and political debate, an arena that is less dominated by large media entities, less subject to government control, and more open to wider participation.' (Benkler et al., 2013: 5). More recently, however, researchers and politicians have started to realize that also counter-voices which oppose basic democratic values (see for the concept of bad civil society Chambers and Kopstein, 2001: 839) and / or replace factual through post-factual information (see e.g. House of Commons Home Affairs Committee, 2012; Silber and Bhatt, 2007) exploit the possibilities of the Web. The most prominent example, in this vein, is probably the Islamic State which some even claim would never have 'come into existence, let alone been able to survive and expand' without digital technologies (e.g. Atwan, 2015: 9). Yet also within the Western world such counter-voices have gained ground: the alt-right sphere in the US (Benkler et al., 2017), the climate skeptics (e.g. Schäfer, 2012; Elgesem 2017) or the anti-vaccination movement (e.g. Guidry et al. 2015; Basch et al., 2017) might serve as prominent examples.

Although we know that online visibility is unequally distributed and that under specific circumstances even challengers may become visible, we lack a full understanding as regards the origins of such visibility. Visibility derives from acts of strategic hyperlinking (Young & Leonardi, 2012) which takes over a gatekeeping function in structuring the web (Dimitrova et al., 2003). When deciding on whom to link to, like-minded and trusted actors are privileged (Author, Park & Thelwall, 2003; Elgesem, 2017) whereas links to those whom one seeks to “exclude [...] from the discourse due to differences in the way they conceptualize the underlying causes and the particular solution to the problem” are avoided (Young & Leonardi, 2012: 236, see also Rogers & Marres, 2000). However, with its focus on the direction of link setting, this research only partially reveals the origins of visibility as it largely ignores the quantitative differences in the link setting activity of proponents and opponents. An exception is Kaiser’s (2017) study on the commenting activity of different camps that shows that those challenging the mainstream are more actively engaged. Similarly, Ackland and O’Neil (2011) show that splits within the environmental movement lead to differences in subgroup visibility, what they refer to as “index authority”, which refers to the fact that central actors in hyperlink networks will be ranked higher in search engine indexes. Jackson and Foucault Welles (2015) in turn use the concept of “crowdsourced elites” to refer to the fact that the features and affordances of online communication allow dissenters to organically create central actors in networks of political disputes – activist organizations, independent media and individual citizens – who surpass traditional elites in terms of visibility.

Case Selection and Methods

Case Selection

To study online contestation among competing coalitions, we analyze the issue of climate change in Germany and the United Kingdom from June 2012 to May 2013. As an issue, climate change presents clear-cut political divisions, which result in two core policy beliefs. Such beliefs separate those who see the anthropogenic contribution to global warming as a problem – climate advocates – and thus follow the scientific consensus formulated by the IPCC (IPCC, 2013) from those who, to varying degrees, dispute the extent to which human-related activities affect the climate and/or the seriousness of its consequences – the climate skeptics. We have chosen these two countries in the specific time period of 2012 /13 as here climate advocates (still) hold a policy monopoly in traditional venues, dominating climate politics, parliamentary debates, traditional media as well as public opinion (although climate skeptics have gained some visibility, e.g. Brunnengräber, 2013, Painter & Gavin, 2016, Carter & Clements, 2015). In climate politics, both countries had been at the international forefront of cutting greenhouse gas emissions and energy use, while working on effective climate policies as well as the introduction of renewable energies (German Watch, 2013). The dominance of the advocates' camp is also reflected in parliamentary debates during this time period where only few skeptical frames become visible (Author). In 2012 /13, climate advocates also dominated the traditional media. AUTHOR for example shows that around 75% of all articles about climate change in the UK and around 70% in the German press do not contain any skeptical arguments. Finally, a closed-up view on public opinion indicates that a large majority in both countries follows the climate advocates: 83% in the UK and 90% in Germany agree that climate change is a fairly or very serious problem (European Commission, 2011). In sum, the comparative research design chosen nicely reflects policy monop-

lies on climate change in both countries – an ideal setting to study the role of the Internet for counter-coalitions.

Collecting data: applying link tracing and content analysis

To identify the involved coalitions and to describe coalitions' resources and their origin, we rely on link tracing and content analysis applying a five-step procedure. *First*, our link tracing approach starts from the eight most important civil society actors in the field of climate change in each country – four of them are climate advocates and four climate skeptics.ⁱⁱ Following Kriesi (2004) civil society actors pursue specific political goals, yet lack institutionalized access to the political process. They have been chosen as starting points as they link to a variety of actors (Rogers and Marres, 2000), as they are the 'champions of online communication' (Schäfer, 2012: 530) and they are the ones most likely challenging the policy monopolies. To identify which civil society actors serve as source seeds, we relied on a literature review and combined it with expert interviews and country-specific Google searches on climate change and global warming (with deleted search histories). Selecting equal numbers of advocates and skeptics in each country we aim for capturing the full ontology of online contestation giving both sides equal starting positions.

Second, we make use of a web-crawling software, called the IssueCrawler (Rogers, 2010). For each country, this crawler starts from the eight selected source seeds and collects all hyperlinks that point to other websites for which the crawler then – in a second step – checks for links running between them. We have chosen a snowball procedure because it allows us to identify cross-camp linking. Beyond, we have limited the crawler setting to follow only one step out as pre-studies have revealed that further steps out primarily find irrelevant pages, i.e. pages that do not deal with climate change. As web-crawlers are blind to the fact whether the included pages actually deal with the issue under consideration, we have indexed all crawled

pages in a *third* step according to our keywords.ⁱⁱⁱ Only those pages that contain our keywords remain in the network.

To allow for a better analysis of the networks, we have added a *fourth* step of data preparation. As we are interested in actors as the nodes of our networks and not in networks connecting single web pages, we have aggregated an actor's single web pages and sub-domains. Beyond, we have deleted the most marginal actors requiring that an actor within the network contains at minimum two links - one of them must be an inlink meaning that an actor is recognized at least by one other actor within the network. In addition, we have dichotomized the networks so that per crawl only one link at maximum runs between a pair of actors. This is necessary as the number of links is very much dependent on the construction of the webpages itself. Additionally, for blogs we have deleted all links stemming from the blogroll thus only focusing on links within the use text. Finally, we have stacked the resulting networks that were collected once per month in an eleven-month period. By stacking the networks, we see how often a specific actor appears in the network (between one and 11 times). The stacked networks serve as the basis for the analyses and contain 361 unique actors in Germany with 3667 links and 353 unique actors in the UK containing 6609 links.^{iv}

Fifth, we have analyzed all actors within the network with a quantitative content analysis. For the coding we used the information found on the 'About us' pages or similar sections of the website. The analysis was conducted by two coders. A master-coder reliability test revealed satisfactory results with Krippendorff's alpha averaging .90. We thereby classified each actor according to the political position advocated, the geographical area he/she is most active in (e.g. Germany, UK, US, global) and the actor type he/she belongs to (e.g. political actors, media, civil society, bloggers). In the coding instructions we clearly indicated that an actor's self-categorization determines its classification. To identify the political position of the media we coded at minimum three editorials dealing with climate change. If all sampled editorials

show a clear-cut position pointing in the same direction, this position was attributed to the actor; otherwise a no-position category was attributed. Analyses describing the coalitions as such (H_i^* index, vitality and composition scores) are based on actors with a political position only (Germany: 335; UK: 312).

Coalitions' identification, resources and their origin

Following the idea of Sabatier (1988) the primary feature of a coalition is its belief system based on *shared core (policy) ideas and values*. To identify the core ideological dimension of coalitions we rely on content analysis data, i.e. the coding of an actor's political position. As a result, we classify actors as climate advocates, climate skeptics or no-position actors. Although the ideological core beliefs are central to demarcate coalitions, Sabatier (1988) assumes that coalition members also show some form of *coordination*. We use hyperlinks to study such coordination. Coordination is indicated if more links run among like-minded actors than to those having other political positions (see also Elgin, 2015; Fisher et al., 2013). We can expect this requirement to be met due to the principle of homophily in linking behaviour and as otherwise the linking economy of the web would play against the own camp. To measure how strongly links refer to allies and how strongly to opponents, we rely on the homophily index H_i^* (Ackland, 2013; Currarini et al., 2009). This index relates the links within a group to those from the group to others and adjusts for the group size. The index has the advantage that it is not dependent on the number of actors in the two opposing camps, and that it is standardized between -1 and +1. A value lower than 0 means that the actors of a camp predominantly interact with opponents (heterophily, Monge & Contractor, 2003), while values greater than 0 mean that they primarily relate to those of their own group (homophily).

Finally, we can only speak of coalitions if they show some *stability* in the course of time. To measure stability of coalitions we analyze how often a coalition member shows up in the net-

work in our eleven-month period. This so-called vitality score of each actor thus varies between 1 and 11 with the latter indicating that an actor is always present in the network. As there is no clear standard against which we can judge whether we find 'enough' stability to speak of coalitions, we regard it as sufficient if we find a core of allies in each coalition that is present through all of the points in time.

To measure coalitions' resources, we study the composition of coalitions as well as at their online visibility. Regarding *composition*, we rely on content analysis data indicating the degree to which political actors as well as (traditional) media are members of coalitions and how strongly they are rooted in the national arena. For the *online visibility*, we look at the degree distribution, i.e. indegree (Burt, 1976) and eigenvector distributions (Bonacich, 1972). The indegree measure simply counts the number of links an actor receives whereas the eigenvector centrality evaluates those links as more important that stem from actors with high online visibility themselves. To evaluate the online visibility, we first compare the average recognition of coalition members of climate advocates and skeptics. As average scores might be misleading due to variation in coalition size, we analyze in a second step, which coalition manages to have the most visible actors within our networks.

To identify the origins of visibility, we combine an analysis of the direction of link setting (i.e. towards the own or opponent camp) with the absolute amount of link setting activity of an actor (i.e. actors differing in their quantity of link setting).

Results

Identification of coalitions

The data clearly support the idea that online contestation is structured by coalitions. First, more than 88% of all network actors in the British network and more than 92% in the German network formulate a clear-cut political position which supports the relevance of belief systems. Not surprisingly in light of the existing policy monopolies in both countries, the

number of climate advocates is more than double as high as that of climate skeptics (UK: 218 advocates versus 94 skeptics; Germany: 242 advocates versus 93 skeptics, see for a visualization Figure 1 & 2 in the Appendix).

Analyzing the interaction patterns of climate advocates and skeptics shows that links running among like-minded actors outnumber cross-camp linking, which suggests some form of internal *coordination*. This tendency towards homophily can be expressed by the index H (Curarini et al., 2009), developed further by Ackland (2013, p. 100) to take into account the different size of the single groups. The corrected homophily index H^* is thus defined as

$$H_i^* = \left(\frac{s_i}{s_i + d_i} - \frac{v_i}{v_i + w_i} \right) \div \left(1 - \frac{v_i}{v_i + w_i} \right)$$

Here, s_i are the ties internal to the group and d_i those connecting the group to others, while v_i is the size of the group and w_i the size the rest of the population. Values greater than zero indicate homophily, values lower than zero heterophily. We can see from Table 1 that the camps in both networks show a substantial degree of homophily. However, these values are indicative of a coalition only to the extent that they differ significantly from what would be expected by chance, and we therefore compared the observed linking patterns for the two camps in both of the networks with 1'000 random configurations for each of them. The simulations were based on the actual networks in terms of the number of nodes and the number of edges, which were distributed at random between the actors. For the UK and Germany, we simulated the networks at each single point in time, stacked them, and then calculated the H_i^* index for climate advocates and skeptics. The result is a distribution of H_i^* index scores for both countries and we then compared the empirical values to the means of the simulations, finding that in each case the distances between them were greater than 20 standard deviations. The introspective orientation of the actors in the camps can therefore be taken as a significant marker of a coalition building process.

[Table 1]

Finally, the last criterion stipulates that the camps display a certain amount of *stability*. While all the camps are characterized by a substantial amount of fluctuation, Table 2 shows that stability does not decrease linearly, but rather describes an u-shaped curve that reveals a stable core. We again used a simulation procedure to assess whether the stability dynamic we see at work differs significantly from what would be expected by chance. We generated an n by m matrix for each camp where the number of columns m equals the replications of the simulation, 10^5 in each case, whereas the number of rows n equals the number of nodes in the camp. Each node can take on a random value between one (lowest vitality) and eleven (highest vitality), but the sums of the rows in each column must be equal to the sum of the observed vitality values for each camp. We then summed the scores for each vitality value in the matrices and compared the resulting distributions to the observed scores using a permutation test with a chi-square statistic implemented in the `wPerm` package for R (Weiss, 2015). The results show that in each case the observed amount of stable allies in each coalition is significantly higher than in the simulations, which supports the notion of at least stable coalition cores. Note that due our filter criterion for the network (total degree of two, minimum of one indegree requirement for each node) the source seeds need not be present at all points in time, particularly if they lack an inlink.

[Table2]

Coalitions' resources and their origins

To evaluate the online resources of the two coalitions, we first look at their *composition* (see Table 3a, see actor types and b, see geographical origin). Not surprisingly, the counter-movement coalition of climate skeptics in 2012/13 is primarily built upon non-established, Internet-based voices, i.e. bloggers (whose share amounts to 55% among the UK skeptics and 48% among the German skeptics) and upon transnational actors of the English-speaking

hemisphere (e.g. 38% of the skeptical actors in the British and 45% in the German network come from the US). Yet, the counter-coalitions show surprisingly strong relations to the media. A closer look reveals that these links run primarily to conservative outlets having online and offline presence (e.g. the Wall Street Journal, the Washington Times, Daily Mail, Daily Express), but also to conservative online-only newspapers and magazines (e.g. Canadian Free Press, American Thinker, Daily Caller). The mainstream coalition of climate advocates, in contrast, is more strongly nationally grounded and composed of traditional civil society actors (whose share amounts to 51% among the UK advocates and 48% among the German advocates), mass media (29% in the UK, 25% in Germany) and to a lesser degree political actors (9% in the UK, 15% in Germany) which indicates stronger connections to traditional venues (and also to a broader setting of mainstream media reaching beyond the conservative sphere). Consequently, the mainstream coalition is more resourceful as regards allies.

[Table 3a and Table 3b]

Comparing the average visibility of coalition members reveals that climate skeptics receive around twice as many inlinks as climate advocates. The average climate skeptic in the UK network receives 30 links within the stacked network whereas the average climate advocate has only 15 – a difference that proves to be statistically significant (permutation test^v, p-value = 0.001). Although the total amount of links within the German network is lower, the relationship remains similar: whereas climate skeptics have an average of 15 links, climate advocates' amounts to 9 (permutation test, p-value = 0.014). Interestingly, these findings can be replicated if the comparison is based on eigenvector centrality which indicates that climate skeptics on average do not only receive more links but also receive more links from important actors (permutation test Germany, p-value < 0.0001; permutation test UK, p-value < 0.0001). These results are particularly relevant, since the size of the climate skeptic coalition

in both countries is only ca. 40% of that of climate advocates and they would therefore be expected to have a lower average indegree.

In a second step, we analyze which coalition manages to have the most visible actors within our networks. The analysis clearly shows that our networks fit the typical uneven distribution of recognition: among the 353 (361) actors in the UK (German) network, it is 29 (30) who receive 50% of the links. Among them climate skeptics are strong. Among the 29 most visible actors with the UK network, we have 15 skeptics, 12 advocates and 2 no-position actors. Among the most prominent actors in the German network, we have 15 skeptics, 14 advocates and 1 no-position actor.

The strength of climate skeptics becomes even more evident, if we look at the single most important actors which by the way also constitute the stable core of each coalition. In the UK, among the five actors with the highest online visibility based on indegree measures, we find only climate skeptics with US and UK bloggers being most prominent (e.g. *Watts Up With That?* (US), followed by *Climate Audit* (US) and *Climate Resistance* (UK)). With far less online visibility, it is the NGO *Skeptical science* and the *Intergovernmental Panel on Climate Change* that follow on the advocates' side. Yet, when looking at eigenvector values, it is also *Greenpeace* and *The Guardian* that turn out to be important players supporting the advocates' coalition. In the German network the dominance of skeptics is less pronounced when looking at indegree values (although also here the US blog *Watts Up With That?* manages to be the most important player) as here the NGO *Real Climate*, the *United Nations Framework Convention on Climate Change* and the *New York Times* also play important roles. However, when eigenvector values are taken into consideration, the most important actors are all from the climate skeptics' coalitions: it is once again two US players *Watts Up With That?* and the *International Climate and Environmental Change Assessment Project* as well as a German civil society group called *EIKE*.

Turning finally to the origins of climate skeptics' online visibility, Table 4 shows the average link setting activity of coalition members and how it is directed towards the own or the opponent coalition. It indicates that in both countries climate skeptic allies have the highest link setting activity. Skeptics in the UK (Germany) set on average 42 (20) links compared to 9 (7) links stemming from an average advocate. As shown before each coalition privileges like-minded actors with its linking behavior. The high activity of climate skeptics pushes thus skeptics into the pole position of online communication (although their tendency to link to like-minded actors is weaker compared to the advocates). Climate skeptics thus turn out to be the true winners of online communication: they actively exploit the link economy of the web and as a consequence get into the pole position there. While both camps display a tendency towards preferential attachment (Barabási & Albert, 1999, see for empirical evidence Figure 3 in the Appendix), i.e. they have large proportions of low-degree nodes, which tend to build ties to established ones, thus contributing to the "rich getting richer" phenomenon, there are also important differences to note. Skeptics, more than advocates, profit from the higher share of mid-degree nodes and particularly from the engagement of bloggers. Bloggers are predominantly active on the skeptical side of the debate and contribute to creating "crowdsourced elites" (Jackson and Foucault Welles 2015), that is, actors that command no substantial social or political status outside these digital spaces, but nevertheless occupy a central position in them.

[Table 4]

Discussion

Political contestation in times where mainstreamers hold a policy monopoly and counter-voices are weak in traditional venues, has four characteristics in the online world. First, such online contestation is structured by coalitions. Such coalitions are characterized by common beliefs, coordination via hyperlinks^{vi}, i.e. preferential linking patterns to allies, and a core of

stable coalition members. Second, our study shows that composition-wise the mainstream coalitions are more resourceful also on the Web as they are better connected to traditional venues. However, the counter-coalitions constituted primarily by Internet-based voices have already established strong ties to one traditional venue, the conservative media landscape of which at least a part has been shown to also push the climate skeptical views in their traditional media outlets (Author). Third, visibility-wise the counter-coalitions of climate skeptics are in the pole position: with high average visibility and with outstanding visibility of individual coalition members they dominate the networks. Climate change communication in Europe thus is another case where the Web makes the counter-voices profit. Fourth, the members of the climate skeptical coalition are responsible themselves for being in the pole position on the Web. Although within-camp linking is less pronounced among climate skeptics than among the climate advocates, this seeming advantage of the climate advocates is more than balanced by the extremely high online activity of the climate skeptical coalition. In contrast, the climate advocate coalition although it manages to ignore the climate skeptics, gains less visibility due to its lack of activity. It is thus not sufficient to silence the opponent camp by non-linking if this is not accompanied by an active online strategy.

However, also this study has limitations. First, with its sole focus on hyperlinks as fabric of the web, it neglects connections on the web that are shaped by a multitude of web users via participatory features of social media platforms (Gerlitz & Helmond, 2013). As social media are on the rise, future studies must take this new fabric of the web into account and show how it affects the role counter-coalitions can play in policy monopolies. Second, the present study captures only part of the wider Internet. Although our pre-studies on crawler settings indicate that crawls digging deeper into the web, do not add substantially to identifying relevant pages for the issue under consideration, we cannot preclude that the sheer quantity of advocate voices being present on the wider Internet may level out the skeptics' higher activity.

Whether skeptics thus are the absolute champions of the linking economy cannot fully be answered; yet they are the ones actively exploiting the possibilities of the web.

Besides analyzing how the participatory fabric of social media influences counter-coalitions' role in challenging policy monopolies, our study opens up at least two further paths for future research. How do such transnational counter-coalitions evolve? Do they contribute to diffuse ideas across borders? It seems that transnational allies are used by national actors to strengthen their positions and form coalitions. However, to truly understand the development of (transnational) coalitions, we need to understand the circumstances under which national actors go transnational in the online world.

Beyond, the question is open on whether and how the climate skeptical coalition can take advantage of its resources. Does online contestation influence for example classical mass media or even the political process? Which role then do such online coalitions play in shaping processes of agenda-building? We thereby assume that even if media and politics do not always directly react to these counter-voices in the online sphere, such counter-mobilization in the online world may have consequences. From a minimalist conception, it might serve as a reservoir of ideas that are well maintained and already made socially acceptable among those who distrust the mainstream – a societal tendency which is part of the diagnosed legitimacy crisis of contemporary democracy (e.g. Mair, 2013) as well as of rising populist tendencies (Albertazzi and McDonnell, 2008). This reservoir might be activated and built upon as soon as a window of opportunity opens up in other venues (see e.g. the withdrawal from the Paris accord of the recent US administration). Yet, such consequences might even spread further. Centola et al. (2018) have shown that committed minorities which constitute only 25% of the population have the capacity to change the majority rules in an online setting. To establish the conditions under which such tipping point dynamics also occur in non-experimental settings

is important to understand the potential further spread of the ideas of a today's minority, the climate skeptics, who already actively exploit the web.

Is the Internet thus a new venue for counter-voices? In the case of climate change communication, with networks originating from two countries where counter-voices are marginal in traditional venues, the answer tilts more to a 'yes'. Although these counter-coalitions still do not have similar connections to traditional venues as the mainstream coalition and although they are still ignored by the dominant camp, they actively use the Web pushing themselves into visibility. Thereby, they can draw on allies from countries where their position is not marginal anymore. With the Web, we are thus only one click away from the firmest challengers in this field: the US climate skeptical movement.

If the Web serves as a new venue for counter-coalitions, are then the hopes for a democratic reconfiguration through online communication fulfilled? From a normative point of view, online communication actually has potential: it allows new voices to be raised, old structures to be challenged and new forms of cooperation and coordination to be established. However, although most movement researchers have focused on the beneficial side of such mobilization for democracy (e.g. Warren, 2000), researchers have also shown that such new voices might challenge democracy (Chambers and Kopstein, 2001). They do so, if they oppose democracy as such, if they oppose some of its fundamental values (i.e. its liberal core) or if they confront democracy with post-truth debates. In such debates long-established facts (e.g. based on scientific evidence) play on equal ground with personal opinions and experiences and self-proclaimed expertise. The climate change debate, studied here, carries such post-truth characteristics: it is the climate skeptics that continue to question well-established scientific evidence that climate change is occurring, that mankind substantially contributes to it and that it has severe consequences (IPCC, 2013). The Web eases such communication as everybody can raise his/her voice without having to go through a filter of journalistic selection or political ratio-

nality. However, thereby the web just offers a technical device: how this technical device is used (and which messages are spread and turn prominent), depends very much on society. In times, in which trust in established institutions is declining, those challenging these established institutions and their views, have gained a new and powerful platform, the Web, to raise their counter-voices.

References

- Ackland R (2013) *Web social science: Concepts, data and tools for social scientists in the digital age*. London: Sage.
- Ackland R and O'Neil M (2011) Online collective identity: The case of the environmental movement. *Social Networks* 33(3): 177-190.
- Adamic L and Glance N (2005) *The political blogosphere and the 2004 U.S. election: divided they blog*. Paper presented at the LinkKDD 05 proceedings of the 3rd international workshop on link discovery, Chicago. doi:10.1145/1134271.1134277
- Albertazzi D and McDonnell D (eds) (2008) *Twenty-First Century Populism. The Spectre of Western European Democracy*. Hampshire and New York: Palgrave Macmillan.
- Atwan AB (2015) *Islamic State: The Digital Caliphate*. Oakland: U of California Press.
- Barabási A (2003) *Linked: How Everything is Connected to Everything Else and What it Means for Business, Science, and Everyday Life*. Cambridge: Plume Books.
- Barabási A and Albert R (1999) Emergence of Scaling in Random Networks. *Science* 286(5439): 509-512.
- Basch CH, Zybert P, Reeves R and Basch CE (2017) What do popular YouTube™ videos say about vaccines?. *Child: care, health and development* 43(4): 499-503.
- Baumgartner FR and Jones BD (1993) *Agendas and Instability in American Politics*. Chicago: University of Chicago Press.
- Benkler Y, Faris R, Roberts H and Zuckerman E (2017) Study: Breitbart-led right-wing media ecosystem altered broader media agenda. *Columbia Journalism Review*. Available at: <https://www.cjr.org/analysis/breitbart-media-trump-harvard-study.php>
- Benkler Y, Roberts H, Faris R, Solow-Niederman A and Etling B (2013) *Social Mobilization and the Networked Public Sphere: Mapping the SOPA-PIPA Debate*. Available at:

http://cyber.law.harvard.edu/publications/2013/social_mobilization_and_the_networked_public_sphere

Benkler Y (2006) *The Wealth of Networks. How Social Production Transforms Markets and Freedom*. New Haven and London: Yale University Press.

Bennett LW (1990) Toward a theory of press-state relations in the U.S. *Journal of Communication* 40(2): 103-125.

Bennett LW and Segerberg A (2013) *The Logic of Connective Action. Digital Media and the Personalization of Contentious Politics*. Cambridge: Cambridge University Press.

Bennett LW and Segerberg A (2014) Three patterns of power in technology-enabled contention. *Mobilization: An International Quarterly* 19(4): 421-439.

Bentivegna S (2002) Politics and new media. In: Lievrouw LA and Livingstone S (eds) *Handbook of new media*. London: Sage, pp.50-61.

Bonacich P (1972) Factoring and weighting approaches to status scores and clique identification. *The Journal of Mathematical Sociology* 2(1): 113-120.

Brin S and Page L (1998) The anatomy of a large-scale hypertextual web search engine. *Computer Networks and ISDN Systems* 30(1-7): 107-117.

Brunnengräber A (2013) *Klimaskeptiker in Deutschland und ihr Kampf gegen die Energiewende*. FFU-Report 3-2013, Berlin.

Burt RS (1976) Positions in Networks. *Social Forces* 55(1): 93-122.

Carter N and Clements B (2015) From 'greenest government ever' to 'get rid of all the green crap': David Cameron, the Conservatives and the environment. *British Politics* 10(2): 204-225.

Centola D, Becker J, Brackbill D and Baronchelli A (2018) Experimental evidence for tipping points in social convention. *Science* 360: 1116-1119.

- Chadwick A (2013) *The Hybrid Media System. Politics and Power*. Oxford: Oxford University Press.
- Chambers S and Kopstein J (2001) Bad civil society. *Political Theory* 29(6): 838-865.
- Currarini S, Jackson MO and Pin P (2009) An economic model of friendship: Homophily, minorities, and segregation. *Econometrica* 77(4), 1003-1045.
- De Maeyer J (2012) Towards a hyperlinked society: A critical review of link studies. *New Media & Society* 15(5): 1-15.
- Diani, M (2001) Social movement networks virtual and real. *Information, Communication and Society* 3(4): 386-401.
- Dimitrova DV, Connolly-Ahern C, Williams AP, Kaid LL and Reid A (2003) Hyperlinking as gatekeeping: Online newspaper coverage of the execution of an American terrorist. *Journalism studies* 4(3): 401-414.
- Elgesem D (2017) Polarization in Blogging About the Paris Meeting on Climate Change. In: Ciampaglia G, Mashhadi A and Yasseri T (eds) *Social Informatics. SocInfo 2017. Lecture Notes in Computer Science*, vol. 10539. Cham: Springer, pp.178-200.
- Elgesem D, Steskal L and Diakopoulos N (2015) Structure and Content of the Discourse on Climate Change in the Blogosphere: The Big Picture. *Environmental Communication* 9(2): 169-188.
- Elgin DJ (2015) Utilizing Hyperlink Network Analysis to Examine Climate Change Supporters and Opponents. *Review of Policy Research* 32(9): 226-245.
- Ellinas AA (2010) *The Media and the Far Right in Western Europe: Playing the nationalist card*. Cambridge: Cambridge University Press.
- European Commission (2011) *Special Eurobarometer 372: Climate change*. Available at: http://ec.europa.eu/public_opinion/archives/evs_372_en.pdf.

- Fay MP and Shaw PA (2010) Exact and asymptotic weighted logrank tests for interval censored data: the interval R package. *Journal of statistical software* 36(2): 1-34.
- Fisher DR, Leifeld P and Iwaki Y (2013) Mapping the ideological networks of American climate politics. *Climatic Change* 116(3-4): 523-545.
- Fu JS and Shumate M (2016) Hyperlinks as institutionalized connective public goods for collective action online. *Journal of Computer-Mediated Communication* 21(4): 298-311.
- Gerhards J and Schäfer MS (2009) Is the internet a better public sphere? Comparing old and new media in the USA and Germany. *New Media & Society* 12(1): 143-160.
- Gerlitz C and Helmond A (2013) The like economy: Social buttons and the data-intensive web. *New Media & Society* 15(8): 1348-1365.
- German Watch (2013) *Klimaschutzindex 2013*. Available at: <https://germanwatch.org/sites/germanwatch.org/files/publication/7161.pdf>
- Gonzalez-Bailón S (2009) Opening the black box of link formation: Social factors underlying the structure of the web. *Social Networks* 31(4): 271-280.
- Guidry JP, Carlyle K, Messner M and Jin Y (2015) On pins and needles: how vaccines are portrayed on Pinterest. *Vaccine* 33(39): 5051-5056.
- Himmelboim I, McCreery S and Smith M (2013) Birds of Feather Tweet Together: Integrating Network and Content Analyses to Examine Cross-Ideology Exposure on Twitter. *Journal of Computer-Mediated Communication* 18(2): 154-174.
- Hindman MS (2009) *The Myth of Digital Democracy*. Princeton, NJ: Princeton U Press.
- House of Commons Home Affairs Committee (2012) *Roots of Violent Radicalization: Nineteenth Report of Session 2010-12*. London: The Stationery office Limited. Available at: <http://www.publications.parliament.uk/pa/cm201012/cmselect/cmhaff/1446/1446.pdf>

- IPCC (2013) *Climate Change 2013. The Physical Science Basis*. Available at: <http://www.ipcc.ch/report/ar5/wg1/>
- Jackson SJ and Foucault Welles B (2015) Hijacking# myNYPD: Social media dissent and networked counterpublics. *Journal of Communication* 65(6): 932-952.
- Kaiser J (2017) Public spheres of skepticism: Climate skeptics' online comments in the German networked public sphere. *International Journal of Communication* 11: 1661-1682.
- Kaiser J, Rauschleisch A and Bourassa N (2017) Building Bridges with Breitbart: A Topic Model Analysis of Online Media Coverage During the US Presidential Election 2016. *Proceedings of IAMCR 2017*.
- Kellner D and Pierce C (2008) Media and globalization. In: Ritzer G (ed.) *The Blackwell Companion to Globalization*. Oxford: Blackwell Publishing, pp.383-395.
- Kim JH, Barnett GA and Park HW (2010) A Hyperlink and Issue Network Analysis of the United States Senate: A Rediscovery of the Web as a Relational and Topical Medium. *Journal of the American Society of Information Science and Technology* 61(8): 1598-1611.
- Kriesi H (2004) Strategic political communication. Mobilizing public opinion in 'audience democracies'. In: Esser F and Pfetsch B (eds) *Comparing political communication: Theories, cases, and challenges*. Cambridge: Cambridge U Press, pp.184-212.
- Mair P (2013) *Ruling the void: The hollowing of western democracy*. London: Verso Book.
- Monge PR and Contractor NS (2003) *Theories of communication networks*. New York: Oxford University Press.
- Painter J and Gavin NT (2016) Climate skepticism in British newspapers, 2007-2011. *Environmental Communication* 10(4): 432-452.

- Park HW, Kim CS and Barnett GA (2004) Socio-communicational structure among political actors on the web in South Korea. *New Media & Society* 6(3): 403-423.
- Park HW and Thelwall M (2003) Hyperlink analyses of the World Wide Web: A review. *Journal of computer-mediated communication* 8(4): JCMC843.
- Peng L (2005) *The first years of Internet media in China*. Beijing: Tsinghua U Press.
- Pilny A and Shumate M (2012) Hyperlinks as extensions of offline instrumental collective action. *Information, Communication & Society* 15(2): 260-286.
- Rogers R (2010) Mapping public web space with the IssueCrawler. In: Reber W and Brossard C (eds) *Digital Cognitive Technologies: Epistemology and the Knowledge Economy*. London and Hoboken, NJ: Wiley, pp.115-126.
- Rogers R and Marres N (2000) Landscaping climate change: a mapping technique for understanding science and technology debates on the World Wide Web. *Public Understanding of Science* 9(2): 141-163.
- Sabatier P (1988) An advocacy coalition framework of policy change and the role of policy-oriented learning therein. *Policy Sciences* 21(2-3): 129-168.
- Sabatier P and Weible C (eds) (2007) *The Advocacy Coalition Framework: Innovations and Clarifications* (2nd ed.). Boulder, CO: Westview Press.
- Schäfer MS (2012) Online communication on climate change and climate politics: a literature review. *WIREs Climate Change* 3(6): 527-543.
- Shumate M (2012) The Evolution of the HIV/AIDS NGO Hyperlink Network. *Journal of Computer Mediated Communication* 17(2): 120-134.
- Silber MD and Bhatt A (2007) *Radicalization in the West: The Homegrown Threat*. New York: The New York City Police Department.
- Simpson CR (2015) Multiplexity and strategic alliances: The relational embeddedness of coalitions in social movement organizational fields. *Social Networks* 42: 42-59.

Tremayne M, Zheng N, Kook LJ and Jeong J (2006) Issue publics on the web: applying network theory to the war blogosphere. *Journal of Computer Mediated Communication* 12(1): 290-310.

Warren M (2000) *Democracy and the Terrain of Association*. Princeton: Princeton University Press.

Weiss NA (2015) *wPerm: Permutation tests* (Version 1.0.1). Available at: <https://cran.r-project.org/web/packages/wPerm/index.html>

Wolfsfeld G (1997) *Media and political conflict. News from the Middle East*. Cambridge: Cambridge University Press.

Wolfsfeld G, Segev E and Sheaver T (2013) Social Media and the Arab Spring: Politics comes first. *The International Journal of Press / Politics* 18(2): 115-137.

Young LE and Leonardi PM (2012) Social issue emergence on the Web: A dual structural model. *Journal of Computer-Mediated Communication* 17(2): 231-246.

Zhou Y and Moy P (2007) Parsing Framing Processes: The Interplay Between Online Public Opinion and Media Coverage. *Journal of Communication* 57(1): 79-98.

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Table 1 *Observed and simulated H* index scores for advocates and skeptics in the UK and the German network*

Camp	Observed H* index	Simulated H* index (mean)	Standard deviation (simulated H* index)
German advocates	.706	-.074	.030
German skeptics	.449	.028	.011
UK advocates	.626	-.079	.021
UK skeptics	.345	.034	.009

Note. German advocates, N = 242; German skeptics, N = 93; UK advocates, N = 218; UK skeptics, N = 94. Simulations for each camp based on 1'000 replications.

Table 2 *Observed and simulated vitality distributions for advocates and skeptics in the UK and the German (DE) network (percentages in parentheses)*

Vitality	DE advocates observed	DE advocates simulated	DE skeptics observed	DE skeptics simulated	UK advocates observed	UK advocates simulated	UK skeptics observed	UK skeptics simulated
1	88 (36)	4.4e6 (18)	32 (34)	1.4e6 (15)	74 (34)	2.0e6 (9)	27 (29)	6.6e5 (7)
2	43 (18)	6.7e6 (28)	24 (26)	2.3e6 (24)	27 (12)	4.0e6 (18)	10 (11)	1.4e6 (15)
3	26 (11)	4.3e6 (18)	7 (8)	1.7e6 (19)	18(8)	2.4e6 (11)	4 (4)	1.2e6 (13)
4	19 (8)	2.8e6 (11)	8 (9)	1.2e6 (12)	12 (6)	3.0e6 (14)	7 (7)	1.0e6 (11)
5	15 (6)	1.9e6 (8)	1 (1)	6.4e5 (7)	4 (2)	2.0e6 (9)	2 (2)	7.8e5 (8)
6	12 (5)	2.0e6 (8)	0 (0)	7.0e5 (7)	4 (2)	2.6e6 (12)	6 (6)	6.6e5 (7)
7	13 (5)	8.1e5 (3)	1 (1)	5.6e5 (6)	9 (4)	1.7e6 (8)	4 (4)	1.0e6 (11)
8	5 (2)	5.2e5 (2)	4 (4)	3.6e5 (4)	7 (3)	1.4e6 (6)	3 (3)	1.1e6 (12)
9	9 (4)	3.7e5 (2)	1 (1)	2.3e5 (3)	12 (6)	1.3e6 (6)	7 (7)	6.7e5 (7)
10	9 (4)	2.9e5 (1)	4 (4)	1.8e5 (2)	17 (8)	1.1e6 (5)	8 (9)	5.8e5 (6)
11	3 (1)	1.0e5 (0)	11 (12)	7.3e4 (1)	34 (16)	3.3e5 (1)	16 (17)	3.1e5 (3)
Chi ²	p < 0.001		p < 0.001		p < 0.001		p < 0.001	

Note. German advocates, N = 242; German skeptics, N = 93; UK advocates, N = 218; UK skeptics, N = 94. Simulations for each camp based on 10⁵ replications.

Table 3a *Composition of coalitions regarding actor types in percent*

%	UK Skeptics	UK Advocates	Ger Skeptics	Ger Advocates
Civil society	24.5	51.4	26.9	48.3
Bloggers	55.3	8.3	48.4	9.5
Media	17.0	29.4	21.5	25.2
Political actors	1.1	9.2	2.2	15.3
Others	2.2	1.8	1.1	1.7
Total	100	100	100	100

Note. Basis: UK: 218 advocates, 94 skeptics; Germany: 242 advocates, 93 skeptics
 Difference regarding actor-type between Skeptics and Advocates Chi-square test: UK: X-squared = 360.09, df = 9, $p < 0.001$; Germany: X-squared = 333.03, df = 9, $p < 0.001$. Also supported by Fisher's Exact Test.

Table 3b *Composition of coalitions regarding geographical origin in percent*

%	UK Skeptics	UK Advocates	Ger Skeptics	Ger Advocates
UK	27.7	36.2	15.1	5.8
Germany	1.1	0.9	12.9	26.9
US	38.3	27.1	45.2	23.6
Australia	6.4	2.3	4.3	4.1
Canada	7.4	0.9	8.6	1.7
Global	9.6	28.9	3.2	30.2
Other	9.5	3.7	10.7	7.3
Total	100	100	100	100

Note. Basis: UK: 218 advocates, 94 skeptics; Germany: 242 advocates, 93 skeptics
 Difference regarding actor-type between Skeptics and Advocates Chi-Square Test: UK: X-squared = 251.08, df = 9, $p < 0.001$; Germany: X-squared = 294.31, df = 11, $p < 0.001$

Table 4: *Average link setting activity of coalitions*

	Skeptics	Advocates	No position	ALL
UK Skeptics	23.0	15.7	3.4	42.1
UK Advocates	1.7	6.9	0.5	9.1
Ger Skeptics	12.8	5.9	1.4	20.1
Ger Advocates	0.5	6.5	0.2	7.2

Note. Basis UK: n = 218 advocates; n = 94 skeptics, n = 41 no opinions; basis Germany: n= 242 advocates, n = 93 skeptics, n= 26 no opinion; Permutation tests skeptics to skeptics vs advocates to advocates: UK, p-value < 0.0001; Germany, p-value = 0.117

- i Our coalition framework differs from traditional party coalitions as coalitions in our conception contain more than party actors. Advocacy coalitions, however, share much in common with Diani's idea of social movements (Diani, 2001) which has been adapted to the online world by Ackland and O'Neil (2011), i.e. the shared sense of identity, the connection through hyperlinks and the engagement in a specific issue conflict. Social movements, however, differ from our coalition approach as they are composed of social movement organizations and activists only whereas advocacy coalitions can contain all types of actors.
- ii For Germany: Advocates (Greenpeace, Klima der Gerechtigkeit, Potsdam Institute of Climate Impact Research, WWW Germany), Skeptics (Analyse + Aktion, EIKE; klimaskeptiker.info, klimaueberraschung.de); for the UK: Advocates (Greenpeace, Oxfam, Friends of the Earth, WWF), Skeptics (The Global Warming Policy Foundation, Global Cooling & New Ice Age, Climate Resistance, repealtheact.org.uk).
- iii For Germany: 'Klimawandel,' 'globale Erwaermung,' 'globaler Erwaerumng,' 'globalen Erwaer-mung', for the UK: climate change and global warming (see for similar search terms e.g. Elgesem et al., 2015)
- iv These aggregated numbers are based on 11 stacked networks per country. The minimum, maximum and average case numbers for the single networks are given in the following: Germany [nodes: min = 60; max = 135; mean = 102.27, sd = 33.47; edges: min = 165; max = 480; mean = 333.36; sd = 100.20]; United Kingdom: [nodes: min = 146; max = 170; mean = 156.91; sd = 8.19; edges: min = 493; max = 736; mean = 600.82; sd = 73.24]
- v The permutation tests here and elsewhere were conducted in the statistical software environment R, using the 'perm' package (Fay & Shaw, 2010).
- vi Of course we are aware that coalitions are bound together by multiple relations (Simpson, 2015) that might well go beyond hyperlinks. In this vein, one major caveat of our study is that we have not looked at social media. However, as actors are active on all venues, also such a partial approach might capture the relevant characteristics of online contestation (see for a similar argument Benkler et al., 2013).

Online Appendix - additional results:

Table 3a

Online value of UK coalition members

UK_Sceptics	Indegree	Eigenvector	Vitalität	Country	Type
Watts Up With That?	232	0.36656526	11	USA	5
Climate Audit	173	0.28664258	9	USA	5
Climate Resistance	159	0.38608637	11	UK	5
Roger Pielke Jr.'s Blog	139	0.23871835	11	USA	3
Committee For A Constructive Tomorrow	122	0.27010626	11	USA	3
Real Climategate	84	0.17078441	11	USA	5
JunkScience.com	78	0.12189359	11	USA	5
International Climate and Environmental Change Assessment Project	76	0.19594279	10	USA	3
Center for the Study of Carbon Dioxide and Global Change	65	0.12653042	11	USA	3
The View From Here	65	0.16206099	8	CA	5
GREENIE WATCH	54	0.11367963	10	AU	3
International Climate Science Coalition	49	0.11577724	10	Global	3
No Frakking Consensus	46	0.18271551	9	CA	3
MailOnline	41	0.07304213	11	UK	4
Nongovernmental International Panel on Climate Change	37	0.04893148	10	Global	3
Alex Cull: My Articles and Reviews	36	0.13046005	11	UK	5
Australian Climate Madness	36	0.17383303	9	AU	5
The Register	34	0.0673738	11	UK	4
Bishop Hill	33	0.21034838	11	UK	5
Climate Etc.	33	0.19140728	11	USA	3
De staat van het klimaat	10	0.14782985	10	NL	5
Climate Lessons	31	0.13559918	6	UK	5
The Reference Frame	10	0.12604152	10	CZE	5
Climate Science: Roger Pielke Sr.	13	0.12147315	11	USA	5

UK_Advocates	Indegree	Eigenvector	Vitalität	Country	Type
Skeptical Science	100	0.24451336	11	AU	3
Intergovernmental Panel on Climate Change	78	0.15163611	11	Global	1
DeSmogBlog	66	0.23783721	11	CA	3
The Guardian	66	0.38644308	11	UK	4
Berkeley Earth Surface Temperature	59	0.12033296	9	USA	3
George Monbiot	51	0.19531882	11	UK	4
campaigncc.org	44	0.14316653	11	UK	3
Open Mind	37	0.08472858	11	USA	5
Stop Climate Chaos Coalition	33	0.1369516	11	UK	3
Women's Environmental Network	31	0.14981072	11	UK	3
Climate Science Rapid Response Team	29	0.10150851	11	USA	4
icount.org.uk	27	0.1125226	9	UK	3
AirportWatch	26	0.21128668	11	UK	3
UK Climate Impacts Programme	25	0.10648218	10	UK	3
International Programme on the State of the Ocean.org	24	0.06634455	8	Global	3
Rabett Run	22	0.11396877	11	USA	5
biofuelwatch	21	0.09877638	7	Global	3
Greenpeace UK	20	0.47713351	11	UK	3
Plane Stupid	20	0.13510007	9	UK	3
World Development Movement	20	0.10225991	5	UK	3
Whatyoucando	12	0.1332238	10	UK	3
Collide-a-Scape	1	0.13058144	7	USA	4
Public Interest Research Centre	2	0.11421342	10	UK	3
No2NuclearPower	10	0.11403531	10	UK	3
BBC	AU	0.1070248	11	UK	4
Mother Jones	10	0.10693655	11	USA	4

Note. Basis: UK: 353. Type of actor: 1 = political actor, 3 = civil society, 4 = media, 5 = blog.

Table 3b

Online value of German coalition members

DE_Sceptics	Indegree	Eigenvector	Vitalität	Country	Type
Watts Up With That?	148	0.44946051	11	USA	5
International Climate and Environmental Change Assessment Project	77	0.3043673	11	USA	3
NoTricksZone	64	0.20954591	11	DE	5
JoNova: Science, carbon, climate and tax	57	0.20575291	8	AU	5
Science and Public Policy	54	0.17057784	10	USA	3
Committee For A Constructive Tomorrow	51	0.16656838	7	USA	3
the Air Vent	50	0.27060497	11	999	5
Shub Niggurath Climate	47	0.22246489	11	999	5
No Frakking Consensus	41	0.19035643	10	CA	5
Climate Audit	39	0.2026712	11	USA	5
Nongovernmental International Panel on Climate Change	39	0.12862049	11	Global	3
Die kalte Sonne	38	0.14990433	11	DE	5
MailOnline	36	0.11045301	10	UK	4
Klimaüberraschung	24	0.09909341	11	DE	5
The SPPI Blog	24	0.29467425	11	USA	3
EIKE - Europäisches Institut für Klima und Energie	23	0.31969914	8	DE	3
EUReferendum.com	22	0.08620676	9	UK	5
Real Science	19	0.05806676	5	USA	5
Science Skeptical Blog	18	0.14153533	10	DE	5
KlimaNotizen.de	16	0.05520511	8	DE	5
New Zealand climate change	14	0.16300751	11	NZ	5
Bishop Hill	5	0.08355908	4	UK	5

DE_Advocates	Indegree	Eigenvector	Vitalität	Country	Type
RealClimate	102	0.23277034	10	Global	3
United Nations Framework Convention on Climate Change	80	0.17640407	9	Global	1
The New York Times	78	0.22947325	11	USA	4
Intergovernmental Panel on Climate Change	75	0.1206474	10	Global	1
DeSmogBlog	36	0.13616486	9	CA	3
Skeptical Science	34	0.04553891	4	AU	3
The Guardian	34	0.16470861	10	UK	4
Heinrich-Böll-Stiftung e.V.	29	0.6175651	10	DE	3
Grist Magazine	28	0.12215842	9	USA	4
Potsdam Institute for Climate Impact Research	28	0.08570614	7	DE	3
Klimafakten.de	27	0.23277034	11	DE	3
chinadialogue	22	0.11774352	10	Global	3
Klimaretter.info	20	0.16812891	11	DE	4
The World Bank Group	20	0.08614568	8	Global	1
Science	19	0.09601994	9	Global	4
BBC	18	0.11005158	10	UK	4
ClimateEquity	18	0.10687631	7	Global	3
Süddeutsche Zeitung	18	0.09216242	10	DE	4
The Hill	AU	0.1263556	10	USA	4
Bundesministerium für Bildung und Forschung	16	0.08772654	9	DE	1
Greenpeace USA	9	0.14394473	9	USA	3

Note. Basis, Germany: 361 actors. Type of actor: 1 = political actor, 3 = civil society, 4 = media, 5 = blog.

Online Appendix

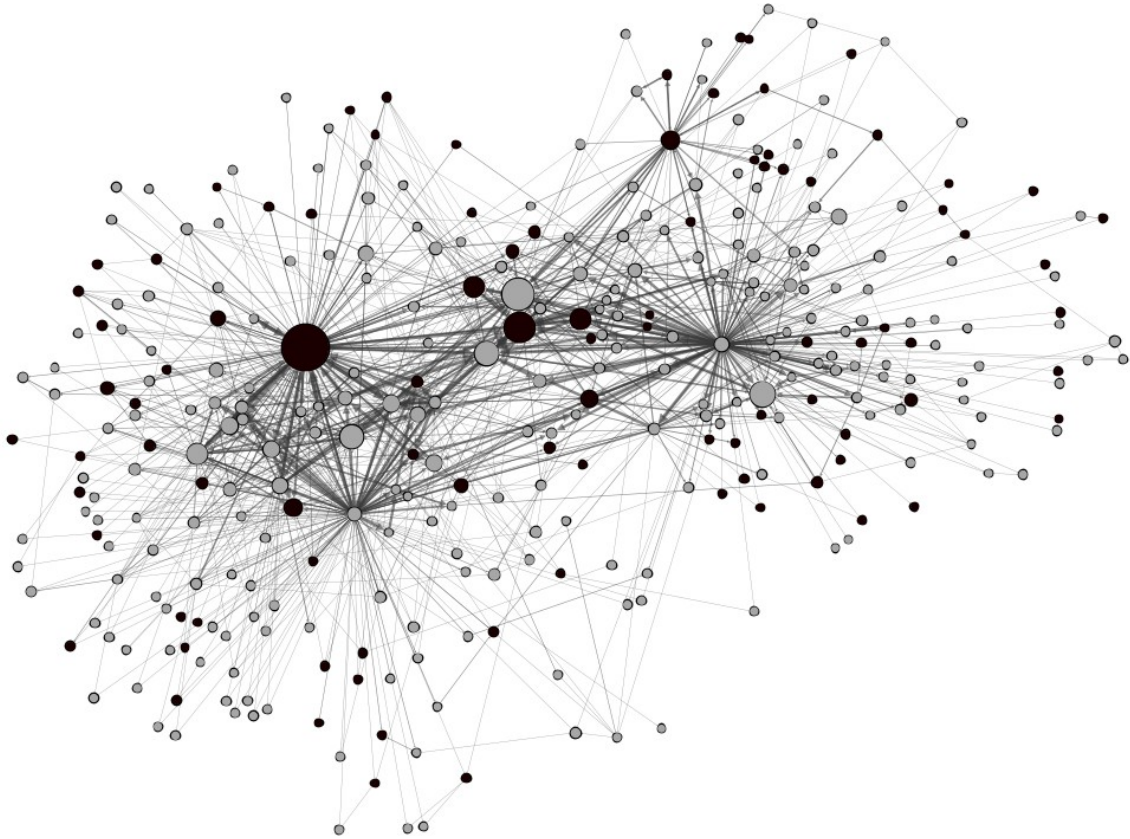


Figure 1. Stacked hyperlink network of climate advocate and climate skeptical coalitions of the German crawls. Node size is proportional to indegree, edge size is proportional to weight. Colors: grey = climate advocate, black = climate skeptic. Basis: 242 advocates, 93 skeptics.

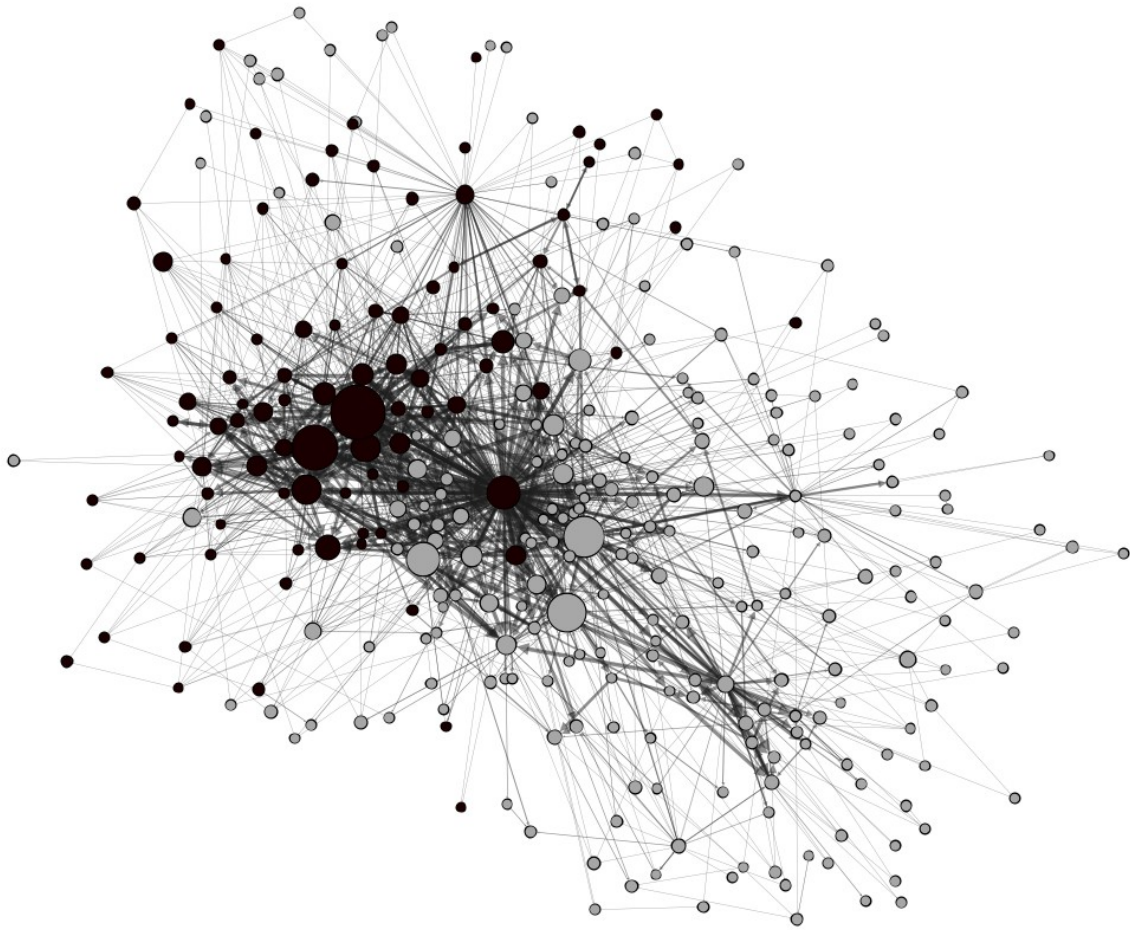


Figure 2. Stacked hyperlink network of climate advocate and climate skeptical coalitions of the UK crawls. Node size is proportional to indegree, edge size is proportional to weight. Colors: grey = climate advocate, black = climate skeptic. Basis: 218 advocates, 94 skeptics.

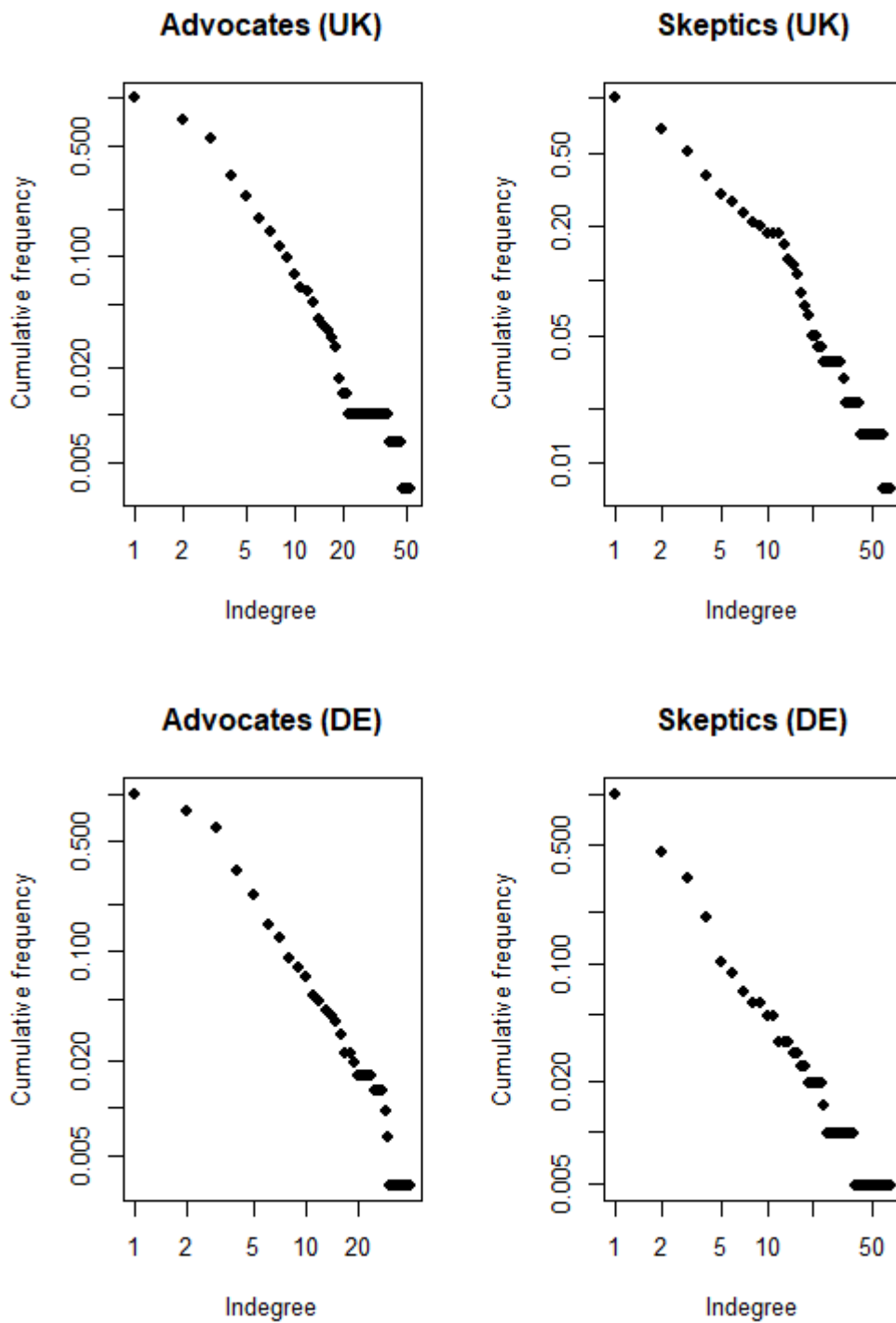


Figure 3. Cumulative indegree distribution of climate advocates and climate sceptics in the UK and the German network.

Note. Axes are on a log-log scale. Basis UK network: 218 advocates, 94 skeptics. Basis German network: 242 advocates, 93 skeptics.