International Journal of Communication 15(2021), 688–714 1932–8036/20210005

The Event-Centered Nature of Global Public Spheres: The UN Climate Change Conferences, Fridays for Future, and the (Limited) Transnationalization of Media Debates

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Research has shown how unpremeditated events can influence media attention and media framing. But how do staged political events influence patterns of news coverage across countries, and are such changes sustainable beyond the immediate event context? We examined whether the UN climate change conferences are conducive to an emergence of a transnational public sphere by triggering issue convergence and increased transnational interconnectedness across national media debates. An automated content analysis of climate change coverage in newspapers from Germany, India, South Africa, and the United States between 2012 and 2019 revealed largely event-focused reporting. Media coverage quickly returned to preconference patterns after each conference. References to foreign countries showed almost no relationship to the climate change conferences' coverage. We found similar results for the effects of the Fridays for Future movement. The significance of these events lies less in long-term changes in media reporting but more in short-term attention generation and coordinated message production.

Keywords: climate change coverage, transnational public sphere, media events, media content analysis, time series analysis, comparative research

Our increasingly interconnected and interdependent world faces severe global crises such as climate change, pandemics, and humanitarian disasters. More than ever, transnational action and global regulations are required to handle these challenges (Cottle, 2009; Eide & Kunelius, 2010). At the same time,

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Date submitted: 2020–03–11

global media create worldwide visibility for these problems. But the question remains whether global events and phenomena also lead to the emergence of a transnational mediated public sphere in which collective learning and problem solving may be established.

In this article, we focus on media debates about climate change, possibly the biggest challenge of our times, marked by an increasing number of extreme weather events and incalculable consequences for economic and social development around the world (Intergovernmental Panel on Climate Change, 2014). In particular, we investigate the possible cross-national discursive effects of the annual United Nations climate change conferences (Conferences of the Parties, or COPs). These conferences, particularly COP21 in Paris in 2015, are staged political media events, which have generated strong media attention over the years (Daly, McNatt, Nacu-Schmidt, & Boykoff, 2020; Schmidt, Ivanova, & Schäfer, 2013) and thus fulfill an important precondition for potential cross-national media influences. Kunelius and Eide (2012) emphasize that "the summits have become an intensive (and exceptional) example of a global mediatized political event where an enormous amount of knowledge production, economic lobbying, civic activism, and bargaining gravitate around potentially consequential political decision making" (pp. 267–268). Consequently, these high-level meetings of policymakers and stakeholders interrupt regular news-making routines and provide a shared set of information inputs for journalists from around the world (Adolphsen, 2014).

Do the COPs also provide discursive impulses that influence national media debates beyond the immediate event context, what has been called "discourse convergence" in previous studies (Wessler, Peters, Brüggemann, Kleinen-von Königslöw, & Sifft, 2008, p. 11)? We answer this question by way of a comparative automated media content analysis of newspaper coverage of climate change between July 1, 2012, and December 31, 2019, in Germany, India, South Africa, and the United States. Our analysis is threefold: We look at (1) cross-national patterns in the amount of media coverage on climate change (*transnational attentiveness*), (2) the extent of cross-references between countries in national news media (*transnational interconnectedness*), and (3) convergences in the media salience of subtopics of climate change between countries (*transnational issue convergence*). The underlying assumption is that the COPs drive national media debates in the same direction across all three dimensions even though debate constellations are quite different at the outset.

Event-Driven Issue Convergence

So far, evidence of an emerging global political public sphere—an enduring structure that enables political debate and opinion formation for and with a global audience—has been very scarce (Wessler et al., 2008). However, staged global media events could be focal points for the emergence of global political public sphere moments because they enable intense and recursive communicative processes between different kinds of actors and stakeholders that amplify and concentrate debates (Couldry, Hepp, & Krotz, 2010; Kunelius & Nossek, 2008). We focus on the COPs as global (instead of national or local), staged (instead of unpremeditated), and political (instead of, e.g., pop-cultural or sports) events. These kinds of media events have gained in relevance over recent years because of efforts for more transnational political coordination in times of global crises (Gilboa, 2008; Seyfang, 2003). Despite the growing importance of staged political media events, research has mainly focused on how unplanned events influence the attention for specific issues (Birkland, 1998; Liu, Lindquist, & Vedlitz, 2011) or issue framing (Birkland & Lawrence, 2009;

Muschert, 2009) in the short term. Frame change is made more likely if the event also induces some kind of policy impact, for example, when interest groups can be mobilized (Birkland, 1998), or when domestic political elites pick up the issue afterward (Liu et al., 2011).

We know less about long-term shifts in the parameters of media debates. It is plausible to expect long-term discursive effects to be induced by events like COP21 because they also mobilize governments and interest groups (Adolphsen, 2014) that may carry messages beyond the event into their routine work. In addition, such events can force national political decision makers to further deal with the issue when agreements need to be translated into domestic policies. Governments can also opt out of global governance processes, such as the U.S. government leaving the Paris Agreement. But even a refusal of global coordination can spur global, interconnected debate and might give rise to a global public sphere in the making.

Event-induced changes in reporting may be particularly likely within the "global news arena" (Reese, 2008, p. 241). Technology-driven interconnectedness and globalized media facilitate an occupational identification within the journalistic profession in which common norms and values are increasingly shared in order to adapt to the needs of the globalized system. Within this global news arena, journalists more easily form an "interpretative community" (Reese, 2008, p. 241). This seems to apply in particular to environmental journalists. Brüggemann and Engesser (2014) found that most climate change reporters agree with the Intergovernmental Panel on Climate Change's consensus on anthropogenic climate change and also with common proposals for solutions. Considering this against the background of the COPs where journalists from around the world work side by side for two weeks, constantly surrounded by members of the global civil society and other political actors, we can expect levels and forms of interaction that will affect global news production (Lück, Wozniak, & Wessler, 2016). Based on interviews at four COPs, Lück and associates (2016) found that the special circumstances of the conferences facilitate "coproduction" (p. 25) of media messages and thereby shape the global picture of the conferences. Such exceptional circumstances provide a good case for investigating processes of convergence in news media messages as a potential consequence of (a) similar, globalized journalistic work routines; (b) journalistic focus on the same important staged political event; (c) event-specific networking and coproduction among actors on-site; and (d) a common focus on a global issue.

Event-Induced Transnational Interconnectedness

We also expect these circumstances to facilitate an increased (compared with routine periods of reporting) global interconnectedness among actors, countries, and transnational institutions in national media debates. Schäfer, Post, Schwab, and Kleinen-von Königslöw (2018) distinguish between horizontal interconnectedness (references to other countries) and vertical interconnectedness (references to supranational organizations) in climate change coverage and found that the former is more pronounced than the latter. However, foreign or supranational actors are more often merely mentioned than actually quoted with a statement (Schäfer et al., 2018).

Several studies have investigated media reporting of climate change (conferences) and especially have looked for convergence and the influence of national backgrounds on coverage. Shehata and Hopmann (2012) compared U.S. and Swedish news coverage on climate change over a 10-year period and found that there were hardly any differences, indicating a weak influence of national political elites on climate change

framing. Conversely, in an analysis of transnational COP coverage in 2007 and 2009, Eide and Kunelius (2010) found that domestic actors dominated the coverage in each country. This may create the possibility "for linking transnational debates into local political struggles" (Eide & Kunelius, 2010, p. 41), but also restricts resources and the connection of information. However, they still see the potential that "the global climate summits help at least somewhat in enabling journalists to reach beyond their structurally imposed nationalistic realisms" (Eide & Kunelius, 2010, p. 41). More insights into event-induced issue convergence in particular are presented by Wessler, Wozniak, Hofer, and Lück (2016) who compared the COP coverage of newspapers from five countries between 2010 and 2013 and found global multimodal frames to be relatively similar across countries.

These studies provide insights about frame similarities in media coverage during the COPs. But despite comparing various periods of time around COPs, their data are cross-sectional rather than longitudinal. We therefore created time series data of seven and a half years of climate change coverage, with the Paris summit in November/December 2015 marking (roughly) the midpoint of this time frame, to look for long-term influences. This allowed us to investigate whether annual COPs and/or COP21 in particular have sent out impulses of increased transnational issue attention, interconnectedness, and issue convergence into national media debates. In other words, we tested the transnational discursive sustainability of the coproduced communicative efforts during the annual COPs and the 2015 Paris summit in particular.

There is one potentially confounding factor toward the end of our period of analysis: the weekly protests of the Fridays for Future movement that began with Greta Thunberg's "Skolstrejk för Klimatet" on August 20, 2018. Here is a persistent, recurring weekly protest that involves elements of civil disobedience and rule-breaking and thus attracts media attention on a regular basis, features that the annual COPs cannot engender despite the attempts by environmental nongovernmental organizations. More importantly, Fridays for Future offers an emotional narrative of David versus Goliath, with a young Greta Thunberg as its figurehead fighting against the proclaimed obliviousness and arrogance of global political and economic elites. In addition, Fridays for Future's core message is couched in intergenerational terms and could thus potentially transcend national borders more easily. By contrast, the narratives offered in the usual COP coverage around the globe (Lück, Wessler, Wozniak, & Lycarião, 2018) are not nearly as gripping. Still, it remains to be seen whether this new environmental movement can grow to become a convincing policy advocate in addition to being a powerful moral entrepreneur.

But for global public sphere theory Fridays for Future does hold promise as an alternative explanation for whatever sustained upward trends in issue attention, interconnectedness, and issue convergence one might detect. Schäfer, Ivanova, and Schmidt (2014) have shown that—besides the COPs—the agenda-building efforts from international nongovernmental organizations are drivers of media attention to climate change. Recent studies about media coverage in Germany suggest that this applies to the Fridays for Future movement as well (Bergmann & Ossewaarde, 2020; von Zabern & Tulloch, 2020). It may well be that Fridays for Future in its short period of existence has also created more of a sustained, transnationally interconnected media debate—and thus more of a lasting global public sphere—than the COPs. This might be due to the movement's discursive focus on intergenerational justice and fundamental systemic change (Fridays for Future, 2020). Yet, the mass media's propensity for episodic framing of social protests under the protest paradigm (Chan & Lee, 1984), along with the perception of children as illegitimate political actors

(Kettrey, 2018) and a paternalistic discourse surrounding striking schoolchildren (Bergmann & Osserwaarde, 2020), would predict a limited capacity of Fridays for Future to elicit substantial discursive shifts in media reporting. To assess the influence of Fridays for Future on the global conversation about climate change we included both the existence of the movement per se and the sequence of attention-generating activities as alternative independent variables in our analyses.

Method

Data

Our country sample—Germany, India, South Africa, and the United States—consists of major pluralist democratic societies with a free press system. Germany and the United States are industrialized countries and have been major players in international politics for centuries; India and South Africa are considered emerging economies with a growing role and level of influence in international relations and global governance. From each country we selected two daily newspapers for an automated content analysis of climate coverage between July 1, 2012, and December 31, 2019: *The Hindu* and *The Times of India* from India, *Frankfurter Allgemeine Zeitung* and *Süddeutsche Zeitung* from Germany, *The Star* and *Daily Sun* from South Africa, and *The New York Times* and *The Washington Post* from the United States. We selected newspapers (a) as functional equivalents for our cross-national comparative analysis, (b) as proxies for the mainstream media debate in each country, and (c) because daily newspapers provide the highest amount of coverage about climate change compared with nightly newscasts and weekly magazines.

Using automated content analysis, we were able to conduct a population analysis of all newspaper articles that dealt with climate change in substantive terms over seven and a half years. Using the search string "climate change OR global warming,"[1] we conducted database searches in Nexis and Factiva (for *The Times of India*, *The Star*, *The New York Times*, and *The Washington Post*), the *Frankfurter Allgemeine Zeitung* Web archive, the *Süddeutsche Zeitung* Web archive, and *The Hindu* website search. For *Daily Sun* articles from 2012 to 2015, an employee of the newspaper searched the nonpublic archive with our search string and sent us the resulting articles; for articles published between 2016 and 2019, we were able to use the Google site search for www.dailysun.co.za. Our database searches yielded 41,185 results, which were subjected to multiple rounds of relevance checks (see Table 1). Based on our experience of manually selecting articles about climate change for prior studies (Wessler et al., 2016), we had to establish whether the articles that the database queries returned dealt with climate change in a substantive way (i.e., whether at least one section was dedicated to causes or consequences of, or remedies for, climate change), instead of merely mentioning climate change in passing or using our search terms metaphorically. A random subset of 1,710 English-language and 340 German-language articles were coded by three coders to study the interrater reliability of our selection criterion. The coders achieved 84% agreement with Krippendorff's alpha of .68. This is very close to the level of .70 suggested by Song and colleagues (2020) as an adequately reliable standard for automated content analysis. These binary coded (relevant/not relevant) articles were then used as training and testing material for our machine-learning model.

[1] The equivalent German keywords were "klimawandel OR erderwärmung OR globale* erwärmung."

Table 1. Article Collection and Validation Process.

Newspaper	Search-string returns	Machine-learning material	Precision/recall (training set)	Precision/recall (test set)	Automatically selected ($p \geq .70$) (n)	Manually reviewed ($.70 > p \geq .30$) (n)	Selected after review ($.70 > p \geq .30$) (n)	Final sample (deduplicated)
Frankfurter Allgemeine	4,089	German: 346	100/93.7	75.6/68.9	1,476	65	24	1,499
Süddeutsche Zeitung	6,288				1,880	104	46	1,916
The Hindu	6,560				4,099	164	27	4,113
The Times of India	8,789				4,308	125	20	4,323
Daily Sun	43				27	0	0	27
The Star	1,022	English: 1,710	91.8/78.7	79.5/61.7	693	13	2	695
The New York Times	8,662				4,237	125	11	4,242
The Washington Post	5,732				2,771	32	7	2,778
Total	41,185	2,056			19,491	628	137	19,593

We trained a Naive Bayes classifier for the English and German articles. Naive Bayes is a generic model that has been used frequently as a baseline model for the binary classification of documents. In simple terms, it is based on the Bayes theorem: The classifier updates its confidence in posterior probability about a document being relevant or not when certain text features (e.g., "climate," "change," "carbon") are present in the document (Manning, Schütze, & Raghavan, 2008). We used the quanteda R package (Benoit et al., 2018) for training these models. For each model, 70% of the manually coded data were used for training and 30% for testing. We then used these models to automatically classify all articles as either relevant or irrelevant (see Table 1 for precision and recall). All articles classified as relevant with a categorization probability of .70 or higher were chosen for further analysis. Articles with a probability between .70 and .30 were manually reviewed for their relevance (for those between .50 and .30, only the headlines were checked[2]). All selected articles were then subjected to a final round of deduplication. Our final population of climate change articles was 19,593.

Independent Variables

In all subsequent analyses, we assumed two sources that could affect transnational attentiveness, interconnectedness, and issue convergence: the COPs and the Fridays for Future movement. We conceptualized the two sources as four different time series, as presented in Figure 1.

[2] Interrater reliability for two coders: 93% agreement, Krippendorff's α = .73.

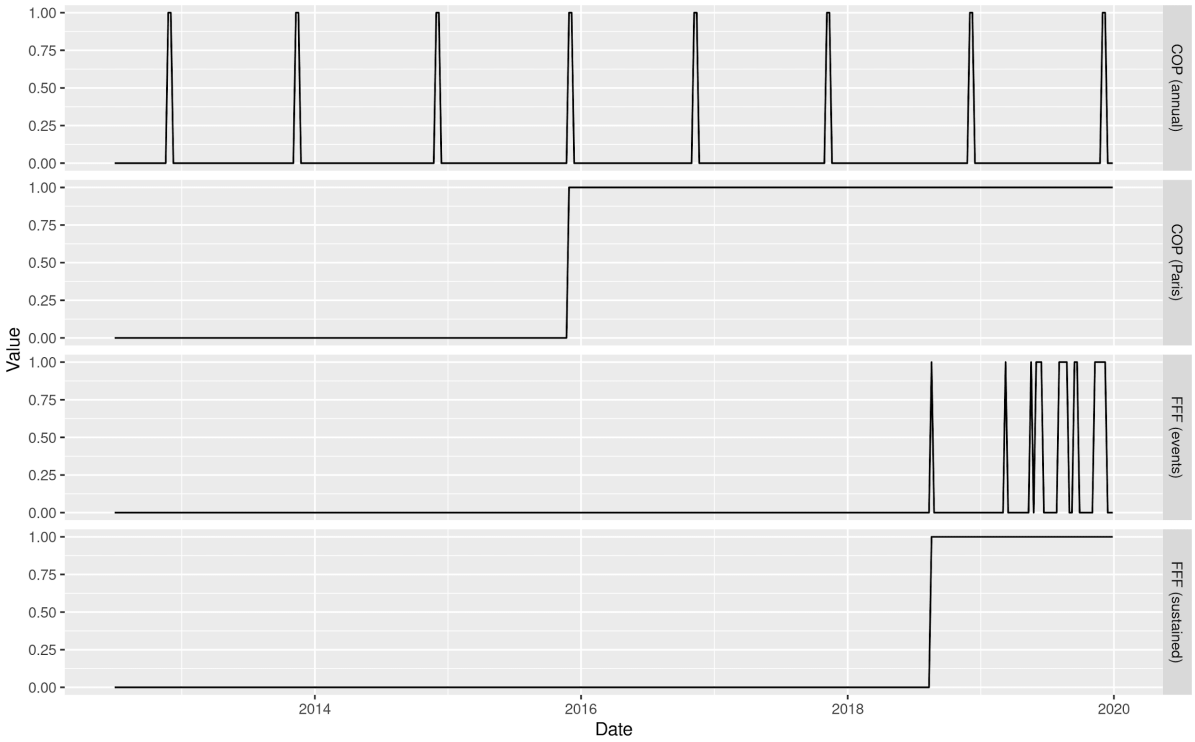

Figure 1. Independent variables as time series. COP = UN climate change conferences; FFF = Fridays for Future.

COP (annual) was a dummy variable time series in which only the weeks with a COP conference were marked as 1 and all other weeks were coded as 0. This version of the variable assumed that the effects of COPs on our three indicators of transnationalization did not extend beyond the immediate context of the climate change conferences. COP (Paris) was another dummy variable, in which all weeks leading up to COP21 in Paris were marked as 0 and all weeks coinciding and following this conference as 1. This version assumed a sustainable transnationalization effect due to the adoption of the Paris Agreement.

We operationalized Fridays for Future as two different time series as well. The first version treated Fridays for Future as a sustained, weekly movement. The weeks after August 20, 2018 (Greta Thunberg's first school strike in Sweden) were marked as 1 and all other weeks before that as 0. This operationalization, which we called FFF (sustained), assumed that Fridays for Future can induce lasting change in our dependent variables compared with their pre-Fridays for Future baseline levels. FFF (events) refers to intermittent media coverage of significant movement-related events, such as the Global Week for Climate Action in September 2019. The operationalization yielded an intermittent time series based on 13 events (the list is available in the methodological appendix[3]). As an independent variable, FFF (events) can only heighten the level of our dependent variables during weeks when these specific events took place.

[3] https://osf.io/rtpwa/?view_only=1d21d230132144a99f34bbe85a420113

Dependent Variables

Patterns of transnational attentiveness were assessed by creating a time series of the number of climate change articles published in the sampled newspapers. We chose to aggregate our data into a weekly time series (391 weeks), which was the best compromise between too much granularity (2,740 days) and too much coarseness (90 months) of the data. It also matched most closely the two-week schedule of the COPs and the weekly structure of the Fridays for Future protests.

For transnational interconnectedness, we used the multilingual dictionaries provided by the Newsmap package[4] (Watanabe, 2018) and extracted all countries mentioned in our media sample. We constructed networks based on the weekly snapshots of relationships between the newspapers' countries of origin and countries mentioned in their respective news reports. With these weekly networks, we operationalized the concept of transnational interconnectedness with two complementing time series. The first time series is the Krackhardt E/I ratio (Krackhardt & Stern, 1988), which quantifies the relative number of external connections (in our case, mentions of foreign countries) to internal connections (mentions of the newspaper's country of origin) and can range from −1 (all links are internal) to +1 (all links are external). A negative E/I ratio indicates that a newspaper mentions its home country more often than foreign countries; a positive E/I ratio indicates more mentions of foreign countries than the newspaper's home country.

Information entropy (Shannon, 1948; adopted as a network-scientific measurement by Eagle, Macy, & Claxton, 2010) allowed us to measure how broad and balanced countries are represented in climate change coverage. A higher value in information entropy indicated a more equitable representation of countries. This indicator supplemented the E/I ratio because the E/I ratio would remain high when newspapers focused only on their own countries and a few major foreign countries (e.g., China and Russia). Information entropy, however, could remain low because of the small variety of countries covered.

For transnational issue convergence, we referred to our own content analysis of climate change coverage (Wessler et al., 2016). Based on quantitative measurements of particular debate elements, we identified nine aspects of climate change discourse across four broader dimensions of the issue that had either been introduced or seen a rise in attention over time. As concerns the causes and responsibility for climate change, COP coverage has seen an increase in references to (1) common but differentiated responsibility and (2) the developed nations' historic responsibility for climate change. As regards consequences, there has been a growing focus on (3) extreme weather events linked to climate change. Concerning remedial strategies, (4) mitigation and (5) adaptation—the two most important negotiation tracks at the COPs—as well as the concept of (6) loss and damage have seen increased media attention. Regarding climate action, (7) the target of limiting global temperature rise to below 1.5°C (as opposed to the older 2° target), (8) the intended nationally determined contributions in the reduction of greenhouse gas emissions, and (9) the national reviews of climate change policies have also gained in relative importance in the lead-up to COP21 where they were formally agreed on. These debate elements map to

[4] The original dictionaries contain country names (e.g., The Netherlands) and their alternative forms (e.g., Holland) as well as demonyms (e.g., Dutch) and city names (e.g., Amsterdam). We used only the countries' names and their alternative forms.

some degree onto the frame dimensions specified by Entman (2004), namely problem definition (extreme weather), causal attribution (common but differentiated responsibility and historic responsibility), and treatment recommendations (the rest of the debate elements). They thus potentially constitute building blocks for media frames on climate change. However, we were cautious not to overinterpret subissues as frames for two reasons. First, we did not study all relevant frame elements of climate change coverage, but focused on the most relevant ones that have seen an increase over time. Any reconstruction of frames on this basis would be incomplete and skewed. And second, we did not study the conjunction of different elements into holistic frames, but traced the prevalence of each debate element on its own.

We operationalized these debate elements into indicative keywords[5] for a dictionary-based search with quanteda. We performed an evaluation of precision and recall of our keywords (see Table 2) by having the lead author manually code a random selection of 180 articles. At least 10 positive and 10 negative cases of matching articles for each debate aspect were included.

We used the week-by-week distribution of these debate elements to calculate an issue convergence score (Sigelman & Buell, 2004). This score indicates how similar or dissimilar the distribution of the debate elements was among the four countries on a weekly basis; a higher value indicates a higher level of issue convergence across all nine debate elements. The full 391-week time series of the issue convergence score was then used as a dependent variable for our analysis.[6]

Table 2. Keywords Used for Automated Debate Element Analysis.

Debate element	Keyword search	Precision/recall
Common but differentiated responsibility	English: COMMON_BUT German: DIFFERENZIERT*/DIVERSIFIZIERT*/GEMEINSAMEN_ABER	1.00/1.00
Historic responsibility	English: HISTORIC* German: HISTORISCH*	1.00/0.88
Extreme weather (total)		0.93/0.88
Extreme weather	English: EXTREME_WEATHER German: WETTEREXTREM*/EXTREMWETTER*	
Rising sea levels	English: RISING_SEA*/SEA_LEVEL* German: ANSTIEG*/MEERESSPIEGEL*/MEERESHÖHE/WASSERPEGEL*/STEIGEN*	

[5] As regards mitigation and adaptation, we decided to search for the exact terms (and their literal translation into German) used within the United Nations Framework Convention on Climate Changes negotiation tracks. This provided a clearer indication of COP-induced wording in media reports than a broader itemization into specific national and local mitigation and adaptation efforts (e.g., switch to renewable energy or building of flood defenses).

[6] See the methodological appendix for more details about this procedure.

Melting ice	English: MELT*/GLACI* German: EISSCHMELZ*/GLETSCHER/SCHMELZ*	
Floods	English: FLOOD*/DOWNPOUR*/HEAVY_RAIN*/HEAVIER_RAIN*/SEVERE_RAIN*/EXTREME_RAIN*/TORRENTIAL_RAIN*/RECORD_RAIN*/RAINFALL_RECORD*/RAINSTORM* German: FLUT*/SINTFLUT*/ÜBERFLUT*/STURMFLUT*/ÜBERSCHWEMM*/HOCHWASSER*/ORKAN	
Storms/hurricanes	English: STORM*/HURRICANE German:STURM*/STÜRM*/HURRIKAN/STARKREGEN*/WIRBELSTURM/WIRBELSTÜRME/UNWETTER*	
Droughts	English: DROUGHT*/DRY* German: DÜRR*/TROCKENHEIT/TROCKENPERIODE*	
Heat/warming	English: HEAT_WAVE*/RECORD_HEAT/HEAT_RECORD*/EXTREME_HEAT/HEAT_RELATED/WARM_WINTER German: ERDERWÄRM*/ERWÄRM*/HITZE*	
Natural disasters	English: NATURAL_DISASTER* German: NATURKATASTROPHE*/UMWELTKATASTROPHE*	
Mitigation	English: MITIGATION German: MITIGATION/ABSCHWÄCH*/LINDER*/MINDER*/SCHADENS*/VERMINDER*/BEGRENZ*	0.98/0.89
Adaptation	English: ADAPTATION German: ADAPTION/ANPASS*	0.97/0.97
Loss and damage	English: LOSS_AND_DAMAGE/LOSSES_AND_DAMAGES German: LOSS_AND_DAMAGE/KLIMAFOLGEN	1.00/0.98
1.5º target	English: DEGREE*/C/CELSIUS German: GRAD-ZIEL/1,5_GRAD/UNTER_2_GRAD/UNTER_ZWEI_GRAD/WENIGER_ALS_2_GRAD/ WENIGER_ALS_ZWEI_GRAD	0.99/0.82
Intended nationally determined contributions (INDCs)	English: INDC*/DETERMINED_CONTRIBUTION* German: INDC/KLIMABEITRAG*/KLIMASCHUTZZIEL*/MINDERUNGSZIEL*	0.98/0.99
National reviews	English & German: REVIEW*	1.00/0.89

Time Series Analysis

Given the autoregressive nature and other properties of time series, an ordinary least squares regression analysis would violate the normality of error and the independence of observations assumption (Wells et al., 2019). Instead, we applied the dynamic regression approach (Gujarati & Porter, 2009; Hyndman & Athanasopoulos, 2018), which assumes that the error term follows an autoregressive integrated moving average (ARIMA) model and not a normal distribution. Regression coefficients from a dynamic regression model can be interpreted as similar to those from an ordinary least squares regression.

For each model, we found the best ARIMA structure of the error term by using the auto.arima function from the forecast R package (Hyndman & Khandakar, 2008). It searches for an ARIMA structure that can explain the most variance according to the Akaike information criterion (Akaike, 1973). We restricted the search to models with *p* (number of autoregressive terms), *d* (number of nonseasonal differences), *q* (number of lagged forecast errors), and values less than (5, 2, 5). ARIMA models with *p*, *q*, *d* values beyond these ranges are highly unrealistic.[7]

Results

Transnational Attentiveness

In a first analytical step, we compared weekly media attention over time across all four countries (see Figure 2). As expected, most of the COPs triggered a substantial increase in the number of newspaper articles about climate change. Other political (but not natural) events also caused media attention to rise, albeit with country-specific variations. For instance, the agreement on a U.S.–China deal on climate change in 2015 and the announcement of the U.S. withdrawal from the Paris Agreement in 2017 triggered more attention in U.S. newspapers than in other countries.

[7] Using vector autoregression would not have been useful because we did not investigate temporal precedence. Also, some time series cannot be plausibly influenced by our dependent variables (e.g., transnational attentiveness cannot influence the date of COPs).

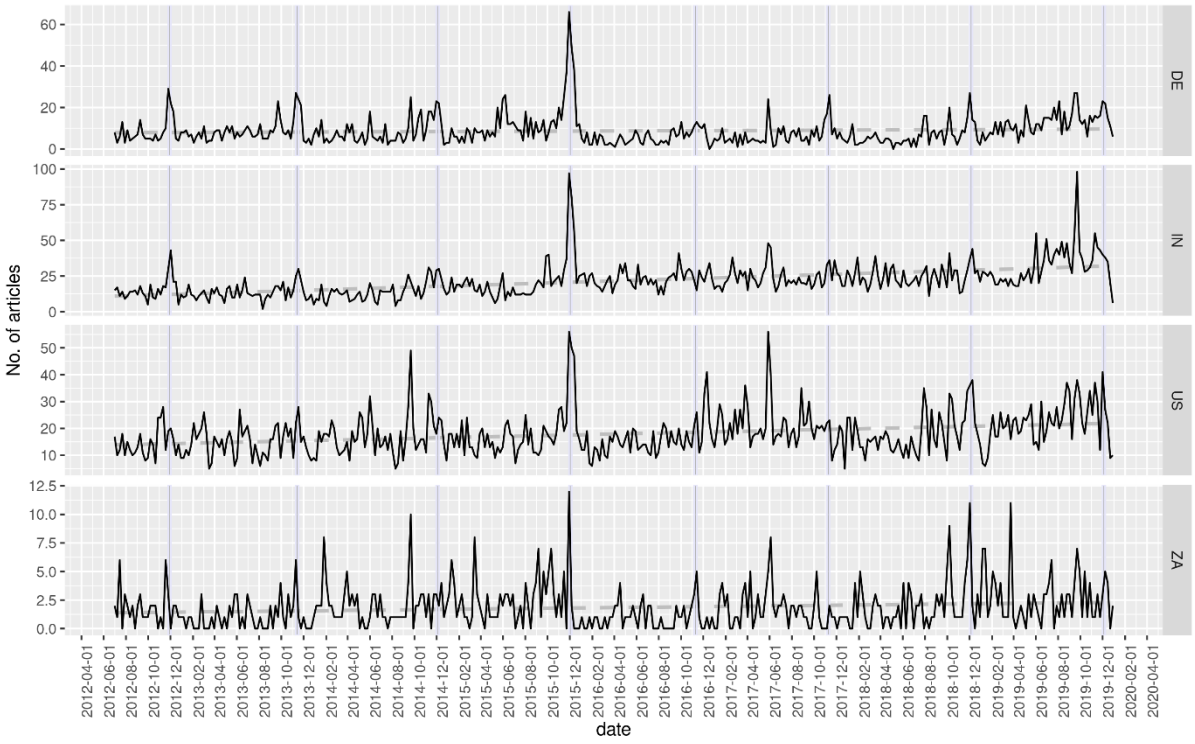

Figure 2. Time series of media attention to climate change by country. Dashed lines indicate time trend; dark vertical lines indicate a climate change conference taking place; y-axes are not in a common scale. DE = Germany; IN = India; US = United States; ZA = South Africa.

Table 3 shows the results of a dynamic regression analysis with transnational media attention as the dependent variable. The COPs were associated with a significant increase in media attention to climate change in all four countries during the weeks when they were taking place (COP [annual] variable). COP21 in Paris was linked to a sustained (i.e., not merely event-specific) increase in media attention in the United States and, even more pronounced, India (COP [Paris] variable). In both countries, there was significantly more climate change coverage in the time period after COP21 than before.

Fridays for Future, however, had different effects on climate change coverage in the four countries. In Germany and South Africa, the movement was significantly related to a sustained increase in media attention to climate change (FFF [sustained] variable). In India, Fridays for Future was associated with an episodic heightening of media attention only in weeks when related events took place (FFF [event] variable). In the United States, Fridays for Future was associated with both episodic and sustained increases in media attention.

Table 3. Dynamic Regression Models (Transnational Attentiveness as the Dependent Variable).

Independent variable	Regression coefficient (*SE*)	*t*	*p*
Model 1: Germany (ARIMA:2,0,0)			
COP (annual)	12.690 (1.386)	9.156	<.001***
COP (Paris)	−1.382 (1.357)	−1.018	.309
FFF (event)	2.174 (1.564)	1.390	.165
FFF (sustained)	3.435 (1.726)	1.990	.047*
Model 2: India (ARIMA: 1,0,2)			
COP (annual)	13.543 (2.266)	5.975	<.001***
COP (Paris)	11.382 (2.364)	4.815	<.001***
FFF (event)	9.893 (2.411)	4.103	<.001***
FFF (sustained)	2.153 (2.826)	0.762	.447
Model 3: U.S. (ARIMA: 0,0,1)			
COP (annual)	10.653 (1.978)	5.386	<.001***
COP (Paris)	2.461 (1.030)	2.388	.017*
FFF (event)	5.234 (2.017)	2.595	.010**
FFF (sustained)	2.851 (1.411)	2.020	.044*
Model 4: South Africa (ARIMA: 0,0,1)			
COP (annual)	1.964 (0.488)	4.024	<.001***
COP (Paris)	−0.406 (0.226)	−1.795	.073
FFF (event)	−0.766 (0.528)	−1.450	.148
FFF (sustained)	1.467 (0.316)	4.640	<.001***

Note. COP = UN climate change conference; FFF = Fridays for Future. Regression coefficients for ARIMA terms are not shown. The full model is available in the methodological appendix.
*$p < .05$. **$p < .01$. ***$p < .001$.

Our data therefore suggest that it was indeed events taking place on a supranational level of governance that consistently led to spikes in media attention across countries. In contrast, a bottom-up effort such as Fridays for Future showed an inconsistent relationship with media attention across the four countries. As regards transnational discursive effects of the COPs, a necessary, but by far not sufficient, condition was therefore fulfilled.

Transnational Interconnectedness

A stronger transnationalization indicator than mere media attention was the level of transnational interconnectedness. As expected, climate change coverage by national newspapers remained strongly focused on domestic affairs, as evidenced by the E/I ratio staying under 0 during most of the study period in all four countries (see Figure 3).

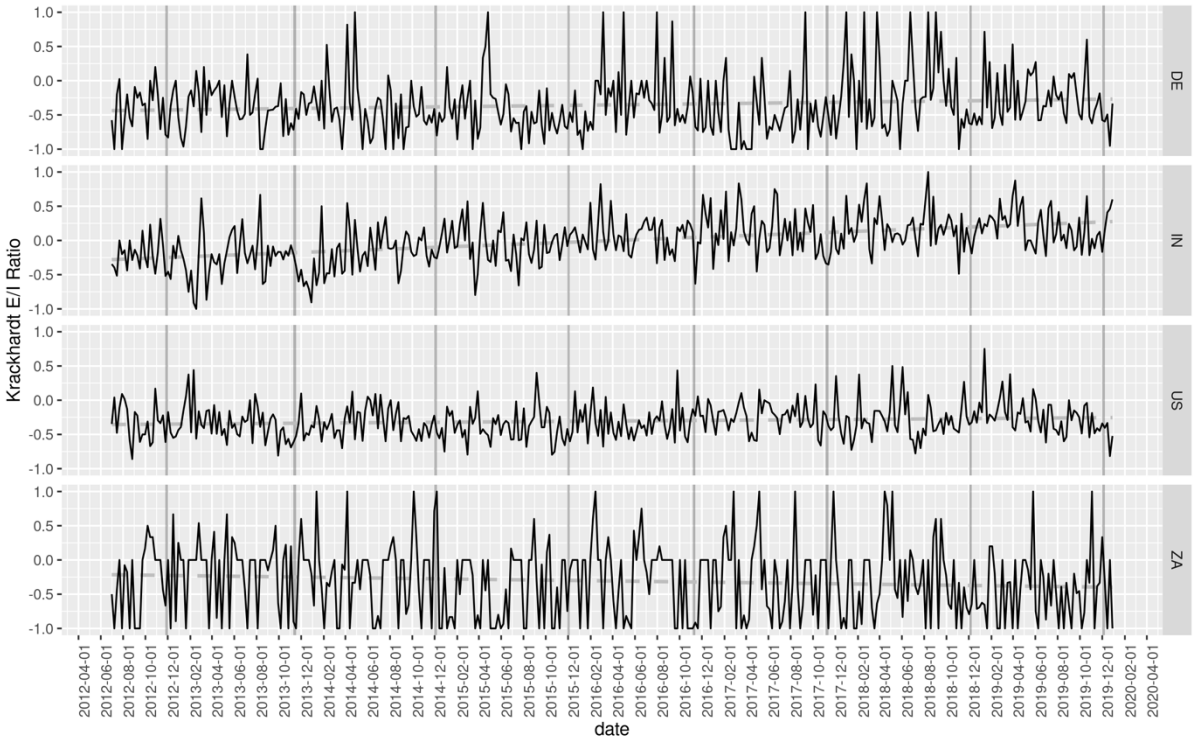

Figure 3. Time series of E/I ratio by country. DE = Germany; IN = India; US = United States; ZA = South Africa.

The United States was by far the most prominent country in all climate change coverage (see Figure 4), in line with previous findings about the United States' relative dominance in international news (Guo & Vargo, 2017). China, despite not being covered by our newspaper sample, was the third most often mentioned country, behind India (which was largely driven by the domestic coverage of the Indian newspapers). These three countries are also among the biggest polluters in the world (International Energy Agency, 2020). As an ad hoc analysis, we studied how often the 10 most climate change-affected countries—Puerto Rico, Myanmar, Haiti, Philippines, Pakistan, Vietnam, Bangladesh, Thailand, Nepal, and Dominica (Eckstein, Künzel, Schäfer, & Winges, 2019)—were mentioned in our media sample. Dominica was not mentioned at all. Puerto Rico, the most affected country, was mentioned only 114 times (that is 0.7% of all mentions of the United States).

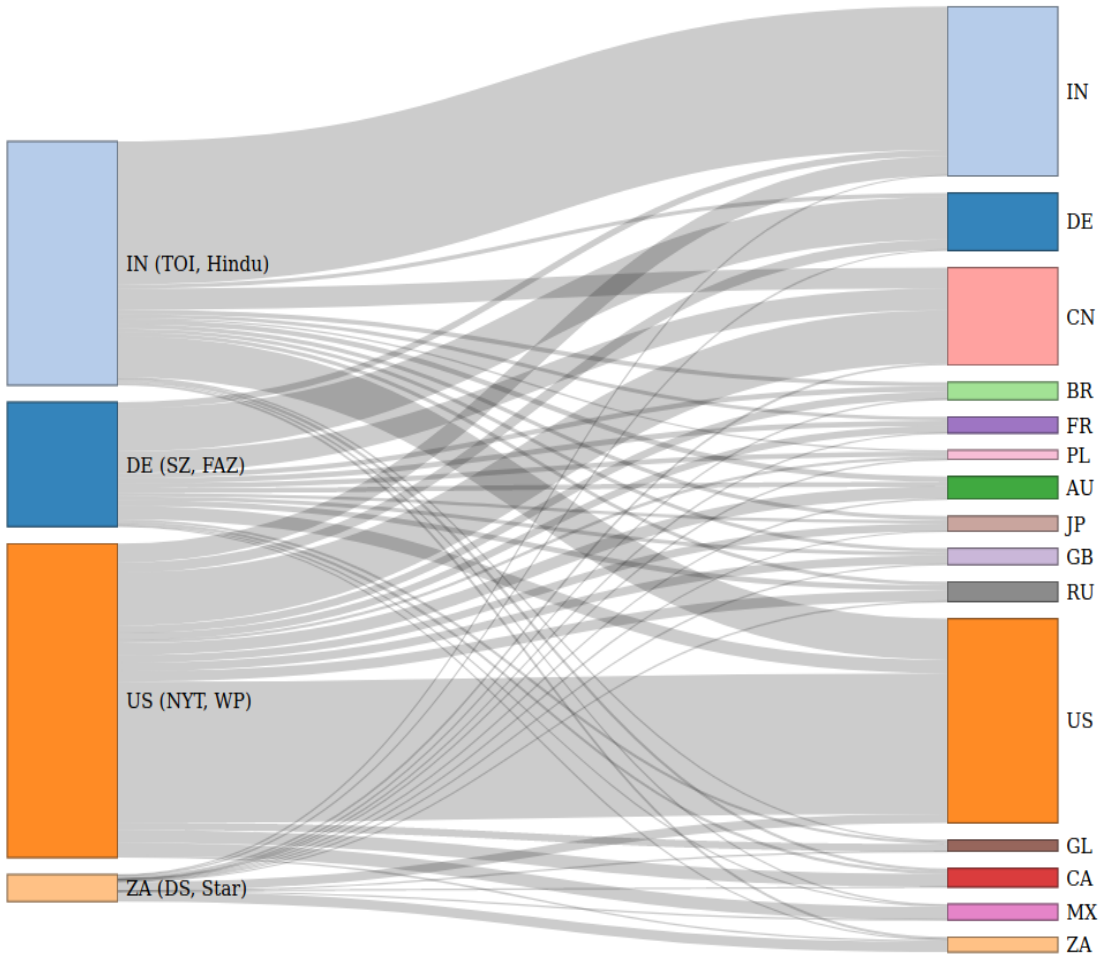

Figure 4. Sankey diagram showing the distribution of country mentions (right) in news coverage in our newspaper sample (left). Thickness of lines is linearly proportional to number of times a country was mentioned in the respective two newspapers from four countries. Reading example: About half of all country mentions in the two Indian newspapers were of India, followed by mentions of the United States and China (left to right). Countries: IN = India; DE = Germany; US = United States; ZA = South Africa; CN = China; BR = Brazil; FR = France; PL = Poland; AU = Australia; JP = Japan; GB =Great Britain/United Kingdom; RU = Russia; GL = Greenland; CA = Canada; MX = Mexico. Newspapers: TOI* = The Times of India*; SZ* = Süddeutsche Zeitung*; FAZ* = Frankfurter Allgemeine*; NYT* = The New York Times*; WP* = The Washington Post*; DS* = Daily Star.

We then ascertained the relationship between the COPs and the Fridays for Future movement, respectively, and the level of transnational interconnectedness over time. We conducted a dynamic

regression analysis using the E/I ratio in all four countries as well as information entropy across countries as the independent variables (see Table 4). Our results show that the COPs were associated with a significant decrease in the E/I ratio in India in the immediate, annual event context, but with an increase in the aftermath of COP21. This indicates that climate change coverage in India tended to be more domestic during COP weeks than usual. But it also shows a clear trend toward more attention to foreign countries when we compared the pre-Paris with the post-Paris time frame. The latter pattern was also observed in U.S. media coverage, but to a much smaller degree. All other correlations with the E/I ratio were not significant, including all relationships with Fridays for Future as the independent variable.

Table 4. Dynamic Regression Models (Transnational Interconnectedness as the Dependent Variable).

Independent variable	Regression coefficient (*SE*)	*t*	*p*
	E/I index		
Model 1: Germany (ARIMA: 1,0,1)			
COP (annual)	−0.204 (0.110)	−1.851	.065
COP (Paris)	0.073 (0.066)	1.113	.266
FFF (sustained)	0.081 (0.088)	0.917	.360
FFF (event)	−0.006 (0.121)	−0.054	.957
Model 2: India (ARIMA: 2,1,3)			
COP (annual)	−0.233 (0.080)	−2.931	.004**
COP (Paris)	0.297 (0.037)	7.943	<.001***
FFF (sustained)	0.087 (0.052)	1.662	.097
FFF (event)	−0.137 (0.086)	−1.599	.111
Model 3: US (ARIMA: 0,0,0)			
COP (annual)	−0.074 (0.063)	−1.183	.238
COP (Paris)	0.063 (0.027)	2.286	.023*
FFF (sustained)	0.051 (0.039)	1.304	.193
FFF (event)	−0.110 (0.068)	−1.611	.108
Model 4: South Africa (ARIMA: 0,0,1)			
COP (annual)	−0.031 (0.143)	−0.216	.829
COP (Paris)	0.005 (0.066)	0.076	.939
FFF (sustained)	−0.101 (0.093)	−1.085	.279
FFF (event)	−0.211 (0.156)	−1.352	.177
Model 5: Entropy (ARIMA: 3,0,2)			
COP (annual)	−0.048 (0.016)	−2.946	.003**
COP (Paris)	−0.015 (0.017)	−0.863	.389
FFF (sustained)	−0.016 (0.021)	−0.748	.455
FFF (event)	−0.005 (0.018)	−0.281	.779

Note. COP = UN climate change conference; FFF = Fridays for Future. Regression coefficients for ARIMA terms are not shown. The full model is available in the methodological appendix.
*p < .05. **p < .01. ***p < .001.

Somewhat counterintuitively, information entropy tended to drop sharply during most weeks when COPs took place (see Figure 5). This indicates that newspapers in the four countries focused on a narrower selection of countries during their COP coverage than usual in their overall climate change reporting. The results of the dynamic regression analysis match this observation (see Table 4): The weeks of the annual COPs were associated with a statistically significant drop in information entropy. Fridays for Future, on the other hand, was not associated with any change in information entropy.

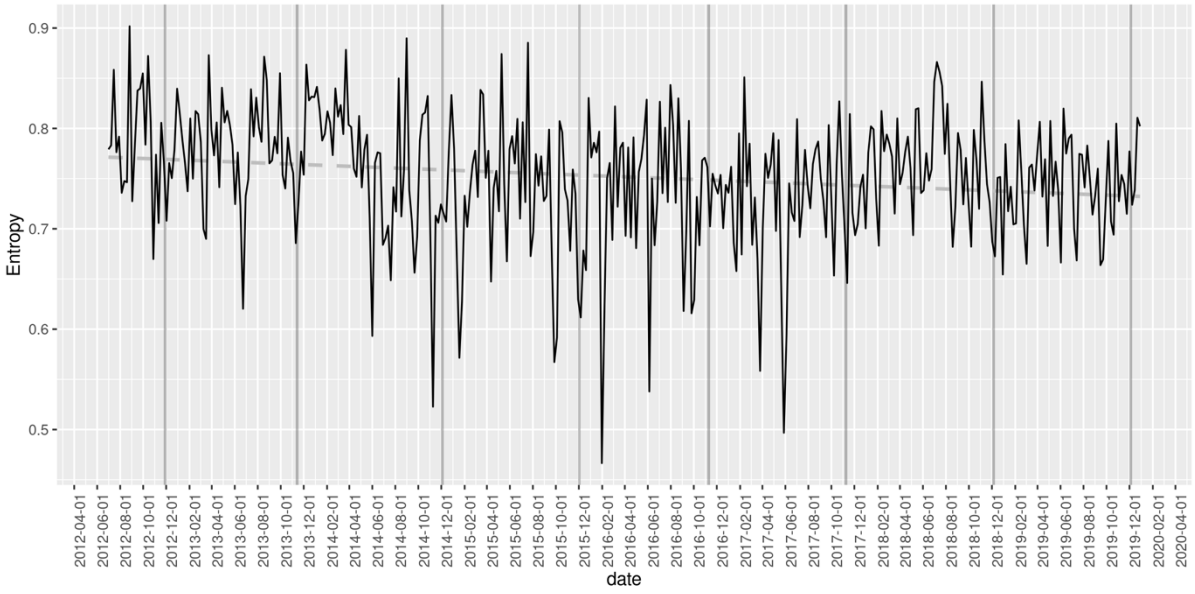

Figure 5. Time series of information entropy.

Transnational Issue Convergence

The most stringent indicator of transnationalization of media coverage was issue convergence, which we operationalized by measuring the frequency of references to nine salient elements of the climate change debate. Almost two thirds (63%) of the mentioned debate aspects were about extreme weather, whereas only 12% referred to the 1.5º target and less than 1% to common but differentiated responsibility or loss and damage (see Table 5).

Table 5. Distribution of Debate Aspects by Country.

Debate aspect[a]	Germany (*n* = 6,498)	India (*n* = 7,906)	South Africa (*n* = 820)	United States (*n* = 11,026)	Total (*N* = 26,250)
Common but differentiated, *n* (%)	28 (0.4)	116 (1.5)	3 (0.4)	5 (0.1)	152 (0.6)
Historic responsibility, *n* (%)	187 (2.9)	342 (4.3)	42 (5.1)	839 (7.6)	1,410 (5.4)
1.5° target, *n* (%)	331 (5.1)	1,242 (15.7)	78 (9.5)	1,576 (14.3)	3,227 (12.3)
Extreme weather, *n* (%)	4,473 (68.8)	4,196 (53.1)	549 (67.0)	7,345 (66.6)	16,563 (63.1)
Mitigation, *n* (%)	973 (15.0)	637 (8.1)	40 (4.9)	159 (1.4)	1,809 (6.9)
Adaptation, *n* (%)	275 (4.2)	602 (7.6)	46 (5.6)	214 (1.9)	1,137 (4.3)
Loss and damage, *n* (%)	44 (0.7)	89 (1.1)	5 (0.6)	22 (0.2)	160 (0.6)
Intended nationally determined contributions, *n* (%)	176 (2.7)	238 (3.0)	13 (1.6)	7 (0.1%)	434 (1.7)
National reviews, *n* (%)	11 (0.2)	444 (5.6)	44 (5.4)	859 (7.8)	1,358 (5.2)

[a]An article can contain more than one debate aspect.

When displaying all of these debate aspects as a time series (see Figure 6), we observe a peak in most of them during COP21 in Paris. One notable exception is the missing peak for common but differentiated responsibility for U.S. newspapers.

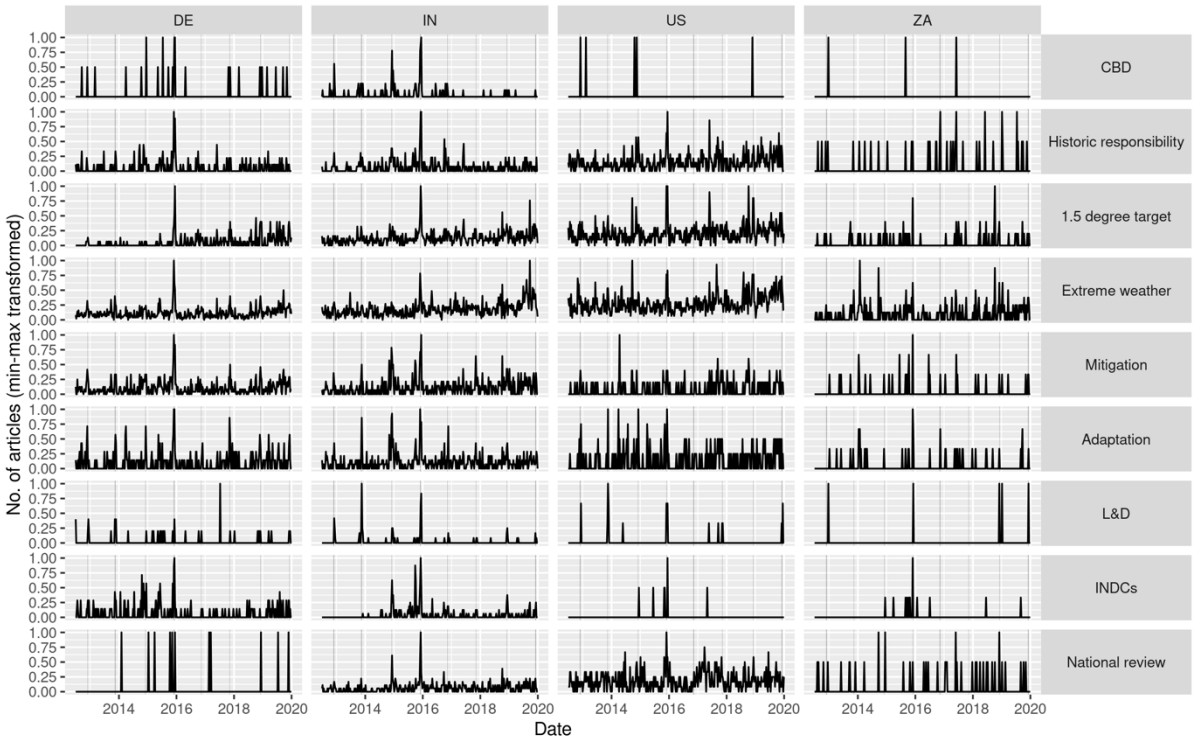

Figure 6. Time series of nine debate aspects by country. The y-axis is min-max transformed. Therefore, it has a range of 0 to 1, with 1 being the maximum value of that particular debate aspect in that country within the study period. CBD = common but differentiated; L&D = loss and damage; INDCs = intended nationally determined contributions.

Using the aforementioned method (Sigelman & Buell, 2004), we transformed these time series into one time series based on the issue convergence score (see Figure 7), which we used as the dependent variable for a dynamic regression analysis.

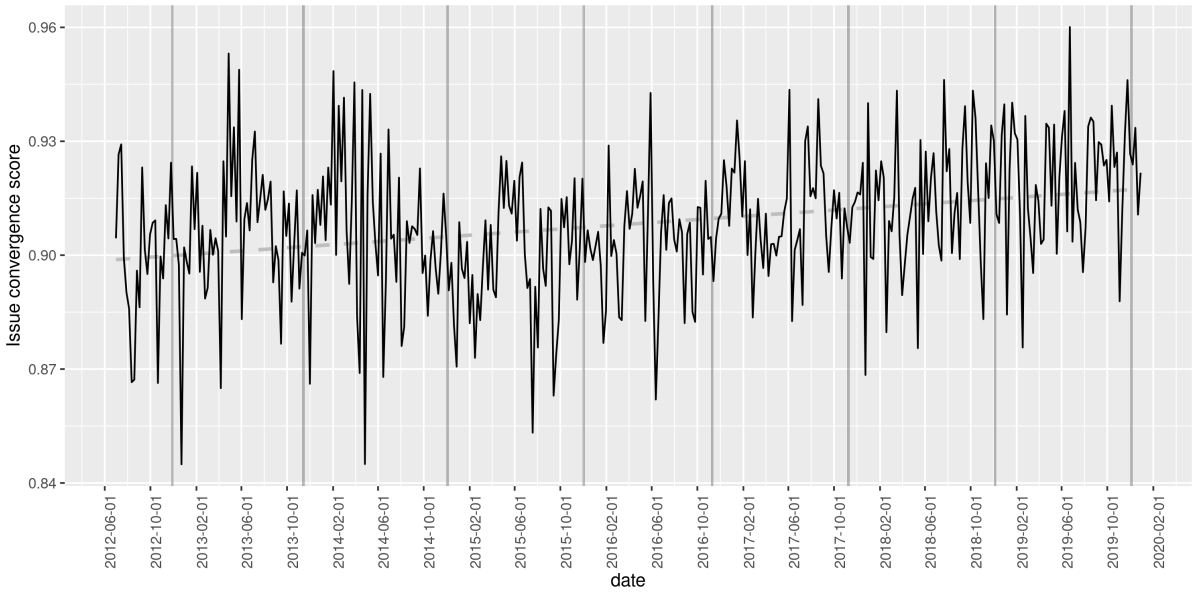

Figure 7. Time series of issue convergence score.

Our results (see Table 6) show that the annual COPs were not associated with a significant increase in issue convergence compared with all other weeks in our time frame. In other words, the annual COPs were not related to an increased similarity in the distribution of the observed debate elements across the four countries. Our independent variables COP (Paris) and FFF (sustained), however, were associated with a sustained increase in issue convergence, although only on a very moderate level: Issue convergence increased by half a percentage point post-Paris and by approximately one percentage point after the start of the Fridays for Future movement.

Table 6. Dynamic Regression Models (Transnational Convergence as the Dependent Variable).

Independent variable	Regression coefficient (*SE*)	*t*	*p*
Issue convergence score (ARIMA: 1,0,1)			
COP (annual)	0.000 (0.005)	−0.014	.989
COP (Paris)	0.005 (0.002)	2.484	.013*
FFF (sustained)	0.011 (0.003)	3.663	<.001***
FFF (event)	0.003 (0.005)	0.681	.496

Note. COP = UN climate change conference; FFF = Fridays for Future.

Discussion

We empirically tested the argument that recurring global staged political media events can have lasting discursive effects on national media debates that would see central characteristics of these debates converge and display increasing transnational interconnections. These discursive impulses could, over time, be conducive to the emergence of a more transnational mediated public sphere, one that is still

based on leading national media outlets, but marked by increasing similarities of topical focus, a convergence in debate elements, and increasing explicit references to other countries as actors in the global political arena. In this study, we analyzed two types of these staged political media events that address climate change: the top-down, elite-driven UN climate change conferences, and a grassroots social movement, Fridays for Future.

Based on our findings, we can draw an ambiguous picture that highlights the potential of the COPs to induce some limited aspects of transnationalization into national media debates but does not confirm the more optimistic expectations of their sustainable discursive effects. We can confirm that the COPs did lead to significant, although very short-lived, spikes in media coverage across the countries under study (corroborating similar findings by Daly et al., 2020; Schmidt et al., 2013). However, we focused our attention on more robust indicators such as horizontal transnational interconnectedness (i.e., an increase in both frequency and broadness of mentioned foreign countries) and transnational issue convergence (i.e., an increasing similarity in references to particular elements of the climate change debate). For both concepts, we found only very limited evidence for transnationalization trends.

As regards transnational interconnectedness, we found that climate change coverage by national newspapers remained strongly focused on domestic affairs. The amount of climate change coverage mentioning foreign countries was not related to the COPs in Germany and South Africa. In India, COPs were even associated with a significant decrease in the relative frequency of foreign country references. This effect can also be seen in our analysis on information entropy. During COPs, we observed a reduction in the diversity of countries mentioned in climate change coverage, probably because news coverage focused even more on "big players" in international politics than usual. This centralization of media coverage on core countries has been suggested in previous studies of global news flows (e.g., Kim & Barnett, 1996), as has the persistent hegemony of the United States (Segev, 2016). Our study identifies the potential for elite-driven political events such as the COPs to perpetuate—rather than break—these patterns of inequality in media coverage of climate change.

We can also conclude that the annual COPs do not foster transnational issue convergence. Although COP21 in Paris was associated with a peak in mentions of most of the debate elements across countries, this was not a general trend. Our dynamic regression analysis indicates that the annual COPs were not associated with convergence of issues across countries. Post-Paris climate change coverage showed more issue convergence than pre-Paris coverage, but this long-term trend was small and cannot be attributed to COP21 with certainty (see discussion below). These findings are in line with the assertion that the "world marketplace of ideas" (Guo & Vargo, 2017, p. 517) has become more competitive and less hierarchical. Our results also fit with our understanding of the domestication of global news that has been empirically demonstrated for issues like international terrorism (Gerhards & Schäfer, 2014) or violent conflicts (Baden & Tenenboim-Weinblatt, 2018).

As regards Fridays for Future, our findings show that it has a limited effect on transnationalization of climate debates. In one form or another, it was associated with a surge in media attention to climate change in all four countries. Comparing the timeframes before and after Greta Thunberg's first climate strike, we also found an association with issue convergence. But this could be an artifact from our

operationalization. Both the FFF (sustained) and the COP (Paris) time series would inevitably also capture an increase in media attention to climate change based on other events or developments in the periods after their respective pre/post points in time. It is therefore difficult to say whether Fridays for Future really caused sustained transnational issue convergence. One way to investigate this ambiguity is to look at the issue convergence score for only the topic of extreme weather. FFF (sustained) was associated with an increase in issue convergence of extreme weather references in all four countries, which strongly suggests a spurious correlation. It is much more plausible to attribute this convergence to actual extreme weather events as well as a host of other contextual factors (political, economic, journalistic, etc.). Then again, actors involved in the COPs and the Fridays for Future movement have been highlighting the severe consequences of climate change, so they might have contributed to this increased linkage between extreme weather and climate change. Disentangling the relative strength of these influences is beyond the scope of our study, but can provide a potentially worthwhile avenue for future research. Finally, we emphasize that the associations we observed in this study, like all other observational studies, do not imply causality.

Conclusion

Through a three-tiered empirical analysis, we found only weak evidence for transnational discursive media effects of the COPs on national media debates. Our findings tell a clear story that the effects of global staged political media events should not be overestimated. Events related to global governance not only have to compete with strong domestic factors (politics, economy, vulnerability to climate change) but also with myriad other events for attention and influence on how topics are framed and told to still mostly nationally based audiences.

One such competing strand of events, the Fridays for Future movement, does explain some degree of increased issue attention to climate change in all four countries, even though the influence of the recurring COPs on media attention in the short term is much greater. By contrast, the level of transnational interconnectedness cannot be explained by the existence of Fridays for Future or related events. Instead, COP21 was a catalyst for a moderate long-term increase in international connectedness in India and the United States, whereas the series of (mostly transitional) annual COPs actually tended to reduce the focus on foreign countries in climate change coverage. Finally, the existence of the new climate movement since August 2018 does correlate with a rather minimal increase in overall issue convergence (as did COP21). Generally, however, neither of the new developments in climate-friendly politics has led to sustained structural changes in the national press's climate coverage.

One possible limitation of our study could have had an influence on our findings. Interconnectedness and issue convergence might have been going on for decades, albeit slowly. For global climate politics, a transnationalization of media debates might go back to the first World Climate Conference in Geneva in 1979, if not further. It seems possible that we have encountered a kind of ceiling effect with our analysis. Our data do show that foreign country references are very common and debate elements also do appear regularly across all four countries. The possibility for further increases in issue convergence and interconnectedness might be somewhat restricted.

We also suspect deeper theoretical reasons for the relative failure of staged political events to trigger sustainable cross-border convergence in media debates. Although the COPs provide fertile ground for short-term, coordinated, institutionalized message production, they may occur too rarely and might not provide a sufficiently powerful, emotionally unifying narrative. For future research in this area, therefore, we advocate investigating the precise ingredients, and the necessary and sufficient conditions, of a sustained, connected, global media debate that we have started here. But we also advocate looking beyond issue aspects and arguments to study the possible convergence of narratives and images (cf. Wozniak, Lück, & Wessler, 2015) while employing longer time scales. It seems to us that a realistic global public sphere theory needs to broaden its research focus if it hopes to uncover the conditions under which global challenges such as climate change can be tackled communicatively with success.

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