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# **Hot Weather, Hot Topic. The Status of Sceptical Frames in the Climate Debate on Twitter**

Renée Moernaut<sup>a</sup>, Jelle Mast<sup>a\*</sup>, Martina Temmerman<sup>a</sup> and Marcel Broersma<sup>b</sup>

*<sup>a</sup> Brussels Institute for Journalism Studies, Department of Linguistic and Literary Studies, Vrije Universiteit Brussel, Brussels, Belgium;*

*<sup>b</sup>Centre for Journalism Studies, University of Groningen, Groningen, The Netherlands*

\*Correspondence details: Pleinlaan 11, 1050 Brussels, Belgium, [jelle.mast@vub.be](mailto:jelle.mast@vub.be)

Renée Moernaut is a postdoctoral member of the Brussels Institute for Journalism Studies at Vrije Universiteit Brussel (VUB) and the University of Gloucestershire Ecolinguistics Circle. Her main research interests include multimodal framing, environmental and climate change communication and journalism practice (especially the mainstream-alternative divide).

Jelle Mast is an Assistant Professor of journalism studies at the Vrije Universiteit Brussel (VUB), Belgium. He coordinates the Brussels Institute for Journalism Studies at VUB and also currently serves as the Chair of the Visual Communication Studies Division of the International Communication Association (ICA). His research is typically located at the intersection of visual communication, journalism practice and professional ethics.

Martina Temmerman is an Associate Professor at the Vrije Universiteit Brussel (VUB), Belgium. She is a member of the Brussels Institute for Journalism Studies at VUB. Besides, she is the programme director of the Masters in Journalism at the Department of Linguistics and Literary Studies (Applied Linguistics), where she teaches linguistic discourse analysis and journalistic writing classes. Her research focuses on the linguistic analysis of journalistic communication.

Marcel Broersma is Professor and Director of the Centre for Media and Journalism Studies at the University of Groningen. His research focuses on the current and historical transformation of journalism, and how journalists, politicians and citizens use social media in particular. He has published numerous articles in peer-reviewed journals, chapters, monographs, edited volumes and special journal issues on social media, transformations in journalism, journalism history and political communication.

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## **Hot Weather, Hot Topic. The Status of Sceptical Frames in the Climate Debate on Twitter**

Extreme weather events like the heat wave of 2018 reinforce public attention for climate change. Social media platforms facilitate, define and amplify debate about this topic. They give rise to counterpublic spaces through which counterpublics such as climate sceptics get a stage they would not easily get in mainstream media. Previous research suggests that sceptics use these spaces as safe havens, but also as bases for interventions in the hegemonic debate. Applying a multideterminant frame model, we analyse the Twitter debate among climate change ‘sceptics’ and ‘believers’. We study all tweets in which the heat wave was related to climate change, and were shared by Dutch and Flemish users between 28 July 2018 and 4 August 2018. Laying bare the worldviews underlying the frames of sceptics and non-sceptics, we first demonstrate the diversity of – unilaterally interacting – ideological interests. Building upon this analysis of the scope of the debate and analyzing its form, we show that both groups mostly use similar antagonistic strategies to delegitimize and denaturalize their out-groups. We argue that these interventions promote polarization rather than a constructive agonistic debate. As such, this study refutes previous studies that consider sceptic frames as deconstructive and non-sceptic frames as constructive.

Keywords: framing; climate change scepticism; Twitter; ideology; depoliticization; polarization

## Introduction

The summer of 2018 was exceptionally hot. Heat records were broken all over the world (KMI, 2018). ‘Climate change is well underway’, newspapers warned, and heat wave alarms and drought plans were issued. Belgium and the Netherlands, both among the most vulnerable regions in Europe in terms of climate-induced drought and flooding (IPCC, 2014), called upon their citizens to reduce water consumption. Belgian and Dutch citizens were faced with a potential climate future which had remained abstract before.

The extreme weather spurred debate on climate change in daily conversations, including those on social media like Twitter (Kirilenko&Stepchenkova, 2014). This article will explore how the debate between climate believers and sceptical counterpublics takes shape in this networked public sphere. Climate sceptics do not easily get a stage in legacy news media to voice their points of view (Author, 2018), mainly because they are denounced for stalling the debate with irrational claims (Kaiser, 2017; Lo, 2014). However, social media platforms provide them with opportunities to get involved in public debates about climate change. We particularly focus on whether the online debates on the heat wave and climate change in general induced a (more) constructive dialogue or tended towards polarization.

Social media are important spaces for information exchange, debate and opinion forming. As such, they lay bare spontaneous conversations which were hard to access before (Williams et al., 2015). Platforms allow minorities to create ‘counterpublic spaces’, as safe havens where they can freely speak out (Kaiser, 2017). Counterpublics, that challenge the hegemonic view, perceive themselves as being excluded from mainstream discussions. They are organized around morally or politically polarizing topics and tend to have their own media channels to intervene in the hegemonic debate (Dahlberg, 2007). Within the climate change context, sceptics are the major counterpublic. We understand climate scepticism as the questioning of the existence of climate change, its anthropogenic cause and dangerous impacts, and/or the scientific insights behind it (Kaiser&Rhomborg, 2016).

To reach a certain level of shared understanding about the urgency of an issue and agreement about possible solutions, sceptics and activists need to recognize their opponents’ views as conflicting yet valid – ideologically inspired – perspectives (Lo, 2014). However, research suggests that (online) debate on climate change is polarized, with both parties refuting their opponents’ views as illegitimate or unnatural (Williams et al., 2015). So far, several framing studies have dealt with climate scepticism (e.g. Antilla, 2005; Kaiser&Rhomborg, 2016). However, little attention has been paid to the ideological grounds for reasoning and framing devices applied in sceptical framing (Entman, 1999; Van Gorp,

2006). The aim of this study is to situate sceptical framing in a larger framework that understands climate (sub)frames as embedded in the reproduction of environmental ideologies, and the power relationships that are entailed. We will build on an earlier study on climate framing in Flanders that showed that sceptical (sub)frames were almost absent in legacy media. However, this study did demonstrate that more open and ‘horizontal’ alternatives – i.e. alternative journalism – facilitate different ideologically coloured subframes (Author, 2018). We ask if the same goes for Twitter; an equally open and horizontal platform in which, contrary to for example Facebook and Instagram, reciprocity is not necessary to follow or to be followed, and debate can thus take place with users of all political leanings.

Based on previous research, we expected a ‘heated’ debate among climate believers and sceptics on Twitter during the heat wave of 2018, stirred up by media reports linking the extreme weather to climate change (cf. Kirilenko&Stepchenkova, 2014). To analyse this debate we gathered all tweets by Dutch and Flemish users between 28 July 2018 and 4 August 2018 that made a connection between the extreme weather and climate change. Applying a qualitative framing analysis, this study discusses the various ideologically coloured subframes in these tweets. Moreover, it demonstrates how a framing approach can help to evaluate the (ant-)agonistic character of the debate. Drawing on a multideterminant frame model, we discuss the Twitter debate among climate sceptics and believers in terms of scope (ideological interests), form (politicizing character of interactions) and technology (affordances of Twitter in relation to scope and form) (Maesele&Raijmaekers, 2017; Porter&Hellsten, 2014).

## **Literature Review**

### ***Social Media and Public Debate***

Online and social media have been ascribed a variety of democratizing functions through which they complement the traditional public sphere (Dahlberg, 2001). As an always-on awareness system, Twitter allows ordinary users to gather, verify or deny, report, frame and distribute information from a variety of sources, blending facts, opinions, emotions and experiences. First, technical features like ‘commenting’ or ‘retweeting’ allow citizens to participate, creating content as ‘producers’ or filtering the news as ‘secondary gatekeepers’ (Hermida, 2017). This makes it easier for counter-hegemonic views to be legitimated (van Zoonen, Vis & Mihelj, 2011). Secondly, online media may facilitate more inclusive interactions across cultural, geographical or social boundaries, bringing about more diversified public spheres (Takahashi et al., 2015). Thirdly, technology-enabled personal

networks, content sharing and deliberation may give rise to citizen engagement and organized political action (Bennett & Segerberg, 2013).

Social media platforms can thus facilitate a more interaction-oriented, open and horizontal discussion than the closed, one-directional and hierarchical debate legacy media afford (Dahlberg, 2001). Yet, while it may be easier to get a voice on social media, not all voices are necessarily heard. Social media platforms, e.g. trending topics, reproduce inequalities: traditional gatekeepers such as legacy media or political parties and web-savvy, highly engaged users with extensive networks of followers, remain the dominant opinion leaders. Moreover, platforms shape users' relational activities, for instance by being organized in 'hashtag communities' (Hemphill et al., 2013). This clustering of like-minded people may prevent fundamental debates among perspectives, fostering polarization (van Zoonen, Vis & Mihelj, 2011). Social media can, for instance, give rise to filter bubbles and echo chambers, although there is less evidence that citizens get completely disconnected from opinions they do not agree with or only have a limited information pallet: 'we cluster, but we do not segregate' (Bruns, 2019, p. 96).

On social media platforms research also found 'mixed-attitude communities'. In these open forums 'cross-constituency discussions and exchanges of ideas can take place'. It is argued that the 'reduced likelihood of polarized views [in] these communities is indicative of a moderating effect of such interactions' (Williams et al., 2015, p. 135). However, climate sceptics are more likely to employ these open fora for antagonistic, rather than for agonistic interventions (Mouffe, 2005), 'mak[ing] greater efforts to influence the debate towards their own view and appear[ing] more confrontational or aggressive towards users who express conflicting views' (Williams et al., 2015:136). Sceptics often use sarcasm and incivility to reframe the hegemonic debate, simultaneously attacking the out-group and building rapport with their in-group (Anderson & Huntington, 2017).

Drawing on Mouffe (2005), Maesele & Raeijmaekers (2017) developed a framework of de-/politicization. They distinguish between scope and form as levels of antagonistic and agonistic contestations. A debate is closed in scope if it excludes all voices and perspectives except for certain privileged ones. It is closed in form if it uses discursive strategies that delegitimize all other voices and preferences as irrational, immoral or unnatural. A debate that is open in scope exposes certain actors or preferences as privileged and introduces alternative views. It is open in form if it uses discursive strategies for constructing valid contestation, either in moral or rational terms (cultivation) or in politico-ideological terms (politicization).

### ***Framing in the climate change debate***

In this paper we will supplement an analysis of the scope and form of the climate change debate on Twitter with a framing analysis. Frames are immanent structuring ideas which give coherence and meaning to texts: framing involves selecting, omitting, expanding and giving salience to certain aspects of a perceived reality, providing context and an argumentative structure. It facilitates the processing of new information by evoking (mental) structures (Entman, 1999; Van Gorp, 2006).

A ‘frame package’ usually comprises a central organizing idea, reasoning devices (problem definition, causal responsibility, treatment recommendation and moral evaluation) and framing devices (e.g. depictions of participants and (inter)actions). While frames help to naturalize ideologies, one ideology never equals one frame, or vice versa (Van Gorp, 2006). We distinguish between three framing levels: (1) Masterframes are structured collectives of arguments, ideas, language and images about how the world is and should be like, reflecting ideological values; (2) Frames structure particular topics of concern, like economics or safety. They constitute a rather stable group, which may reappear across various political debates; (3) Subframes are ideologically coloured realizations of frames.

A number of framing studies deal with climate change and climate scepticism specifically and came to diverging conclusions. Antilla (2005) found four climate science frames in US newspapers and concluded that sceptics got ample attention. In contrast, O’Neill et al. (2015) found ten frames in coverage of climate science reports on legacy and social media, with the frame that accepts climate change and quashed uncertainty or scepticism most dominant on Twitter. Kaiser and Rhomberg (2016) found that about 15 percent of German news articles on the 17<sup>th</sup> UN Climate Change conference contained climate sceptical frames, focusing on challenging climate change as such and science in particular. Adding to this body of work, Author (2018) studied climate change in Flemish news media and introduced a multilevel climate frame set. Two masterframes were found. First, an anthropocentric masterframe which sees humans and nature as clearly separate, draws on values like human domination, utilitarianism, (economic) growth, competition and ingenuity, and tends to be depoliticizing. Second, a biocentric masterframe which sees humans as part of nature, emphasizes values like equality, mutual dependence, respect and sufficiency, and tends to be politicizing.

While these previous studies only paid attention to news media and the scope of reporting, and not so much to form, we focus here on Twitter and complement our analysis with the multideterminant frame model of Porter & Hellsten (2014). This model incorporates

three elements for assessing the transformative potential of social media. First, sociopolitical contexts – especially existing hegemonic struggles – enable or disable interactions online, while online communication may also affect broader contexts (social determination). Secondly, social media platforms may be used as instruments for various purposes, e.g. informing, denouncing realities and promoting alternatives, building understanding (instrumental determination). Thirdly, various media platforms have varying technological affordances/limitations, which may affect where, how and with what goals actors (may) communicate or what frames they convey (technological determination).

Porter and Hellsten's model is reinterpreted in terms of the (de-)politicization framework of Maesele & Raeijmaekers (2017). This adds the role of technology, which may facilitate or prevent open or rather closed scope and form. We therefore included the functions of various Twitter conventions in our analysis (Kirilenko & Stepchenkova, 2014). First, hashtags cluster tweets around particular issues, structuring awareness streams and shaping 'hashtag communities'. Hemphill et al. (2013) demonstrate, for instance, that Democrats and Republicans use different 'framing hashtags' to discuss the same issue, but also apply similar generic 'non-framing hashtags'. Second, addressivity markers (boyd et al., 2010) are often used to start conversations or shape conversational flows. Mentions and replies, for example, are intended to attract the attention of specific users and engage them in conversations. Addressivity markers such as retweets help to 'crowdsource' certain contents, and confirm or contest certain tweets or actors. Users are more likely to retweet others whose views they share, emphasizing group identity (Williams et al., 2015). A more oblique 'mention' is often used to introduce a conflicting view. Being reframed negatively, the latter may still confirm in-group membership (Hermida, 2017).

Drawing on this multideterminant framing approach we ask:

RQ1. Is the Twitter debate on climate change open or closed in scope?

In order to answer this question, we analyse the quantity and content of sceptical and non-sceptical climate subframes in our corpus and examine how Twitter conventions (retweeting, hashtags, addressivity markers) contribute to the scope of the debate.

RQ2. Is the form of the debate open or closed?



In order to answer this question, we analyse how the discursive strategies used in the interaction of (sub)frames affect the relations among and within ideological communities, and how Twitter conventions afford these strategies.

## **Methods**

### ***Sample***

We selected 28 July 2018 to 4 August 2018 as the period for analysis because Belgium and the Netherlands then experienced a heat wave (KMI, 2018). To gather tweets we used Sifter<sup>1</sup> that retrieves access to every undeleted tweet in the history of Twitter. To retrieve the vast majority of the tweets by Dutch-speaking users in Belgium (Flanders) and the Netherlands, we searched for the keywords ‘opwarming van de aarde’, ‘#opwarmingvandeaaarde’, ‘(#)klimaatopwarming’, ‘(#)klimaatsopwarming’ (global warming), ‘(#)broeikaseffect’ (greenhouse effect), ‘(#)klimaatverandering’, and ‘(#)klimaatsverandering’ (climate change). To keep the corpus manageable, we limited the sample to a week’s worth of tweets. These 4.919 tweets were automatically loaded into the online tool Discovertext. To assure that tweets were related to the heat wave, we then used a word cloud explorer tool to identify the most frequently used words (implicitly) connected to the heat period (such as ‘heat’, ‘drought’ or ‘hot’) and narrowed our sample down to tweets containing these words. The resulting sample was validated manually (tweets: N=1.298; users: N=1.062) and automatically deduplicated (n=465).

### ***Approach***

Reinterpreting the model of Porter & Hellsten (2014) and integrating it with the (de-)politicization framework of Maesele & Raeijmaekers (2017), this study applies a multideterminant frame approach to study the form and scope of online debate. Scope refers to how in- or exclusive debates are in terms of sociopolitical perspectives that are included. Form refers to positioning strategies for convincing audiences of the validity of certain claims, de-/legitimization strategies that enforce grounds on which certain claims or actions are perceived (un-)justified, and de-/naturalization strategies that deal with the existence of a debate concerning a particular issue (Maesele & Raeijmaekers, 2017).

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<sup>1</sup> As of 30 September 2018 the services and website of Sifter, powered by Twitter-owned social data provider Gnip, have been decommissioned.

**[Figure 1 about here]**

In a first stage of analysis, we quantitatively coded the deduplicated dataset (n=465) deductively based on our earlier code book for framing research into legacy media coverage of climate change (Author, 2018). In Figure 1 we summarize our climate change frame set containing five frames – Cycles of Nature, Human Rights, Environmental Justice, Economic Challenge and Inscrutable are the Ways of Nature – and ten subframes. Rights-of-the-Superior-Species, a subframe of Human Rights, was added to the conceptual model based on our exploration of the Twitter data. Together with Rights-of-the-Free-Market and Natural Machine, this newly identified subframe constitutes the ‘sceptical’ view. These anthropocentric subframes question climate change. They draw on a status-quo ideology that does not, or hardly, question unlimited growth and is highly suspicious of interventions by (political) elites.

The other seven subframes support the belief in human-induced climate change. Four of them are anthropocentric (Scala Naturae, Consumer Rights, Unequal Vulnerability, and Human Wealth), while three of them are biocentric (Natural Web, Civil Rights, Unequal Attribution). The anthropocentric ‘believers’ envision government-led reform within the contours of the capitalist society. The biocentric ‘believers’ denounce the current capitalist system and strive for far-reaching transformation (Hopwood, Mellor & O’Brien, 2005).

Next, a subsample of the dataset was further qualitatively analyzed in NVivo. First, all tweets which had previously been coded as ‘sceptical’ (n=95/465) were inductively analyzed by means of an in-depth, qualitative framing analysis, informed by our earlier findings (2018) and the literature. This analysis was inspired by grounded theory as applied by Van Gorp (2006) and drew on the framing analysis toolkit elaborated in Author (2020). While the 280-character limit may not allow for elaborate argumentation, it at the same time makes tweet messages – combining text, hashtags, addressivity markers and/or images – particularly conducive to the expressive and manifest communication of a (sub)frame’s central organizing idea. Subsequently, the sceptical tweets were deductively coded so as to complete the first stage of the quantitative analysis.

The first author coded all tweets for the presence of the 10 subframes (mutually exclusively). An intercoder reliability test was performed on a random sample of ten per cent of the deduplicated dataset (n=50). The reliability score for the average pairwise Cohen’s

kappa was 0.849, and 0.85 for Krippendorff's Alpha. These are high intercoder reliability scores (Krippendorff, 2004).

In a second stage, we exported all coded tweets, clustered per (sub)frame, to SPSS and coded them for the following variables: subframe, number of retweets, hashtags, on-and offline authority of user, connection to in- or out-group and related subframes, link to external source, name of source and related subframe. The evaluation of authority of users on Twitter was based on the influence score provided by DiscoverText that uses follower-following ratio. Users with a score of five or higher were considered authoritative. Offline authority was based on an assessment of the names, functions and institutional roles of users.

In a final step, we selected tweets which were explicitly connected by addressivity markers to tweets of their out-group or their in-group *and* those referring to external sources through hyperlinks (n=329/465). Using NVivo, we analyzed the form of debates according to the discursive strategies of Maesele and Raeijmaekers (2017): positioning, de-/legitimization and de-/naturalization. We further distinguished between ethos, pathos and logos as subcategories of de-/legitimization (cf. Auger, 2014), and coded for strategies of incivility and sarcasm (Anderson and Huntington, 2017).

## **Findings**

### ***Scope***

#### ***Subframes***

In order to shed light on the inclusiveness of the Twitter discourse on the 2018 heat wave, we first look into the range of perspectives – conceptualized here as ‘ideologically coloured subframes’ – that emerge. From graph 1, showing the number of tweets that contain each subframe, it becomes clear that the non-sceptical (or reform) anthropocentric subframes ‘Scala Naturae’ (n=463) and ‘Consumer Rights’ (n=437), and the sceptical (or status-quo) ‘Natural Machine’ subframe (n=293) dominate the debate.

The prevalence of the former two is consonant with the patterns found in our previous research on news discourse (Author, 2018; cf. Figure 1). ‘Scala Naturae’ argues that vulnerable nature is the victim of human activity while humans should protect it. ‘Consumer Rights’ emphasizes that humans are jeopardizing their own species, and that all action should be aimed at protecting human health, safety and well-being. To a lesser yet still notable extent adding to the non-sceptical perspective on Twitter, is ‘Human Wealth’ (n=62). This

‘Economic Challenge’ subframe points out that human-induced climate change causes economic, technological and/or cultural losses, and that human action is needed and may stir development and prosperity.

**[Graph 1 about here]**

The absence of Environmental Justice frames (‘Unequal Vulnerability/Attribution’) – the second-best represented category in news discourse – is noticeable. Probably, this can be explained by our focus on the heat wave. While this was a global phenomenon, most discussions were directly related to the daily experiences of users, rather than to less tangible structural changes. This might also explain the small group of biocentric subframes (n=16, including ‘Natural Web’, ‘Civil Rights’, ‘Unequal Attribution’), which build on broader developments too. The limited length of tweets (280 characters) is not conducive for contextualization either.

Turning to the sceptics (n=320), the relative dominance of the subframe ‘Natural Machine’ suggests that debate on Twitter is more open in scope than in legacy media. Indeed, sceptical discourses such as the ‘Rights-of-the-Free-Market’ and ‘Natural Machine’ subframes are more present on Twitter which allows and urges a more profound understanding of their defining features and ideological backbone(s). Moreover, we identified an additional perspective, ‘The Rights-of-the-Superior-Species’ (cf. Figure 1, for a schematic overview, and Appendix A, for frame matrices of the sceptical subframes).

The most prolific sceptical view, ‘Natural Machine’, is a subframe of ‘Inscrutable are the Ways of Nature’. It contends that climate change is mainly due to natural processes such as naturally produced greenhouse gases, but the perfectly designed natural machine can regulate and mitigate these changes. Hence, claims that humans can grasp, let alone manipulate, the workings of nature (for the better or the worse) are problematic. Next, ‘Rights-of-the-Free-Market’, a subframe of ‘Economic Challenge’, blames (political) elites for threatening economic liberties and prosperity through climate policies. These pressures need to be lifted to allow consumers and producers to prosper, taking advantage of resources which nature offers.

Finally, ‘The Rights-of-the-Superior-Species’ is a subframe of ‘Human Rights’. It implies that, while humans are well-aware of (potentially human-induced) climatic changes, they are preoccupied with potential problems. Being too strongly focused on ways to mitigate or adapt to environmental changes, they run the risk of denying the benefits these cause for

their wellbeing and comfort. Changes in nature happen largely for the sake of the ‘higher living beings’, mainly humans. Hence, we must embrace them.

While these descriptions convey the ideological character of these subframes, there is nothing in the argumentations as such that makes them either open (agonistic) or closed (antagonistic). We will show below how discursive strategies may give these problem definitions, causal responsibilities and treatment recommendations a de-/politicizing character. Before doing so, however, we analyse how the affordances of Twitter impact to the *scope* of the debate. These findings, combined with the frame analysis, provide a fruitful basis for the subsequent, in-depth analysis of the *form* of the Twitter discourse.

### *Retweets and Users*

The 320 sceptical subframes were (re)tweeted by 282 different users and the 978 non-sceptical subframes by 791 users. Most users thus only tweet once or twice; the most active user, a believer, posted 16 tweets. This suggests that the tweets represent broadly shared views, rather than the perspectives of an active minority. Moreover, the sample contained only 465 original tweets (35.8%), while 833 were retweets (64.2%). This means that although the debate is not confined to a minority group of prolific users, differences in the nature of participation do exist. The larger group of users in our sample joins the debate by aiding the visibility of a particular view through retweets, validating users and their subframes without commenting (and thus potentially reframing).

### **[Table 1 about here]**

To get a deeper understanding of how the sizeable amount of (near-)identical retweets affects the presence and prominence of subframes, we studied the distribution of original tweets and retweets per subframe. Table 1 shows for each subframe the total number of original tweets, grouped and ordered by the number of times they were retweeted. The top three subframes are similar to the top-3 original tweets: Scale Naturae (n=209), Consumer Rights (n=121), and Natural Machine (n=72). However, the relative proportions differ. Focusing on the two leading non-sceptical subframes, Scala Naturae and Consumer Rights, the former is almost twice as often expressed through an original tweet, while they are more or less equally prominent in the overall sample (n=463 versus n=437, see Graph 1). Consumer Rights’ visibility, then, to a larger extent depends on (near-)identical retweets. The same goes for the dominant sceptical subframe Natural Machine: only one out of four tweets (72/293) is

original. Table 1 also demonstrates that these discrepancies are not just a matter of Consumer Rights and Natural Machine tweets being more likely to be retweeted (one out of three tweets, versus one out of four for Scala Naturae) but, importantly, that a number of highly prolific individual tweets belong to these frames.

Most tweets – nearly three out of four (338/465) – are not retweeted. If messages do, this usually happens no more than five times. The three dominant subframes are somewhat more likely to be retweeted by larger groups of users, however, with ‘top’ retweet scores of 78 (‘Consumer Rights’), 58 (‘Natural Machine’), and 42 (‘Scala Naturae’). As argued, retweets at least partly account for the prevalence of these subframes (cf. Graph 1). Obviously, visible tweets/subframes are also more likely to be (further) retweeted.

Linking retweets to the ‘authoritative’ status of the authors of the original tweets (n=465), we find, as expected, that users who are considered authoritative sources – such as weather(women), scientists, legacy media – are more likely to be retweeted and, overall, by more users (see Table 2). Authoritative users usually confirm the hegemonic view on climate change. This may help to explain a large part of the retweets of the non-sceptical (reform) subframes. For example, the top retweeted message, belonging to Consumer Rights, originated from an authoritative source. The sceptical ‘Natural Machine’ subframe was exclusively (re)tweeted by non-authoritative users. Yet, the ‘retweet patterns’ are similar to those of the most prevalent non-sceptical subframes, and in fact this is the subframe with the highest percentage of retweeted messages (33,3%), including in the ‘top’ category of 50-100 retweets. This suggests that users in this smaller counterpublic space are actively retweeting other – less visible – members with similar views in an attempt to crowdsource them to prominence (Kirilenko & Stepchenkova, 2014).

## **[Table 2 about here]**

In our analysis of hashtags and addressivity markers below, we will focus on the three sceptical subframes (n=95) and the (three) most prevalent non-sceptical subframes (n=358).

### *Hashtags*

Three hashtags – ‘#climatechange’ (n=118), ‘#heatwave’ (n=48) and ‘#drought’ (n=31) – can regularly be found (together). These are ‘non-framing hashtags’ (Hemphill et al., 2013) and deal with climate change issue in general. Clustering views and voices, these give rise to

inclusive ‘hashtag communities’. For instance, the first example uses the hashtags with Consumer Rights; the second one employs them with Rights-of-the-Free-Market.

“How often did I wish that Amsterdam would lie 1000 km to the South with a Mediterranean climate (...). Be careful what you wish for I guess #heatwave #drought #climatechange #sealevel #oops” [1]<sup>2</sup>

“Wait for it, next week the message will break that bread also becomes more expensive because of climbing wheat prices due to #drought and #climatechange” [2]

However, many of the other hashtags only appear once or twice in the sample (e.g. ‘#WinterIsComing’, ‘#summer2018’). Also, a large number of tweets from both groups has no hashtags (n=193), excluding a considerable part of the users from hashtag communities.

#### *Addressivity markers*

If they use any addressivity markers, believers tend to talk with like-minded users (n=187) (Williams et al., 2015). In the following example [3], a user retweets and responds to a tweet of a Dutch weatherman:

July the most sunny month of July since 1904 and the driest month of July since 1921.  
@GerritHiemstra what does this #recorddry and #recordsunny mean then for the coming years?

Gerrit Hiemstra 🐱 @GerritHiemstra

We’ve had a historic month of July: #recorddry, #recordsunny and very warm (3th since 1901). Given the #climatechange this month gives us a glance of the future.

<https://www.knmi.nl/nederland-nu/klimatologie/maand-en-seizoensoverzichten/2018/juli>

Both comment and retweet employ Scala Naturae Subframes, with the comment paraphrasing the original tweet.

Non-sceptical and sceptical tweets are not regularly linked through addressivity markers, largely preventing interactions (n=22). Rather than speaking with the sceptical out-

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<sup>2</sup> All examples are translated from Dutch. Original phrasing of the tweets can be found in Appendix B.

group, believers mainly speak ‘about’ them within their in-group – if they are mentioned (i.e. recognized) at all. For instance [4]:

How can you still deny?

Authoritative username @ [authoritative username]

Climate change. Here and now.<https://twitter.com/CNN/status/1023708524268924928> ...

Some interaction is going on, nuancing the idea of echo chambers. However, this is mostly initiated by sceptics looking for debate (Kaiser & Rhomberg, 2016). The following reply has, for instance, the quoted tweet of the weatherman above as starting point [5]:

The weatherman is mixing up weather and climate again. Is he climate man?

Replying to @ [username]

weather-records are also an indication of climate change.

Overall, the sceptical counterpublic tends to talk with or at least to their out-group (n=48/95), attempting to draw attention through addressivity markers. As suggested, this is not always successful. At least, sceptical users seem most keen to contribute to ‘mixed-attitude communities’ (Williams et al., 2015).

Irrespective of the subframes they are promoting, sceptics commonly interact with users that emphasize *Scala Naturae* (n=43). Retweeting the same tweet of the weatherman, for instance, the following user responds with *Rights-of-the-Free-Market*:

Climate hysteria alert! Everyone must turn to water pumps, windmills, solar panels and isolation! And the beggar’s staff! #Heatwave [6].

While *Scala Naturae* is dominant in the hegemonic Twitter space the counterpublic wants to challenge, it also deals with the most fundamental issues of climate change. Clearly, climate change/science is still the main object of dispute; if one rejects this, one logically also dismisses all natural, human *and* economic consequences foregrounded in other (sub)frames.

Believers (n=135/358) *and* sceptics (n=31/95) interact with legacy media, as one group of ‘authoritative users’. Users who do not simply retweet messages, but comment on them, or include hyperlinks to news articles in their tweets, may either reinforce, question or reframe the original message (Kaiser & Rhomberg, 2016). A small group of Dutch and Flemish media outlets (both public broadcasters, the main Dutch commercial television news



and popular newspaper, the main Flemish broadsheet), which tend to emphasize the consensus (believer) view on climate change, are regularly referred to. News media and blogs with an outspoken progressive signature (e.g., Dutch weekly *De Groene Amsterdammer*, a website centered around sustainable development, *Duurzaam Nieuws*, or a scientifically inspired climate blog, *Klimaatverandering*) are also retweeted or mentioned by non-sceptics. Sceptics often refer to *Klimaatgek.nl*, a Dutch climate-sceptical blog. While non-sceptical users mainly interact with news that confirms their own views, sceptical users interact with a broader spectrum of sources, either seeking confirmation of their beliefs, or juxtaposing their frames with incompatible views in order to challenge or reframe them, as we will see below.

### ***Form***

Whereas the first part of the analysis concerned the inclusiveness of the debate in terms of the *range* of ideological positions that emerged, we now turn to the question *how* these actors and their viewpoints were represented. In order to do so, we further examine the subset of tweets containing addressivity markers and hyperlinks, by ascertaining the discursive ‘form’ strategies that underlie the specific use of these conversational tools. As such, we will elaborate how discursive practices affect the interaction between ‘believers’ and ‘sceptics’, and open or close the Twitter debate, through strategies of positioning, de-/legitimization and de-/naturalization (Maesele & Raeijmaekers, 2017).

### ***Positioning***

First, positioning is a more indirect way of shaping public debate, asserting a preferred view regarding a particular issue by invoking a meaningful context (Maesele & Raeijmaekers, 2017). Applied to this study, both believers and sceptics draw strongly on ‘objective’ contexts – scientific evidence, historical facts – to foreground only one claim as valid. Positioning is thus used for the purpose of closing the debate (i.e. depoliticization).

Believers relate the exceptional heat to recurrent instances of extreme weather phenomena as proof of an ongoing – human-induced – process, or a foreshadowing of the future. Sceptics also accept the heat as factual. Yet, they situate it within a broader historical context to contend that it does not differ from similar events in the past, or – more broadly – that it is simply the expression of a variable natural climate system or unpredictable weather. This tweet from a sceptic denounces quite explicitly argumentations that seek proof for climate change in the heat wave:

@GerritHiemstra Was the hot summer of '47 also related to the 'climate change', then?  
[7]

Interestingly, the heat wave triggers a minority among the believers to raise a similar issue in the in-group and stress the importance of valid contextualization. It is argued, then, that denouncing sceptics for providing invalid proof but equally failing to objectively support one's own claims threatens to undermine the credibility of the in-group as a whole:

Question: if we laugh with American senators who 'prove' with a snow ball in the hand that climate change doesn't exist, then pointing at an individual summer is equally nonsensical, isn't it? #d(are)t(o)a(sk) #climatechange [8]

### *De-/legitimization*

Second, de-/legitimization entails reaffirming or redrawing boundaries between justified and unjustified claims or actions, whether on rational, moral or politico-ideological grounds. This more direct discursive practice of opening or closing the debate can be usefully explained through the rhetorical categories of logos, pathos, and ethos (cf. Auger, 2004).

**Logos.** In line with objectifying their position, both groups tend to delegitimize the other's arguments as illogical or unreasonable, contrasting them with their own 'reasonable, factual and neutral' views. However, particularly sceptics engage actively in this type of discourse whereas believers rather employ strategies of ethos and pathos.

Indeed, explicit in-group legitimization is especially apparent in sceptical tweets, which regularly use typical conventions of a rather scientific – and thus neutral – style: quotes of authoritative sources, numbers, graphs, jargon, nominalizations and passivizations, conjunctions and adverbs suggesting a logical (often causal) relation among statements, and other devices which evoke a strong (scientific) truth modality (Halliday, 2000). For example:

This is an overview of #climatechange in the past 450.000 years. Three recent peer-reviewed studies have been used. Current temperature is NOT exceptional nor extreme for an interglacial period. (...) #fact (...) [9]

The original message, which contains a scientific graph, is retweeted. The hashtag explicates the presumed factuality of the statement.

Such rationalizations are not very common in non-sceptical tweets, except for those which deal with consequences and solutions. Presumably, non-sceptics consider the rational character of climate science as given – which is disputed by sceptics – whereas the status of various interpretations regarding impacts and treatments is less obvious (Kaiser, 2017).

Similarly, believers hardly comment on the arguments – let alone the underlying values – of sceptics, who, on their part, have a greater interest in counter-acting the dominant view (Kaiser, 2017). Accordingly, sceptics are more vocal, delegitimizing the argumentations of their out-group. This often happens very explicitly, with the consensus subframes being identified as ‘hoax’, ‘fake (news)’, ‘nonsense’ or ‘fairytale’. These terms suggest irrationality, allowing sceptics to dismiss climate science without even commenting on the underlying findings or argumentations (Woods, Fernández & Coen, 2010). However, some of these terms – especially ‘hoax’ and ‘fake news’ – also suggest immorality, that is intentional manipulation or deception for the good of the (elite) villains. Similarly, prevalent verbal processes (Halliday, 2000), laying bare the contradictions in the out-group’s statements, imply that the out-group claims are unsubstantiated. The doubt is regularly enhanced through offensive interrogative sentences, directed toward specific users via mentions and replies, or functioning as rhetorical questions.

While these observations indicate attempts at closing the debate (i.e. depoliticization), there is some room, though, for the construction of valid contestation in moral or rational terms, or so-called ‘cultivation’ (Maesele & Raeijmackers, 2017). That is, some users are willing to take the statements of their out-groups into consideration. They employ hedging strategies (‘indeed, but...’) to weigh various perspectives as – potentially – equally rational arguments. Some sceptics, for instance, emphasize the general idea of ‘climatic change’ as common ground, while some non-sceptics respond to the rather provocative statements and questions from their out-group to demonstrate how they are actually not contradicting their own rational views.

***Ethos.*** As argued above, both groups draw on ‘authoritative’ external sources (institutions, experts, legacy media) to legitimate their subframes, often by including addressivity markers and hyperlinks. The credibility of those sources is largely taken for granted. Legitimacy or expertise are only explicitly constructed through the introduction of well-known names (‘KNMI’) or role labels (e.g. ‘scientists’). Rather, the emphasis lies on strategies which foreground the untrustworthiness of the out-group.

Sceptics, in particular, employ name-calling, mockery and direct attacks, regularly

crafting ‘creative names’ for addressing or mentioning specific weather(wo)men, suggesting that the latter lack expertise to make claims. Example [11] uses a derogatory name as hashtag. The underlying reproach is explicated by means of a parody on the weather forecast, addressing a Dutch weatherman:

Climate. Weather. It remains difficult. What about tomorrow’s climate, Gerrit?  
#ConfusedClimateMan [10]

Similar accusations are conveyed through explicit attacks, or incivility. In addition, religious terminology is common – evoking an underlying opposition between religion and science, or irrationality and rationality (Woods, Fernández & Coen, 2010). For instance, by using the metaphor ‘weather prophet’, sceptics denounce the immorality of the out-group, whose opportunist actions damage their (financial) interests. Such accusations of opportunism are also phrased in terms of government propaganda and manipulation.

Non-sceptics, then, are less likely to turn to ad hominem attacks, but may ridicule the out-group as a whole, employing derogatory terms like ‘climate denier’ and ‘nitwit’ to emphasize their irrationality. Clearly, climate scepticism is considered a matter of narrowmindedness, or unwillingness or inability to understand, as becomes clear from the prevalent use of mental verbs like ‘realize’ and ‘deny’.

***Pathos.*** To convince others of the irrationality and immorality of certain perspectives, both groups, and sceptics in particular, draw on irony and sarcasm to evoke emotional responses. The subframes of the out-group are foregrounded, only to criticize – and thus delegitimize – them:

No not today. The greenhouse effect has been countered effectively today because the drought is over. That’s it. Proven. [11]

It’s quite a thing... Drama for the Netherlands! The #heatwave RECORD hasn’t been broken. Oh how unfortunate. There goes the global warming and everything that goes with it. It’s sad, people. All drama for nothing. [12]

Both examples parody typical arguments. The former tweet, from a believer, exaggerates oversimplification (lack of rational argumentations) associated with scepticism, drawing on a

marked use of punctuation. The latter, employing melodramatic language, intensifiers and captions, magnifies a sense of alarmism which sceptics tend to denounce their out-group for (Kaiser & Rhomberg, 2016).

Both groups also use explicit contradictions, sometimes combining those with humour. Drawing on the (perceived) incongruity between ‘objective’ facts and the statements or behaviour of the out-group, such sarcastic phrasing present the other as nonsensical.

The deniers of climate change are mumbling all day long, puffing and sweating, ‘it isn’t hot, it isn’t hot, it isn’t hot’ etc. etc. etc. [13]

Hilarious @Greenpeace uses the current heatwave to point to #climatechange. The previous 24 since 1901 apparently were merely a question of nice weather [14]

The repetition in the first example, reinforcing the underlying idea that the claims of the sceptical out-group are unsubstantiated, is a sarcasm marker. The laughter expression ‘hilarious’ and the signal word ‘apparently’ in the second example, posted by a sceptic, have a similar function. Other features which are commonly used to signal sarcasm include emoticons, hashtags (e.g. #not), rhetorical questions and signal words like ‘yeah right’ or ‘of course’. Sceptics are more likely to highlight their sarcastic tweets using these tools, while non-sceptics generally give their arguments a ‘neutral’ guise.

### *De-/naturalization*

Finally, both groups also use naturalizing strategies to emphasize social consensus and dismiss the existence of alternatives, and hence debate. The explicit identification as ‘fact’ of either the presence or the absence of human-induced climate change is common. So are existential or relational processes (‘to be’, ‘it/this is’) which present views as facts, and other devices which evoke strong (empirical) truth or dynamic modality (Halliday, 2000):

(...) climate change is an established fact. Heatwaves already appear more often and will further increase in frequency without a different economic system [15]

Nevertheless it was much warmer than now before the last ice age (...). ““Climate”” always fluctuates. The Netherlands are now briefly in a ““hot”” year. Or a warmer period. Temporarily! [16]

The first example presents a certain solution as inevitable, while the second one repeatedly foregrounds climate variability as natural. Accordingly, both groups express impatience with those ‘who refuse to accept the facts’, for instance through the use of a hashtag like ‘#aretherestilldeniers’, or by foregrounding the in-group perspective as common sense:

No @NUnl, drought (...) has nothing to do with climate change (...) [17]

## **Conclusions**

Drawing on a multideterminant frame model for analyzing the scope and form of the Twitter climate change debate triggered by the 2018 heat wave, this study demonstrates the usefulness of an integrative approach. This allows for a nuanced assessment of the potential of digital ‘counterpublic spaces’ and ‘mixed-attitude communities’ to open up public conversation and foster a constructive dialogue. It does so by considering technological affordances alongside a comprehensive understanding of the broader ideological positions informing the viewpoints of ‘believers’ and ‘sceptics’, and the discursive strategies articulated through Twitter discourse. Yielding both quantitative results and thick qualitative findings, our analysis provides both empirical and conceptual contributions to scholarly work at the intersection of (climate change) framing, pluralism and (de-)politicization, and social media.

Shifting focus from mainstream news to the more open, bottom-up and horizontal communicative structure of social media allowed for developing a more profound understanding of the subframes that constitute climate scepticism. These share with those of climate believers a meaningful connection to particular, structuring topics of concern (e.g., the natural system, human well-being, the economy) as well as to a larger environmental ideology, in this case anthropocentrism (as distinguished from biocentrism). The distinct presence of climate scepticism online, amounting to about a quarter of all tweets in the studied period, contrasts with its near absence in news discourse, and seems to corroborate the idea of social media platforms, like Twitter, operating as a ‘safe haven’ for viewpoints that are marginalized in the mainstream. This is also suggested by the observation that the amplifying effect of identical retweets was particularly evident with sceptics, who while being outnumbered by believers, most actively invested in ‘crowdsourcing’ their view into prominence.

While the online co-existence of believers and sceptics found in this study points at some measure of diversity in terms of viewpoints, the use of Twitter conventions such as retweets, hashtags and addressivity markers nuances the scope of the interactions taking place. Identical retweets make up two-thirds of the total sample, hashtags are often absent and those potentially facilitating inclusive ‘mixed-attitude’ communities occur in less than half of original tweets. Moreover, believers in particular tend to address like-minded users when employing addressivity markers. Authoritative actors with elite status in the offline world, such as scientists or weather(wo)men, remain particularly influential in shaping the online debate because they are twice as likely to be retweeted compared to ‘ordinary’ users. Also, there is a considerable presence of external references to authoritative institutions, mostly legacy media. This all points towards rather unilateral interaction.

Furthermore, by taking a fine-grained approach to the additional dimension of discursive form, we lay bare that if relational practices do occur, these tend to be antagonistic, being primarily aimed at delegitimizing and denaturalizing the out-group. As such, these interventions promote polarization rather than a constructive agonistic debate, based on the recognition of each community’s ideological interests. Although interactions largely originate from sceptics, we have shown that the discursive strategies used by sceptics and believers are similar, being largely aimed at closing the debate. Having a greater interest in challenging hegemonic views, sceptics are more likely to operationalize them in salient ways, though. Interestingly, the specificities of the social media context allow for diverse and highly expressive strategies – emoticons, hashtags summarizing views (e.g. #not), targeted address or mockery – that are less likely to be found in legacy media or other contexts.

These findings refute the broadly shared conclusion, also in the academic literature, that sceptical frames are often deconstructive, while non-sceptical frames are constructive, or even neutral. In this regard, Lo (2014, p.560) argues, that ‘[o]utright dismissal [of the sceptical view] is possible on scientific grounds, but would not ease the tension if these beliefs are premised upon defensible cultural, ideological, or ethical considerations.’ In fact, our analysis of the subframes reveals that both groups, drawing on anthropocentric values, in fact share an underlying concern for the right to develop or to live in dignity. Moreover, our findings confirm previous research that filter bubbles and echo chambers are less prevalent on social media than is often assumed in public debate (Bruns, 2019).

Clearly, this study has limitations that could be addressed in future research. Deductive framing analyses would allow to analyse larger, synchronic or diachronic, samples, while network analyses would shed more light on the interactions among users. Also, studying sceptical subframes on other platforms could allow for broader insights into climate frame and public debate.

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