Is Twitter in a climate emergency? The dissemination of the terms "climate crisis" and "climate emergency," and Greta Thunberg's influence on public discourse

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Abstract

As of 2018 the message that urgent measures must be implemented to avoid planetary collapse owes much to the youth climate movement, led by, among others, activist Greta Thunberg. The main aim of this research is to explore the level of penetration of the urgency discourse, necessary to determine future communication strategies. Our methodological proposal is to measure the presence of the terms "climate crisis" and "climate emergency," in the Twitter conversation, as indicative of the degree of penetration of the discourse on urgency, as opposed to the term "climate change," which we associate to a discourse prevalent before the events of 2018, as well as to assess Thunberg's influence on the dissemination of said terms in the (digital) public sphere. The period under discussion covers 36 days, including the 2019 United Nations Climate Change Conference held in Madrid (Spain), from which we collected tweets (n=3,324,580) and analyzed the volume of the terms "climate change," "climate crisis," and "climate emergency." We conclude that discourse on the climate urgency is relevant on Twitter and that Thunberg could have played a major role in the increasing use of "climate crisis" over "climate change," though not so for "climate emergency."

Keywords: Environmental communication, science and media, public engagement with science and technology, climate change, public discourse.

Introduction

The years 2018-2019 have been crucial in the field of climate change communication (Bevan et al., 2020; Ebrey et al., 2020). In 2018 the publication of a new report by the IPCC, the addition of major countries to the list of signatories to the declaration of a climate emergency and the organization of multiple international youth protests placed this problem at the forefront of media attention. This was not just a mere resurgence in issue salience, but rather implied a novel approach, a new kind of discourse.

Bevan et al. (2020) identified five narrative strategies that focus, to some extent, on the idea of urgency in the context of climate change: "The need for greater urgency in dealing with climate change seems increasingly well established (…) not from governments, but from emergent social movements frustrated at official inaction" (p. 11). Urgency discourse, to be clear, existed before that moment. For example, Risbey (2008, p. 34) had announced the emergence of alarming discourse while Plagia (2018) analyzed the discourse of "global climate crisis" prior to the 2009 COP 15 conference in Copenhagen from climate

scientists and social actors who both appropriated and mediated scientific data as well as knowledge. However, we might argue that this urgency discourse was not so relevant in the public sphere as compared to 2018-2019.

A specific language for transmitting urgency has been identified by looking at terms like "climate crisis" and "climate emergency." Specifically, youth strikes and youth activist Greta Thunberg have been found to increase usage of urgent climate language much more significantly than any other climate-related issues or events (Ebrey et al., 2020). A discourse bent on urgency is an evident call to imminent action against climate change. Thus, the potential effects of urgency discourse on citizens and politicians are of interest because they can imply the implementation of policies (Fesenfeld & Rinscheid, 2021). The aim of this article is to provide some enhanced knowledge of the degree of penetration of urgency discourse in society as well as of the role that Greta Thunberg might have played in fostering said discourse.

Our methodological proposal is to measure the presence on Twitter of the terms "climate crisis" and "climate emergency" as indicative of the degree of penetration of the discourse on urgency, as opposed to the term "climate change," which we associate to a discourse prevalent before the events of 2018.

Another study over the course of our research demonstrated that, in 4 years' time (from 2015 to 2019), expressions such as "climate crisis" and "climate emergency" went from near-non-existence to figure among the most prominent terms in media communication in the context of Spain (anon.). With this in mind, our hypothesis is that this urgency discourse has also expanded, not only on Twitter, but globally.

The climate emergency

Looking at the history of environmental discourse on climate one can notice a considerable evolution. Thus, for example, after being coined by geochemist Wallace Broecker in a Science article in 1975, in the 1980s and 1990s "global warming" entered the public sphere (Ungar, 1992). NASA scientist James E. Hansen's testimony[1] before the US Congress is credited with the rise in popularity of the term (Conway, 2008). Media usually referred to "global warming" indistinctly to discuss manifold related issues such as the so-called greenhouse effect, rising global average temperatures and sea levels (Wigley, 1999). However, "climate change" points not only to a rise in temperatures, but also to further more complex issues related to climate (Whitmarsh, 2009; Shi et al., 2020) and, in general, to science and research in that field (Lineman et al., 2015; Shi et al., 2020). In fact, as early as 1988 the Intergovernmental Panel on Climate Change (IPCC) had already been formed. That might explain why "global warming" was replaced by "climate change," a phrase which gained traction in the 2000s (Lineman et al., 2015), eventually becoming one of the most frequently used expressions in the English language (Global Language Monitor[2], 2009). Despite their extended use, neither "global warming" nor "climate change" convey the imminent threat the Earth is facing (Ungar, 2000; 2003).

In 2008 David Spratt and Philip Sutton's *Climate Code Red: The Case for Emergency Action* insisted on the need to act rapidly and to use all the means at our disposal. The authors propose a plan for a large-scale transition to a post-carbon economy and society. These ideas have been widely accepted by

[1] U.S. Senate, Committee on Energy and Natural Resources, "Greenhouse Effect and Global Climate Change, part 2," 100th Cong., 1st sess., 23 June 1988, 44.

[2] Global Language Monitor (GLM) is a company that collectively documents, analyses, and tracks trends in language usage worldwide, with special emphasis on the English language.

environmentalists and climate activists alike. In fact, this book is believed to have laid the kernel for the Climate Emergency Declaration (CED).

Since the Paris Accord of 2015, focus on man-made climate change effects has shifted to the urgent measures that should be implemented. In 2016, a group of Australian scientists, politicians, businessmen and environmentalists launched the first Climate Emergency Declaration (CED) petition, calling on the Australian Parliament to declare a climate emergency and to mobilize resources to restore a safe climate. This was the kernel of a transnational awareness movement that today counts with the commitment of thousands of local, regional and state administrations, including larger organizations.

"We have only 12 years left." Originating in the Special Report on Global Warming of 1.5°C (IPCC, 2018) this motto has arguably introduced new voices and a new discourse on climate in the public sphere (Hulme, 2019; Bevan et al., 2020). After the IPCC 2018 report, the journal *BioScience* published a Special Editorial, backed by over 11,000 scientists from 153 countries, stating: "We live in the time of Global Climate Emergency. What we need now above all is to immediately begin to think and ACT as if it is a real EMERGENCY" (Gills & Morgan, 2019, p. 14). *Nature* also published a visual take on the climate emergency via mathematics: If reaction time is longer than the intervention time left ($\tau / T > 1$), we have lost control. The corresponding authors for the article conclude that "the evidence from tipping points alone suggests that we are in a state of planetary emergency: both the risk and urgency of the situation are acute" (Lenton et al., 2019, p. 595).

This discourse of urgency, together with the expressions "climate crisis" and "climate emergency," subsequently started appearing in the media (Parks, 2020). The presence of such discourse has been analyzed especially in the United Kingdom, where a series of urgency narratives converged following the mass protests organized by Extinction Rebellion ("The collapse is imminent" narrative) and by the youth movement for climate ("You're destroying our future" narrative), the Parliament's ratification of the Declaration of Climate Emergency ("Climate emergency" narrative), and the publication of the IPCC report itself ("12 years to save the world" narrative) (Bevan et al., 2020).

In that context, British news media *The Guardian* was actually the first to state that it would favor the term "climate crisis or emergency" rather than "climate change" (Carrington, 2019). The European Union Parliament declared the "climate emergency" on 28 November of the same year and, at the end of 2019, Oxford Dictionaries announced that "climate emergency" was the Oxford Word of the Year.

If we attend to discursive associations with terms such as "global warming" and "climate change" in previous studies (Lineman et al., 2015; Shi et al., 2020; Whitmarsh, 2009) and we add to those the two novel terms "climate crisis" and "climate emergency," we can tentatively establish three kinds of discourse on climate:

- A discourse associated with "global warming" and "greenhouse effect," which focuses on rising temperatures.
- A discourse associated with "climate change," consisting of the latest developments in climate science as well as political and social debate aspects.
- A discourse of urgency, to a large extent an activist discourse, linked to "climate crisis" and "climate emergency."

Greta Thunberg

The message that urgent measures must be implemented to avoid planetary collapse is permeating society as a whole thanks, to a large extent, to the youth climate movement led by, among others, Greta Thunberg (Thackeray et al., 2020). Greta Thunberg's school strike movement and further advocacy activities have gained purchase for worse-case scenario narratives that "trigger fresh news attention and social media discussion" (Nisbet, 2019). Even if there were prior social movements, celebrity activists and NGOs raising awareness of climate change and its impact worldwide, mass action for climate by non-experts in the field owes much to Thunberg. As several studies have noted (Vavilov, 2019; Martínez García, 2020; Skilbeck, 2020), her skillful deployment of rhetorical strategies has made an impact in the public sphere, most notably on social media, where she is most vocal and garners both supporters and detractors alike. Among other strategies emphatic repetition is salient, lending force to her message, accompanying scientific data and statistics with a discourse reliant on strong emotions and using digital affordances such as RT, tagging and so on to her advantage (Martínez García, 2020). This strategic use of rhetoric to persuade the public of climate-related issues is not new, but builds on a tradition of former environmental activist movements (Cox, 2013). This time, however, it is emphatically led by youth whose rhetorical approach, though criticized by some scholars for its limitations (Evensen, 2019), seems to have inspired many others across the globe to follow suit, both in actual striking and in the language employed (Feldman, 2019). In this regard, further work conducted in the US concludes that familiarity of those interviewed with Greta Thunberg is indeed a predictor of climate activism (Sabherwal et al., 2021).

Greta Thunberg first came to prominence on 20 August 2018. Then fifteen-year-old Thunberg decided not to attend school, but to strike in front of the Swedish Parliament, thus starting the first-ever school strike for climate and laying the kernel for what would become a major social movement not only locally or nationally, but globally. Thousands of schoolchildren soon followed her example, demonstrating in cities all around the world under the banner "Fridays for Future." Thunberg's name and face, in turn, became the icon of this youth-led climate movement (Belam, 2019).

Thunberg has also become a public figure thanks to her no-nonsense approach to public speaking on the subject of the "climate crisis," her term of choice since, as she has repeatedly asserted, "We cannot solve a crisis without treating it as a crisis" (Thunberg, 2019a, p. 16). From late 2018 and until the 2019 Climate Summit Greta Thunberg participated in major international venues such as the United Nations Climate Change Conference in Katowice (Poland), the World Economic Forum in Davos (Switzerland), the UN Climate Action Summit in New York City (USA) and COP25 in Madrid (Spain). In the meantime, she was even named TIME Person of the Year.

Thunberg's discourse, both off and online, is heavily imbued with strong emotions (Martínez García, 2020). Attention has been paid to the discourse she employs in her public speeches (Holmberg and Alvinius, 2020; Vavilov, 2019; Murray, 2020; Sjögren, 2020), and to her rise in popularity thanks to social media (Jung et al., 2020). But studies have so far failed to show to what extent her discourse may have contributed to shaping the current prevalence of referring to climate as an "emergency" and a "crisis" over mere "change" in the public sphere. For instance, Bevan et al. (2020) have observed her prominent role in the rise of an "emergency" frame when discussing climate, but they study the UK in isolation and no quantitative study is

presented. A focus on Twitter, the platform that has arguably lent both her and the movement for climate the most visibility, might help explain this significant shift in public discourse at a global scale.

Twitter

Twitter has been shown to be a perfect medium to potentially organize collective action (Segerberg and Bennett, 2011; Gerbaudo, 2012). The first time Greta Thunberg alerted the world to her strike was via Twitter, thereby setting in motion a process that grew exponentially over the next months (Olesen, 2020). Linking sentiment analysis with Thunberg's role, the sole query keyword "Greta Thunberg" generated 44% of positive tweets, 37% neutral, and 19% negative (Jung et al., 2020).

In our case, Twitter serves as an indicator of the presence of different expressions on the question of climate, which point to the existence of diverging discourses. Radical shift in public discourse following the IPCC Special Report in October 2018, has been explored, looking at Twitter for evidence, to address its appearance in the discourse of UK Members of the Parliament. Research found an increased political discourse on climate change, and an increasing use of "urgent" climate language (Ebrey et al., 2020).

Of note for the present study is the monitorization of key events for the emergence of discourse on climate change, such as the climate summits (Dirikx & Gelders, 2010). Prior studies show there exist connections between certain events and climate change awareness. Some extreme weather events can thus yield an "increase in average tweet sentiment affirming climate change," whereas this does not hold for other types of events (Koenecke & Feliu-Fabà, 2019). Leas et al. (2016) and Dahal et al. (2019) found a link between events and increased engagement via Twitter. For the first, the event chosen was Leonardo DiCaprio's speech on climate change at the 2016 Oscars award ceremony. The latter found that "spikes in tweet volume coincide with the US declaration of intent to withdraw from the Paris Climate Accords on June 1, 2017, Hurricane Irma's formation early September 2017, and a divisive tweet posted by US President Trump on the subject of global warming on December 28, 2017" (Dahal et al., 2019, p. 11). These studies, though interesting, fail to address global connections. On the other hand, we know from previous research that interactions on Twitter show strong affinity between polarized activist vs skeptic groups, with users often segregated in like-minded communities or "echo chambers" (Williams et al., 2015). Political polarization has similarly proven to be on the rise (Gruzd & Roy, 2014; Jang & Hart, 2015). However, no study has thus far captured what the climate movement may be achieving, at least discursively.

Overall, very few comparative analyses of the diverse range of terms to refer to climate applying analysis to Twitter messages can be found. Lineman et al. (2015) revealed that the expression "climate change" was perceived as being more positive than "global warming." In another study, Shi et al. (2020) demonstrated that the use of different terms is linked to different perceptions of climate phenomena associated with climate change. In a longitudinal study of tweets from 2009 to 2018, they found that the term "global warming" triggered more political responses, while "climate change" was linked to a more scientific perspective. In addition, this study shows that "climate change" has become more dominant than "global warming" in public discussions. However, no studies on such novel terminology as "climate emergency" and "climate crisis" have been published until now. Our present study intends precisely to address that.

Research questions

The general objective of this research is to explore to what extent novel terms "climate crisis" and "climate emergency" are relevant in the Twitter conversation, as well as to assess the potential influence of Greta Thunberg's discourse on the dissemination of said terms.

Q1. To what extent are the terms "climate emergency" and "climate crisis," as opposed to "climate change," prevalent in the conversation on Twitter?

Q2. To what extent do those who mention Greta Thunberg on Twitter also use the terms "climate emergency" and "climate crisis"?

Q3. How does an event such as the Climate Summit influence the distribution of the terms "climate change," "climate crisis" and "climate emergency"?

Methodology

With the purpose of studying the climate change communication related to the United Nations Climate Change Conference held in Madrid in 2019, we have selected 36 days in our tweet collection for this study (20 November 2019 – 25 January 2020). The event took place on 2-13 December 2019, which covers 12 natural days, a period which will be referred to as the "event." Similarly, 12 natural days have been considered prior to the event, named "pre," as well as 12 natural days after the event, which will be called "post."

The data extraction was carried out through a Python script, which will be executed continuously during the period of the experiment in a Web App, located in a private cloud. Tweets were collected from around the globe thanks to Twitter's public API, using the following list of search terms/keywords: "climate change"; "climatechange"; "climate crisis"; "climatecrisis"; "climate emergency"; "climateemergency." This list applies to every tweet including any of the above terms published during the period of study, which was captured and considered for the analysis.

Every captured tweet carries the following information: day of publication; time of publication; tweet text; language; source; screen name; verified; description; location; follower count; listed count; friends count; retweet count; default image; mentions.

For classification purposes, a training dataset was used to train a neural network until a predictive performance was acceptable.

In more detail, to perform this classification a first data cleaning was performed over each tweet's text:

- Transforming all typed text to lowercase.
- Removing mentions, hashtags and URLs from text.
- Removing punctuation.
- Removing stop-words.
- Translating emoticons into single words (for example, "=D" becomes "smile").
- To detect non-human activity and classify tweets as "sent by a bot," logistic regression has been performed.

Finally, we analyze the data applying, in each case, the corresponding statistical proof, as indicated in the results section. In order to measure the importance of the climate summit for the diffusion of "climate

change," "climate crisis" and "climate emergency," we employ the Kruskal-Wallis test for non-parametric data to look at the three established periods of analysis. To predict Greta Thunberg's influence over said expressions, the cross-correlation function is applied.

Results

Terms

Q1. To what extent are the terms "climate emergency" and "climate crisis," as opposed to "climate change," prevalent in the conversation on Twitter?

The total number of tweets containing the search terms is 3,324,580. In the majority of cases, they present only one of the search terms (96.4%), but there are tweets where two or three terms are mentioned (3.5%). The most frequently used term has been "climate change," present in nearly 75% of tweets, while "climate crisis" and "climate emergency" lag far behind that figure, appearing just in 16.2 and 12.6% of tweets, respectively, as shown below.

Table 1: Total number and percentage of tweets per term

	Total sample of tweets		**Greta Thunberg's mentions in tweets**	
	Total no.	**Percentage**	**Total no.**	**Percentage**
Climate change	2,489,391	74.9	44,743	42.3
Climate crisis	538,776	16.2	46,431	43.9
Climate emergency	419,629	12.6	15,716	14.9

Source: Own elaboration

Q2. To what extent do those who mention Greta Thunberg on Twitter also use the terms "climate emergency" and "climate crisis"?

The vast majority of tweets in the sample (3,137,802) contain one or several "mentions," understood as having the username from an account other than one's own be part of the textual body of one's tweet. Up to 3.1% of total tweets (105,684) mention activist Greta Thunberg. Even though, at a glance, this might seem a low percentage, she is in fact the most mentioned figure in the sample, as shown below.

Table 2. Top 10 mentions

Mention	**Total mentions**

gretathunberg	105,684
peythaag	85,786
jins_	56,644
jbknockout	52,845
berniesanders	40,147
jeremycorbyn	34,488
bts_twt	31,790
variety	29,288
bts_bighit	29,273
channel4news	21,884

Source: Own elaboration

We provide two examples of Greta Thunberg's mentions in sample tweets. Both were published 13 December 2019, with the first expressing support for the young activist facing ridicule by then US President Donald Trump, and the second disavowing Thunberg while praising Trump.

> "Former first lady Michelle Obama offered a message of support to teen climate crisis activist Greta Thunberg after the 16-year-old was mocked on Twitter by President Trump: "Ignore the doubters and know that millions of people are cheering you on" (@cnn, 2019/13/12).
>
> "The liberals couldn't believe President Trump Would speak out against their Climate Change Puppet Greta Thunberg. Here's Greta and her parents all wearing Antifa shirts... This is who the left supports, instead of a President who truly loves America and it's [sic] people!" (@realmattcouch, 2019/13/12).

At the same time, in the case of tweets related to Greta Thunberg, one can notice a significant change in the terminology employed: "climate crisis" is the most frequently used term (43.9%), before "climate change" (42.3%). At the same time, "climate emergency" acquires some relevance in said subgroup (14.9%) over the total tweets sample (12.6%).

Periods

Q3. How does an event such as the climate summit influence the distribution of the terms "climate change," "climate crisis" and "climate emergency"?

Although Madrid's Summit was extended until 15 December 2019 (it was meant to end on 13 December), we maintain three periods for analysis of the same duration, of 12 natural days each: 20 November – 1 December; 2–13 December; 14 December 2019 – 25 January 2020. Series of 36 entries were calculated per number of daily tweets reporting the terms "change," "crisis" and "emergency."

Results per period, in volume of tweets, are the following:

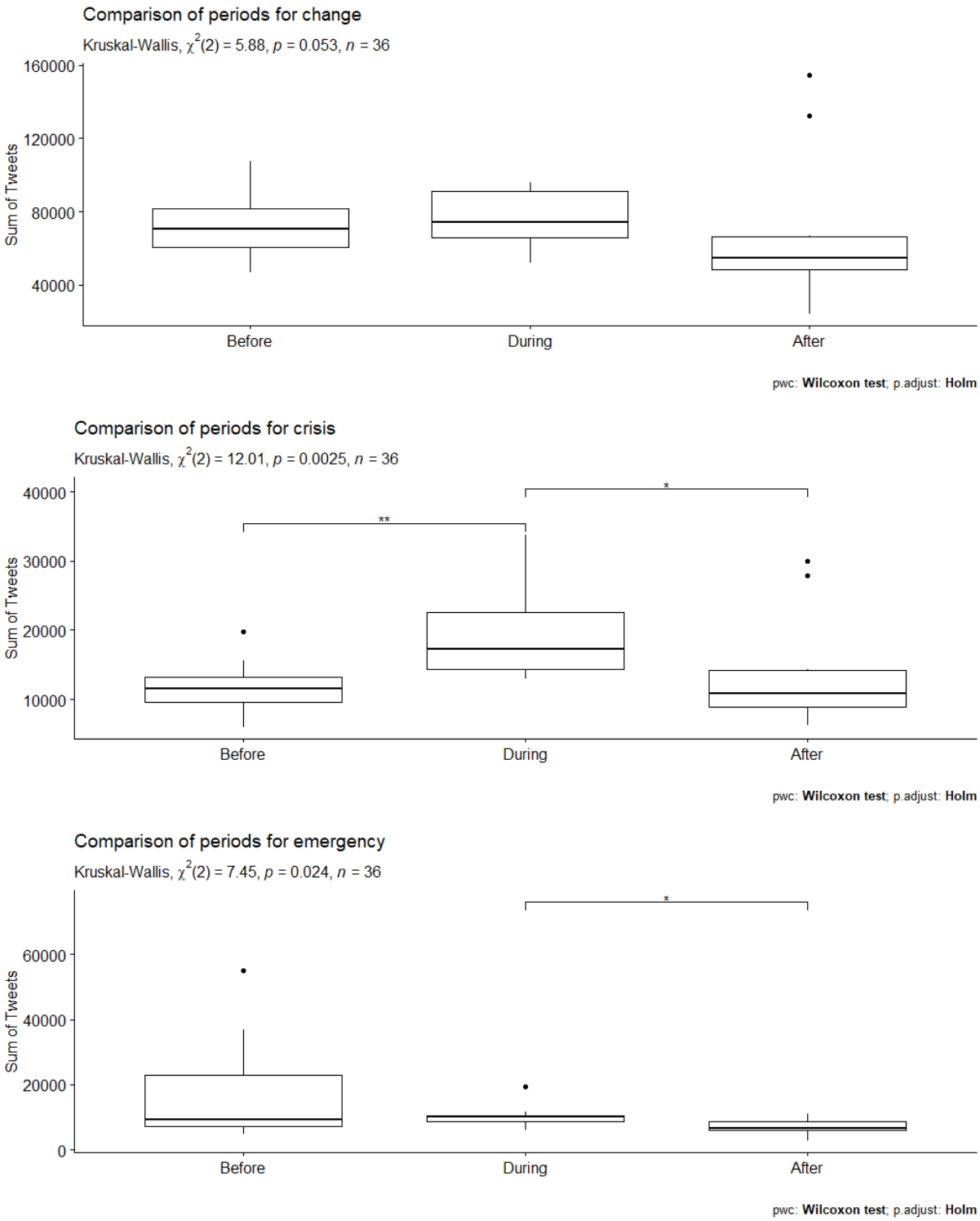
In the 12 days prior to the summit 1,160,320 tweets (34.9%) were detected, while during COP25 that figure rose to 1,221,957 (36.8%). After the Summit, the number of tweets fell to 942,303 (28.3%). However, looking at a day-to-day evolution, the highest peaks in volume of tweets took place after the Summit

(150,670, 20 December) as well as before (146,230, 21 November), seemingly due to traffic generated by bots on those dates.

Tweets mentioning Greta Thunberg did not follow the general pattern of an upward curve until Madrid's Summit or a subsequent downward curve. In this case, the pre-summit period meant limited visibility for the activist on Twitter (15.2%), whereas from then on tweet volume kept rising (40%) and, instead of lapsing after it concluded, continued its upward trend (44.8%). 22 December is, in fact, the day featuring the largest number of tweets in the subsample of tweets mentioning Greta (22,140).

Regarding the search terms, we employed the Kruskal-Wallis test for non-parametric data. In cases where analysis has proven to be significant, post-hoc analyses with Holm's adjustment method have been conducted.

Figure 1: Comparison of periods per term



Source: own elaboration

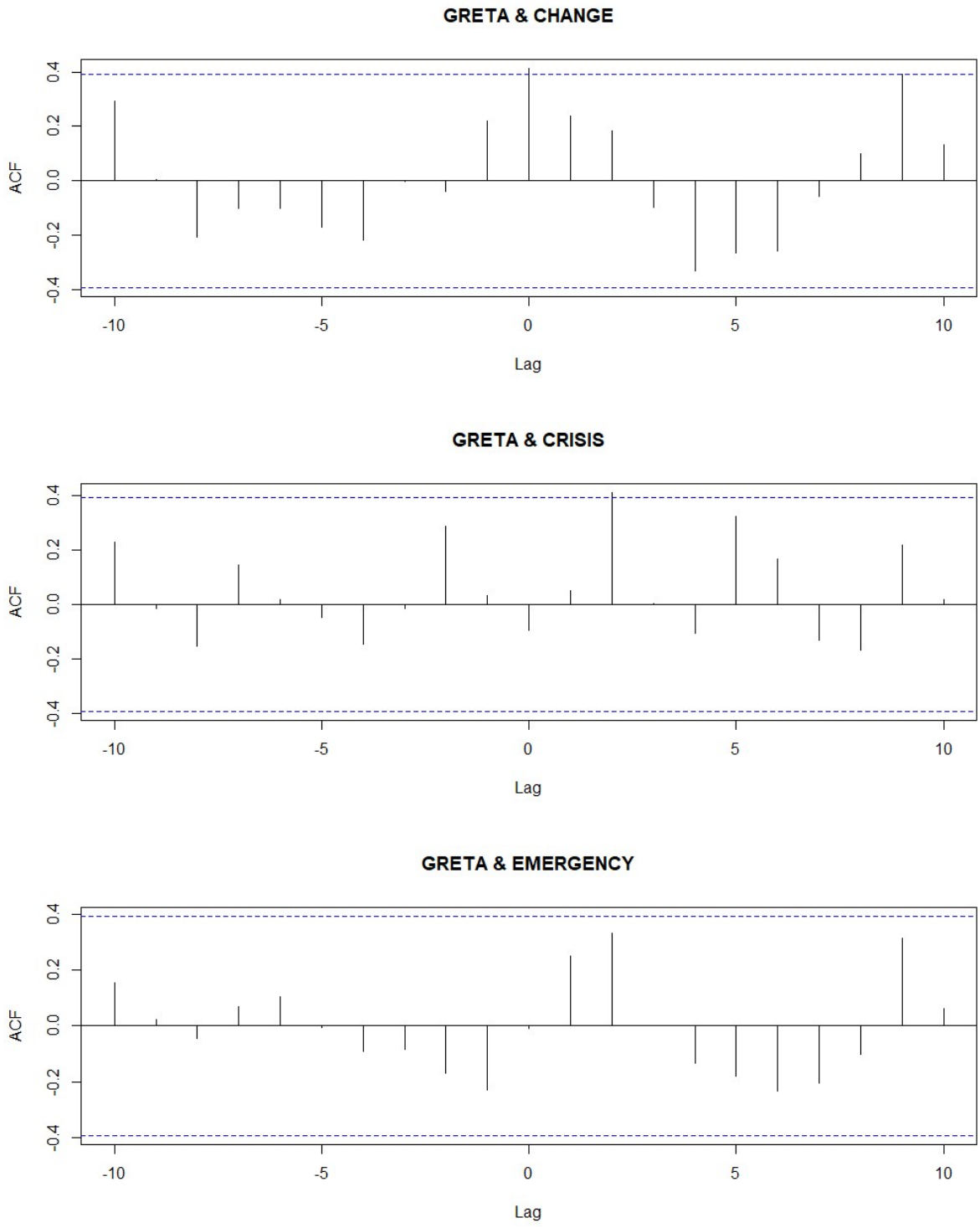
The prevailing expression for the three periods is "climate change." Nevertheless, the term "climate emergency" is seen to stand out in the pre-summit period, while later decreasing. Conversely, a marked surge in the term "climate crisis" can be linked to Greta Thunberg's speech at COP25 on 11 December 2019, which meant a peak in volume of tweets mentioning her. In fact, by 10 December Greta Thunberg's presence

was already on the rise, with up to 13,647 tweets in which a conspicuous increase of the term "crisis" practically eradicates the use of "climate change" whenever she is discussed. The term "climate crisis" continues to have a prominent place in the post-summit period.

Looking at the use of the term "climate change," two atypical points amounting to a peak in volume of tweets can be observed. The first took place on 19 December 2019, with 154,411 tweets; the second, on 20 December, with 132,266 tweets. Looking at the evolution of the label "climate crisis," we find three atypical points: 21 November 2019, with 19,814 tweets; 14 December, with 27,925 tweets; and 20 December, with 30,021 tweets. A further three atypical points were detected for "climate emergency": 21 November 2019, with 54,960 tweets; 10 December, with 19,455 tweets; and 11 December, with 19,493 tweets. This traffic was found to be caused by bot accounts. Therefore, in order to conduct a rigorous analysis, said data must be considered outlier data, since they do not intervene in the conversation among real people and cannot thus imply a change in discourse.

On the other hand, applying the cross-correlation function, a positive correlation between "Greta" and "climate change" and between "Greta" and "climate crisis" is also observed, but not between "Greta" and "climate emergency" (Figure 2). The cross-correlation function was calculated by drawing from the series obtained. It measures the degree of similarity as a coefficient that oscillates between -1 and 1. Said coefficient is calculated for present value in relation to lags from other series at times t-10–t10. The t0=.4 correlation coefficient is the traditional estimate. This cross-correlation coefficient also estimates standard error allowing for an evaluation of calculated coefficients to assess whether they can be considered equal to or other than zero.

Figure 2: Correlation "Greta" & key terms



Source: Own elaboration

When Greta Thunberg was mentioned in the sample tweets, a few days later, this actually increased the number of tweets using the expressions "climate change" and "climate crisis." For instance, Figure 2 shows a peak response to t9=.4 lag, which means that tweets mentioning Thunberg are positively related to tweets mentioning "change" 9 days later. Meanwhile, she affects the term "crisis" 2 days later.

Discussion

Terms

Q1. To what extent are the terms "climate emergency" and "climate crisis," as opposed to "climate change," prevalent in the conversation on Twitter?

In this article we have conducted the first-ever analysis of the presence of such novel terms as "climate crisis" and "climate emergency" on Twitter. Faced with lack of prior research on how widely used these terms are, we have proved they are significantly employed. However, they do not, to date, displace, let alone substitute, the dominant expression "climate change."

Of the two, "climate crisis" has been most frequently used, with a steady growth along the sample period. It can be said that this expression was successful, although it is far from being used as much as "climate change."

Conversely, "climate emergency" has not enjoyed as much acceptance in the public sphere. This clashes with the fact that, over the period analyzed, some events might have aided a surge of the latter term. For instance, the European Union Parliament declared a "Climate Emergency" on 28 November and, at the end of 2019, Oxford Dictionaries announced "climate emergency" as the Oxford Word of the Year.

In any case, we can indicate that in 2019 there is a discourse of urgency to act against climate change, as other authors before us have rightly pointed out (Bevan et al., 2020; Ebrey et al., 2020).

Q2. To what extent do those who mention Greta Thunberg on Twitter also use the terms "climate emergency" and "climate crisis"?

The discourse employed by activist Greta Thunberg may be having an impact on the dissemination of these new terms. Indeed, Greta Thunberg is the most mentioned person in tweets containing the search keywords. Besides, we have found that tweets mentioning the Swedish youth are more likely to use the phrase "climate crisis" (over three times more so than in the total sample). They also use the expression "climate emergency" more often than in the average of tweets, even as we had anticipated the choice of the latter expression might be much more prominent.

As we explain below, a correlation has been found between Thunberg's speech and the increase usage of "climate crisis" and "climate emergency," which supports the outstanding role of certain actors in the public debate on climate change. In this sense, what was indicated by Bevan et al. (2020) is confirmed: the fact that the discourse of urgency is not supported by institutional actors, but by social ones.

Periods

Q3. How does an event such as the climate summit influence the distribution of the terms "climate change," "climate crisis" and "climate emergency"?

Analysis per period follows previous studies on the importance of events for climate change communication on social media (Leas et al., 2016; Dahal et al., 2019). The volume of tweets is shown to increase during the climate summit in Madrid and to decrease afterwards.

The various terms evolve differently during the period analyzed, with "climate emergency" being, contrary to all expectations, the least successful of all. Thus, "climate change" is the dominant expression for the

whole duration of the period, the term "climate crisis" rises during the summit and continues to have a prominent place in the post-summit period, while "climate emergency" is falling gradually out of use.
This means that, albeit maintaining an average value, the term "emergency" has solely experienced decline.
It is important to note the positive correlation between the tweets mentioning Greta Thunberg and the term "climate crisis." This finding leads us to believe that Greta Thunberg's discourse plays a relevant role in how widespread the expression "climate crisis" has become in the global conversation on Twitter. Yet, we have also found a correlation with "climate change," which points to the activist denoting a larger conversation on Twitter on "climate change," a term that she, however, strongly disagrees with. Against all expectations, the expression "climate emergency" is not linked to Greta Thunberg's mentions in tweets.
Results indicate an increase in the conversation on climate precisely at the time Greta Thunberg enters the public sphere, in this particular case thanks to her physical presence as well as to the speech she delivered at the climate summit in Madrid. This finding is consistent with that indicated by Ebrey et al. (2020) regarding Thunberg's role in increased usage of urgent climate vocabulary much more significantly than any other climate-related issues or events.

Conclusion

Is Twitter in a "climate emergency"? Discourse on the climate emergency is present on Twitter, but there is still room for its potential growth. We have measured for the first time the relevance of the new terms "climate crisis" and "climate emergency" as indicators of the degree of social penetration of urgency discourse, obtaining a significant volume of tweets for both expressions and demonstrating Greta Thunberg's influence on an increase in use for "climate crisis." However, results do not back a connection between the activist and the expression "climate emergency" in the same way. In fact, "climate emergency" has been shown to enjoy far less success than it had been assumed.
Madrid's climate summit and, to be more specific, Greta Thunberg's speech during said conference on 11 December 2019, proved to be decisive in driving the term "climate crisis" forward. We conclude the event contributed significantly to enhancing Thunberg's popularity.
This paper makes a relevant contribution to knowledge of the level of penetration of urgency discourse, necessary to determine future communication strategies. We now know that there is a significant presence in the discourse of terms associated with the urgency of acting on climate change, but that message should be reinforced, relying on the term "climate crisis," since it seems to be the most successful.
This research also highlights the important role that social actors can play in the dissemination of messages about the climate crisis, which further contribute to a change in the prevailing public discourse.
The present study has its limitations, as is admittedly the case when working with automated natural language processing classifications. Future longitudinal studies on the extension of the use of these terms could delve into the advance of the urgency discourse and the influence of different actors on this discourse.

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