Article

Ready for the World? Measuring the (Trans-)National Quality of Political Issue Publics on Twitter

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Abstract

This article presents a multi-method research design for measuring the (trans-)national quality of issue publics on Twitter. Online communication is widely perceived as having the potential to overcome nationally bound public spheres. Social media, in particular, are seen as platforms and drivers of transnational communication through which users can easily connect across borders. Transnational interactivity can be expected in particular for policy fields of global concern and elite or activist communication as practiced on Twitter. Nevertheless, there is still a lot of evidence for the enduring national structuration of political communication and publics as it results from a shared language (mostly), culturally defined media markets, established routines of social and political communication, and sociocultural stocks of knowledge. The study goes beyond measuring user interaction and also includes indicators of cross-referential cohesion. It applies a set of computational methods in network and discourse analysis and presents empirical evidence for Twitter communication on climate change being a prime issue of global concern and a globalized policy agenda. For empirical analysis, the study relies on a large Twitter dataset (N ≈ 6m tweets) with tweet messages and metadata collected between 2015 and 2018. Based on basic measurements such as geolocation and language use, the metrics allowed measurement of cross-national user interactions, user centrality in communicative networks, linking behaviour, and hashtag co-occurrences. The findings of the exploratory study suggest that a combined perspective on indicators of user interaction and cross-referential cohesion helps to develop a better and more nuanced understanding of online issue publics.

Keywords
climate change; cross-referential cohesion; issue publics; national structuration; network analysis; transnational communication; Twitter

Issue

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1. Introduction

Online communication and social media have undeniably extended the possibilities for every user to reach out to the world of other users in a shared communicative environment. This not only holds true for the so-called “producer” (Bruns, 2009) and his/her ability to realize one-to-many communication to large audiences bypassing the traditional gatekeepers of public communication (Shirky, 2008). Reaching out to the world is also meant in the literal sense; by reducing the role of media gatekeepers, the internet and social media are widely regarded as bearing the potential to overcome nationally bound publics co-constituted to a large extent by classical media institutions, and move them towards a new state of the “online networked public sphere” (Benkler, 2006). The fundamental technical architecture of the internet provides the technical connectivity for transnational public spheres to emerge beyond nation-states and national identities (Cairncross, 2001). In contrast, however, nationally structured public spheres seem to be quite persistent. As mass media research has already shown, me-
dia markets are embedded in systems of socio-cultural struc- 
turation, most often at a national scale (Straubhaar, 1991, 2010). In accordance with such research, non-
appropriate theories and studies on nationalism have em- 
phasized the role that mass media play in the soc- 
al construction of national identities (Anderson, 2006; 
Kielmansegg, 2003, 2013). Whether the structural trans-
formations of public spheres induced by the internet and 
social media are able to break up this co-fundational re-
lation is yet to be determined.

In this article, I seek to contribute to this fledgling field of research by providing an integrated set of indi-
cators for the empirical analysis of social media com-
munication. This should help to answer the question of how (trans-)national online issue publics are. How do 
(trans-)national flows of communication differ be-
tween policy fields and among national user communi-
ties? Going beyond measurements of user interaction 
as applied in Social Network Analysis the approach pre-

tented here is innovative in that it builds on a more so-


cially informed discourse theoretical perspective. Consequent-

ly, it includes a set of indicators for cross-

referential cohesion of online communication at differ-

ent dimensional levels. In order to test the measures 
introduced and to explore the (trans-)national quality of a prominent case, I apply the multi-method research 
design to the global Twitter debate on climate change (#ClimateChange).

The article contributes to the field of research on so-
cial media and political communication in several ways: 
First, it presents innovative empirical indicators for the 
(trans-)national quality of online communication. Second, 
it provides instructive insights for the case included. 
Third, it offers a set of methods for further application.

2. Transnational Twitterspheres versus Structural Nationalism

2.1. Transnationalisation of the Public Sphere

Where internet development in general and social me-
dia, in particular, are expected to induce structural trans-
formations of public spheres expectations of transna-
tionalisation are often included in this developmental 
story. Indeed, scholars of online communication and the 
“networked public sphere” have argued for an open-
ung of up of social communication across borders (Benkler, 
2006; Cairncross, 2001; Castells, 2008). Internet tech-
nology and social media would make social interaction 
less dependent on being at the same place (Giddens, 
1991) but would open up “electronic elsewheres” (Berry, 
Kim, & Spigel, 2010) as new places for social interac-
tion (Papacharissi, 2015). Moreover, structural changes 
induced by digitalization even affect the very concept of 
the public sphere with a network of public spheres and 
issue publics emerging instead of a single, widely shared 
public as constituted by traditional mass media (Bruns, 
2008, p. 69). Twitter plays an important part in this devel-
opment with hashtag functionality being crucial for the 
dynamic emergence of (ad hoc) issue publics (Bruns & 
Burgess, 2011).

An important field of scholarly research on transna-
tional public spheres has been focussed on European 
integration and so-called Europeanization (Risse, 2010, 
2015). A wide range of concepts, different operational-
isations, and methodologies were used. Communication 
flows were measured by network analysis (Bennett, Lang, 
& Segerberg, 2015) or claims analysis (Koopmans & 
Statham, 2010). Others turned towards discourse ana-

tical approaches (Kantner, 2015; for an overview, see 
Pfetsch & Heft, 2015). A number of works put a par-
focal particular focus on internet communication and social net-
works (Bennett et al., 2015; Koopmans & Zimmermann, 
2010; Ruiz-Soler, 2018). As to the fundamental ques-
tion of European public spheres, results diverge. If there 
is a common baseline, however, it is that transna-
tional publics cannot be expected to appear “above 
and beyond the various national or issue-specific pub-
lic spheres,” but rather through the “Europeanization of 
national and other public spheres” (Risse, 2015, p. 17). 
Given the persistence and prevalence of national publics, 
more nuanced approaches are required in order to re-
ev what may well turn out to be the gradual transna-
tionalisation of issue publics. Kantner’s theoretical con-
ception of “transnational discourse arenas” (Kantner, 
2015), meaning national public spheres that reflect dif-
derent degrees of transnational political communication, 
measurable by topical coherence, the timing of media 
reporting, and aligned framings, might be a helpful ori-
entation for a more nuanced approach. The combina-
tion of indicators in this article follows a kind of re-
versed logic, as network indicators might reveal a high de-
gree of transnational interactivity with remarkably lower 
topical coherence as measured by indicators of cross-
referential cohesion.

Not surprisingly, the issue of transnationalisation has 
also been intensely discussed in social movement re-
search where transnational movements had been in-
vestigated long before digital change became a phe-
nomenon and heavily affected mass communication 
(Della Porta & Tarrow, 2005; Tarrow, 2005). Activists can 
be seen as more adaptive for globalised communica-
tion environments and good test cases given their self-
interest in connecting transnationally to drive their agen-
das regarding global issues. New media, of course, have 
been embraced as potential drivers of the developments 
under study (Della Porta & Diani, 2011; Vicari, 2014). 
As Dahlgren (2013, p. 35) stated: “The web facilitates 
protest and solidarity on the global arena.” Recent empir-
ical works have studied the role of social media in general 
and Twitter in particular for inter- and transnational cli-
mate activism (e.g., Chen, Tu, & Zheng, 2017; Segerberg & 
Bennett, 2011; Stier, Schüneemann, & Steiger, 2018).

Empirical studies on transnational online communi-
cation of social movements, however, have presented a 
mixed picture. Focused on transnational protest move-
While they find average distance for pairs of interacting with up to 9 interactions per month, for users with a degree, geographical distance does indeed matter for user relationship intensity—with the 500 to 600 miles bearing the minimum for users who interact up to nine times per month, supporting a potentially higher relevance for nationality or national discourse community than for locality. In contrast, the increasing distances above this threshold point to the role of celebrities etc. for whom geography matters less (Leetaru et al., 2013, pp. 23–24). This again speaks for differentiated approaches of measurement as presented in this article.

3. Case Selection and Expectations

3.1. Case Selection

As a test case for the exploratory study, I selected the international Twitter debate on climate change represented by the hashtag #ClimateChange. Climate policy is a paradigmatic case of a globalized policy agenda, with climate change affecting people across the world and thus putting territorial political order and nation-bound approaches of political action under stress (Held, 1997, p. 258). Climate change has been the core concern of global environmental policy development for more than two decades since the famous Rio de Janeiro Earth Summit (United Nations Conference on Environment and Development) in 1992. Intergovernmental efforts including multiple stakeholders have been institutionalised at a high level with the United Nations Framework Convention on Climate Change (UNFCCC) established in Rio and the so-called Conference of Parties (COP) gathering all kinds of stakeholders from across the world for an annual flagship event. Three COPs are included in the dataset.

3.2. Expectations of International Variation

The transnational quality of Twitter communication shall be assessed by measuring the degrees of actual user interaction and cross-referential cohesion. Measurements of user interaction are actor-based. On Twitter, users can deliberately link to other users by @-mentioning them, thus including their Twitter handle preceded by the @ symbol. Moreover, they can refer to a particular post another user has made by retweeting it. As done in a lot of other Twitter studies, we take both actions as user interactions (Schünemann, Steiger, & Stier, 2015). In contrast, cross-referential cohesion is not based on user interactions but topical references. References can be made within the Twittersphere with the use of hashtags or other web content that is referred to using hyperlinks. Both kinds of references are indicators of how a message is embedded in wider networks of content and discourse. The variation between national user communities for both sets of indicators might be instructive for gaining a deeper understanding. From existing research and theoretical reflections, three tentative expectations can be derived for the exploratory study.

First of all, I expect Twitter communication on climate change to show a greater variation for indicators...
of cross-referential cohesion than on cross-national user interaction (Expectation 1). Users who interact cross-nationally on Twitter might still leave cultural imprints by the content that they share and the references they make, be it within the sphere of the platform (hashtags) or beyond (URLs). Moreover, countries represented in the dataset cannot be treated as equal. Previous works have shown that especially the size of a national community and whether it belongs to the Anglo-Saxon language sphere affect the likelihood of transnational interaction (Hale, 2012; Takhteyev et al., 2012, p. 75). Thus, cross-national user interaction is expected to be lower for English-speaking countries than for user communities with English as a foreign language (Expectation 2). In contrast, given their cultural proximity, cross-referential cohesion is expected to be higher for countries from the Anglo-Saxon sphere (Expectation 3).

4. Data and Geolocation

4.1. Data Collection

Twitter is a unique data source for interactional data of a large user community around the globe (Takhteyev et al., 2012, p. 73). Data access for researchers is still relatively easy and comprehensive. There are important downsides to using Twitter for social science research as well (boyd & Crawford, 2012; Jungherr, 2014; Ruths & Pfeffer, 2014), most importantly its elite bias as Twitter is certainly not the platform for the masses. However, it is relevant for political information and activism alike. It can hardly be ignored by actors of strategic communication. While elite actors active on Twitter can be regarded as informants for broader domestic publics in the sense of so-called two-step flow communication (Lazarsfeld, Berelson, & Gaudet, 1948), at the same time and in a reverse direction, they can be expected to leave their domestically formed discursive imprints on the global debate as well.

We used Twitter’s Streaming API (application programming interface) by applying the R package StreamR (Barberà, 2013) for automatic data collection. We streamed data for an extended research period of almost two and a half years between August 2015 and January 2018, acquiring about 10m tweets in total, from which around 6m tweets could be kept for the final dataset after data cleansing and geolocation of users.

4.2. Geolocation

The geolocation of users is an essential preparatory step for further analyses as any measurement of (trans-)national interaction or structuration of social communication requires that messages can be ascribed to a national origin. Precise geoinformation with coordinates is included in the metadata provided by Twitter only for a marginal share of tweets, namely for users who enabled geotagging in their user settings. In order to make assessments on the national background of users, I used the geographical index of the Data Science Toolkit (DSTK), a collection of open-source tools and open datasets provided by data scientist Pete Warden (2011). Geolocation, as applied for this article, takes self-reported user-location as input from the metadata obtained via the API. Previous research has shown that taking entries in the location field as input data for geocoding tools—geolocating users as opposed to their tweets—provided better coverage and accuracy (Leetaru, 2013, p. 14). Moreover, as critics might point to the lack of reliability of user-reported locations—the findings presented in empirical research support the assumption that a majority of users are truthful when filling in the location field (Leetaru, 2013, p. 17). The DSTK geocoder returned geolocation data for 59.2% of tweets collected. The subset of geolocated tweets remained comprehensive with around 6m tweets posted by roughly 1m users. I used the subset of accurately geolocated data (by geoencoding) as a reference for the evaluation of DSTK geolocation. Taking the ‘naturally’ georeferenced tweets as a “sensor-based gold standard” for assessing the quality of geocoding is a common evaluation practice in the field (Leetaru et al., 2013, p. 13). This way I measured an accuracy level of 81% of tweets for a comparison to other tools, see Takhteyev et al., 2012, p. 76).

Activity on Twitter is highly unequally distributed across the world with the platform being most heavily used in the US. This general observation for online communication has been well documented by previous research (Barnett & Park, 2014). It is illustrated by the World Map depicted in Figure 1. Most tweets were posted by US users with a share of 44.2%, followed by other Anglo-Saxon countries, ranging between 7.7% for Canada, and 10.3% for the UK. France, the host country of COP21 in December 2015, is the first continental European country in the ranking with 2.1%. I included the top 20 countries for the comparative analyses presented below. This meant a lower threshold for inclusion at 0.6% of all tweets sent as reached by Indonesia and Kenya.

4.3. Language Use

Language use is a fundamental aspect of connected communication across cultures and national communities as every social interaction relies on the peoples’ ability to understand each other, which in most cases means to share a common language (Takhteyev et al., 2012, p. 75; Taneja & Webster, 2016, p. 176). English has a special function in this regard as it serves as a global language (Crystal, 2012). Consequently, as previous works have shown, English is the dominant language in cross-nationally linked issue publics online (Hale, 2012). Other linguistic communities are more likely to be linked via English sites than bilaterally. Content that is provided in other languages than English will likely not be recognised by international audiences at all (Hale, 2012, p. 146). Nevertheless, previous work has shown for gen-
eral Twitter communication, that users tend to dominantly write tweets in their own languages (Leetaru et al., 2013, p. 11). This, however, is obviously not true for this English-language hashtag taken as query term for data collection. Against potential critique, it is important to note that the use of English for tweeting is nevertheless widely spread across linguistic communities across the world and thus not exclusive to Anglo-Saxon or Western countries (Leetaru et al., 2013, p. 11). Obviously, as Figure 2 illustrates, English is the all-dominant language in the dataset for this study as well. Data collection with the international English language hashtag #ClimateChange as a query term has, of course, introduced a strong bias to find English language communication. Thus, language cannot be taken as an indicator of discursive cohesion itself. The measured extent to

![Figure 1.](image1.png)

Figure 1. World map of Twitter activity for #ClimateChange between August 2015 and January 2018. Note: A detailed frequency table for all countries is provided in Supplementary File, appendix A. Source: Author, prepared with R worldmap.

![Figure 2.](image2.png)

Figure 2. Percentages of English language tweets by country. Notes: Only the 20 most frequent countries in the dataset were included. Values for the detected language of a tweet were directly taken from the metadata provided by Twitter. Source: Author, prepared with R ggplot2.
which English is dominant or—inversely put—the extent to which users also write in other languages might, how-
ever, give a rough comparative impression of linguistic
structuration. Unsurprisingly, Figure 2 shows higher per-
centages of English language tweets for countries with
English as the official language (all countries on the left-
hand side of the axis until Cameroon). Countries with
English only as a foreign language have lower values,
with the Romanic speaker communities of France and
Italy being at the bottom of the list.

5. Empirical Indicators

For the study of the transnational quality of issue publics
on Twitter, I propose a combination of indicators that are
grouped into network indicators (cross-national user in-
teraction and network centrality) and indicators of cross-
referential cohesion (hyperlink referentiality and has-
tag co-occurrences).

5.1. Network Indicators

5.1.1. Cross-National User Interaction

The analysis of user interaction is the most basic and
straightforward measurement of (trans-)national inter-
action among the methods applied. Twitter communica-
tion is taken as what it is, a network, with users acting as
nodes and retweets and @-mentions as links between
them. This operationalisation is well established in so-
cial science Twitter research (Ruiz-Soler, 2018). It is im-
portant to note that this is a lower-bound definition of
interaction. Twitter ties, in general, are relatively weak
(Takhteyev et al., 2012, p. 74). In contrast to network
analysis based on e-mail traffic (State et al., 2015) or
users who follow each other on Twitter (Takhteyev et al.,
2012), the links defined for this study do not require nor
express any pre-existing social ties of users. In correspon-
dence to the other indicators included, the links of the
network reflect an awareness of other users and/or ex-
posure to their content. The comparative indicator is the
percentage of outgoing cross-national linkages in a di-
rected network.

5.1.2. Network Centrality

Going beyond counting interactions, network analytical
measures can help to better understand the actor-based
structuration of an issue public based on actor centrality.
Which actors are central to a debate? Which are the
most influential, which are most listened to? The re-
results of Twitter network analysis do not only tell some-
thing about the Twittersphere. In fact, relational struc-
tures in a Twittersphere issue public already reflect dis-
cursive structuration beyond it. Many accounts, for in-
stance, that attract the most attention on Twitter (in-
degree centrality) only seldom write or reply to others
(outright centrality) as Ruiz-Soler (2018, p. 438) and
others have shown in previous research. Their relative
standing within the network is thus not derived from
their activity on the platform but from holding a promi-
nent speaker position in the general debate. For the pur-
poses of this article, this is best reflected by indegree
centrality. Indegrees were calculated for all nodes in the
global network and the national subgraphs. The resulting
frequency distributions were then correlated with each
other. I used Pearson’s R for calculating correlations with
every pair of values for the respective entries from the
global distribution and the distribution for the respec-
tive national cases having been taken into account (see
Leetar et al., 2013). This resulted in a list of 20 correla-
tion coefficients, one per country.

5.2. Indicators of Cross-Referential Cohesion

5.2.1. Hyperlink Referentiality

Hyperlinks are at the core of internet technology
(Benkler, 2006). Hyperlink analysis helps to better as-
se how users realize the potential interconnectedness
of internet technology in their actual communication.
Hyperlinks serve as a proxy to measure awareness of con-
tent across national or linguistic borders (Barnett, Chung,
& Park, 2011; Taneja & Webster, 2016). This understand-
ing of hyperlinks is well established in previous literature
on the blogosphere (Adamic & Glance, 2005; Hale, 2012)
and is transferable to social media (Jacobson, Myung, &
Johnson, 2016). As Leetar et al. (2013) have shown, a
considerable share of sent tweets globally contains hy-
perlinks (almost 16%, see Leetar et al., 2013, p. 26).
Given the fact that with URLs, Twitter users mostly re-
fer to other online content provided beyond Twitter, hy-
perlink analysis opens an analytical window to the wider
mediascapes that users populate. For hyperlink analysis,
link shorteners—as standard in Twitter communication—
needed to be re-translated for obtaining the actual
URLs—I used longURL for R (Rudis, 2016). URLs were
again shortened to domains in order to compare refer-
enced sources of content. From the resulting lists, domi-
nent content service providers such as Facebook, Google,
and of course Twitter itself have been removed before
comparative analysis. From that, I built frequency distri-
butions for the global dataset and for national subsets.
A high correlation—expressed with Pearson’s R—in do-
main referred to a single national user com-
community and the global distribution would thus indicate a
higher degree of cross-referential cohesion.

5.2.2. Hashtag Co-Occurrence

Hashtags have become a core element of Twitter us-
age. They are user-created metatags that serve as dy-
namic markers of issue publics themselves (Bruns &
Burgess, 2011). In practical use, hashtags are often ac-
companied by further hashtags that might relate sub-
discussions to a broader Twitter debate. This allows
the study of co-occurrences of hashtags. Hashtag co-occurrences have been used to analyse trends in Twitter debates (Steinskog, Therkelsen, & Gambäck, 2017). From a discourse theoretical perspective, they can be read as connectors between topically oriented discourses or as frame-bridging elements connecting different contexts of social sense-making regarding certain commented on events (Eriksson Krutrök & Lindgren, 2018). As Twitter communication cannot be conceived as separate from broader public debates, co-occurrences of hashtags might carry substantial information on the discursive structuration of those debates. For the analysis, I obtained hashtags co-occurring to the main hashtag that had been used as a query term. From that, I built frequency distributions for the global dataset and for national subsets with a high correlation between them indicating a higher extent of cross-referential cohesion per national user community.

6. Results

6.1. Network Indicators

Network indicators include the share of actual cross-national user interactions, thus retweets or @-mentions that referred to other users of a different national community, and the correlation of indegree distributions per country, equally based on retweets and @-mentions as links of the network. The values per country are depicted in Figure 3, sorted in descending order by indegree correlation. As the entire dataset reflects the prevalence of US users in Twitter communication so does the network built for this study. US accounts are by far the most frequently referred to. This, to a large extent, explains why cross-national links are a kind of standard for the observed communication ranging from 88.5% of all interactions for the UK to almost 100% for Cameroon with the obvious exception of the US itself with only 52.3% of interactions towards other national user communities. While this would typically underscore assumptions of cultural dependency, one should keep in mind the inequality of Twitter usage reflected in the dataset. If one, for a contrastive picture, disregards all links towards US users, data points for all other countries drop to values around the 50%-line. Both curves showing lower values for English-speaking countries with high Twitter populations (UK, Canada, and Australia) suggest that those countries are somewhat less connected to the cross-national debate than the other countries. This is most clearly illustrated by correlations of indegree. In clear contrast to the very basic statistics on language use, most of the countries with English as the official or major language (Bangladesh), with the notable exception of the UK, are now positioned on the right-hand side of the figure, thus with the lower values of correlation. On the other side, at the top of the list just behind the US itself, we find large user communities from non-English language countries such as Brazil, Germany, France, and Spain.

Table 1, in addition, allows for a cursory qualitative glance at what kinds of users are most central to the global network and to selected country subnetworks. I selected the cases to be included for the table according to their position in Figure 1 (thus correlation values for indegree distributions) with the US representing the dominant user community, Germany as the first European country in the list and Indonesia as the user community with the lowest correlation (respective lists for all 20 countries are provided in Supplementary File, Appendix B). The top 10 lists depicted are mainly

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**Figure 3.** Network indicators (share of cross-national links and indegree correlation) per country. Notes: Only the 20 most frequent countries in the dataset were included. Sorted in descending order by indegree correlation. Network analyses were exerted with igraph for R. N (tweets) = 6,041,024; N (users/nodes) = 1,197,515; N (edges) = 4,260,896. Source: Author, prepared with R igraph and ggplot2.

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composed of actors from US politics and administration, UN organisations, and programmes (like UNEP) and fora (COP23 for Germany), as well as other international organisations like the World Economic Forum, NGOs (especially Greenpeace), and some individual activists (Leonardo DiCaprio as a celebrity and climate activist). While one cannot read too much into this comparison of the top entries only, the top-10-lists include some interesting hints to international variation with the US and Germany having more entries in common with the global list, and there being slightly more international organisations and NGOs with higher ranks in the case of Germany, and especially Indonesia, than for the US.

6.2. Indicators of Cross-Referential Cohesion

As indicators of cross-referential cohesion, I propose web-based cross-referentiality represented in tweets as shared URLs and discursive linkages as seen in hashtag co-occurrences. Figure 4 integrates the two indicators into a comparative plot. The descendant order of the plot is according to shared URLs. Overall, correlation is highest for shared URLs with values ranging mostly between .59 for New Zealand and .93 for the US. Ireland constitutes a remarkable outlier though with only $r = .26$. Cross-referential cohesion measured by hashtag co-occurrences shows overall lesser correlations with a comparable variation, ranging from .55 in the case of Australia to .94 for the US. Here again, Ireland and New Zealand have much lower values (.34 and .33 respectively). Both countries need to be more deeply investigated in further research. Nevertheless, I leave them aside for the further discussion of results in this article as their highly divergent discursive patterns might be explained with a high degree of automated activity, professional propaganda or trolling. At least, qualitative insights obtained by the inspection of the top-50-lists of hashtag co-occurrences and shared URLs (as pro-

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**Table 1.** Top 10 users measured by indegree for the global network and selected country subgraphs.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Global</th>
<th>US</th>
<th>Germany</th>
<th>Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>leodicaprio</td>
<td>realdonaldtrump</td>
<td>unfccc</td>
<td>wscmedia</td>
</tr>
<tr>
<td>02</td>
<td>realdonaldtrump</td>
<td>leodicaprio</td>
<td>leodicaprio</td>
<td>examinercom</td>
</tr>
<tr>
<td>03</td>
<td>unfccc</td>
<td>badlandsnps</td>
<td>greenpeace</td>
<td>greenpeace</td>
</tr>
<tr>
<td>04</td>
<td>greenpeace</td>
<td>potus</td>
<td>wef</td>
<td>greenpeace</td>
</tr>
<tr>
<td>05</td>
<td>potus</td>
<td>biologistdan</td>
<td>realdonaldtrump</td>
<td>leodicaprio</td>
</tr>
<tr>
<td>06</td>
<td>badlandsnps</td>
<td>climatereality</td>
<td>unep</td>
<td>humanity4frica</td>
</tr>
<tr>
<td>07</td>
<td>wef</td>
<td>greenpeace</td>
<td>un</td>
<td>unicef</td>
</tr>
<tr>
<td>08</td>
<td>biologistdan</td>
<td>algore</td>
<td>climatereality</td>
<td>un</td>
</tr>
<tr>
<td>09</td>
<td>climatereality</td>
<td>unfccc</td>
<td>anttilip</td>
<td>who</td>
</tr>
<tr>
<td>10</td>
<td>unep</td>
<td>billnye</td>
<td>cop23</td>
<td>unep</td>
</tr>
</tbody>
</table>

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**Figure 4.** Indicators of cross-referential cohesion (correlations of hashtag co-occurrences, shared URLs) per country. Notes: Only the 20 most frequent countries in the dataset were included. Sorted in descending order by correlation of shared URLs. N (tweets) = 6,041,024; N (unique domains) = 37,271; N (co-occurring hashtags) = 291,053. Source: Author, prepared with R ggplot2.
vided in Supplementary File, Appendix C) lend support to this assumption.

Leaving the controversial cases aside, overall Figure 4 shows the highest correlations for a number of developed countries of the OECD world (plus Brazil) on the left-hand side of the plot. On the right-hand side, there are the newly industrialised and developing countries, except for Italy. This general trend line would not be completely but partly blurred when sorting by hashtag co-occurrences (e.g., for Cameroon). Australia is a remarkable case, coming from the opposite angle, as hashtag co-occurrences have the lowest correlation of all cases (except for the two outliers). The Australian user community stands out as a particular case and seems to be more independent from the global debate when measured based on a more discourse-oriented indicator.

The top 50 co-occurrences for the global debate and selected country cases are depicted in Figure 5. Besides the US, with Australia and Kenya, I selected two countries at the bottom end with regard to the correlation of co-occurring hashtags (the respective lists of top 50 co-occurring hashtags are provided in Supplementary File, Appendix D). The findings are illustrative for the cultural and political specificities of the Australian issue public and indicate a somewhat separate national issue public with a focus on Australian politics and administration (‘#auspol’), Australian activism (‘#stopadani’) or regional environmental risks (‘greatbarrierrreef’). Particular patterns of frame bridging as typical for the combined use of hashtags are also illustrated by the Kenyan case where besides regional references (‘#Africa’) and regional initiatives like ‘#weaare’ prominent references are made to the fight against hunger (‘#zerohunger’) and for food security (‘#foodsecurity’).

7. Discussion and Conclusions

The multi-method research design presented in this article allows the study of the (trans-)national quality of issue publics on Twitter regarding different dimensions. I proposed a separation into network indicators and indicators of cross-referential cohesion. As expected, variation is higher for the more discourse-oriented indicators (Expectation 1). Yet, this tendency is already visible in in-

Figure 5. Wordclouds of top 50 co-occurring hashtags for #Climate Change in the global Twittersphere and selected national user communities. Notes: N (global) = 291,053; N (US) = 178,060; N (Australia) = 46,148; N (Kenya) = 8,602. Source: Author, wordclouds prepared with R wordcloud.
degree centrality distribution. This underlines the dual character of Twitter links as both marked user interactions and discursive events. In support of Expectation 2, comparative observations of user interaction suggest an effect of language in the sense that communicating in the mother tongue allows for a somewhat higher separation of debates from the global stream of communication while cosmopolitan elites tweeting in English as a foreign language are more cross-nationally active. In contrast, when looking beyond user interactions and including user centrality, it seems that other factors such as regional or developmental status also affect the results. This, of course, makes much sense especially regarding the overall topic and policy field represented by this case study: climate policy. While this would be in line with previous research (Hale, 2012), it is important to keep in mind that at least the linguistic effects can partly be ascribed to the choice of hashtag with users from non-English speaking countries using the English hashtag decidedly for their international communication while tweets obtained based on the initial query for users from countries with English as the official language also reflect national debates. This fundamental divergence might also be part of the explanation for the differences observed for indegree distributions.

This bias should, however, produce lesser effects for the indicators of cross-referential cohesion as they should reveal traces of national structuration also for cosmopolitan elite communication. Thus, including shared URLs and hashtag co-occurrences as further indicators allows for more nuanced findings. In fact, in contradiction to Expectation 3, it seems that it is not cultural proximity in a linguistic sense that is having an integrating effect on the user communities of the Anglo-Saxon world. Instead, regional and developmental statuses seem to matter more when explaining variation, with Australian users serving as an illustrative case in this respect.

To conclude concerning the broader research question, whether Twitter allows for a transnational quality of issue publics, the findings presented above yield a mixed picture. They certainly do not suggest national encapsulation or isolation as the degree of cross-national user interaction is high. The US as the dominant and much more self-sufficient user community needs to be considered as a special case, of course. Otherwise, the more indicators reflect the structuration of discourses, the more they show variations that help to produce nuanced insights into the (trans-)national structuration of online issue publics.

However, to corroborate the preliminary findings presented so far and to find causal explanations, further research needs to be done, i.e., by including additional case studies and by inspecting the development of indicators over time. Moreover, the fluidity of hashtag use needs to be considered for data collection as well as the limitations of studying a single platform such as Twitter and the taking of only a single hashtag as query term for data collection. Despite those limitations, this article aimed to introduce a set of indicators into the methodology and to test it on a prominent case. Further applications should follow. As most of the indicators included can be adapted for use beyond the Twittersphere as well and further indicators—most importantly indicators for the measurement of discursive structuration (e.g., topic modelling)—can be added to the methodology, there is a lot of potential for more nuanced approaches to the measurement of (trans-)national structuration to thrive in future.

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Conflict of Interests

The author declares no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

References


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