Communication strategies in the climate change debate on *Facebook*. Discourse on the *Madrid Climate Summit* (*COP 25*)

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Abstract

Climate change (CC) has become a topic of great interest in traditional and social media, two valuable sources of information that contribute to discussion on current affairs. *Facebook* is the social network with the most users in the world and also promotes mobilization, which makes it a platform of great interest for the study of CC communication strategies. The aim of this study is to analyse the content of the messages on CC posted on *Facebook* by prominent users: the relevance of the topic in the posts as a whole, objectives pursued, type of discourse and the emotions associated with messages. After validating a selection of 10 accounts (Greta Thunberg, Donald Trump, Scott Morrison, Alexandria Ocasio-Cortez, *Extinction Rebellion USA*, Justin Trudeau, Bernie Sanders, *United Nations*, *Extinction Rebellion UK* and Jane Fonda), the methodology was based on content analysis applied to messages on CC (n = 599) posted on *Facebook* by the selected accounts between 1 November 2019 and 10 January 2020, the period covering the *Madrid Climate Summit* (*COP 25*, held in 2019). The results revealed different CC communication strategies. Regarding the presence of CC as a topic, we observed three different strategies: omission, simple mention and high presence. In terms of discourse, we noticed two different strategies: an emotional strategy that was more successful at generating interaction with others, and an analytical strategy that was generally more belligerent in its fight against CC.

Keywords

1. Introduction

Interest in science has grown steadily in recent years. According to *Science and Engineering Indicators* (*National Science Board*, 2018, p. 31), 81% of young adults (18-24 years old) use the internet as their main source of information on science and technology. Moreover, with the development of the internet, the traditional approach to science communication has been transformed. Scientists and journalists are no longer the only ones who disseminate information on science and technology. They have been joined by public relations professionals, international organizations, foundations, companies, museums and non-governmental organizations, not to mention "hyperactive bloggers, tweeters and social media users" (**Francescutti**, 2018, p. 17). Therefore, the first information on a new scientific or technological development is made public through social media (**Brown**, 2014, p. 18), a true forum for debate on controversial topics such as nuclear energy (**Li** *et al.*, 2016), nanotechnology (**Veltri**, 2013; **Runge** *et al.*, 2013; and climate change (CC).

When the content on climate change is studied, it is clear that social media outlets are also the source of information on CC for more than half the population, as well as a place for sharing information among users (**Painter** *et al.*, 2016, p. 3; **Painter**; **Kristiansen**; **Schäfer**, 2018, p. 8). For the complex, controversial topic of CC, social media provide a complementary platform to traditional media, where people and organizations can share, discuss and become mobilized (**Gess**, 2012; **Schäfer**, 2012).

Climate change has been a topic of public and academic debate since the 1990s. The struggle between those who believe that measures should be taken to deal with the problem, those who are indifferent and those who deny the existence of CC is played out in the public sphere. In academia, these positions are studied in order to identify effective communication strategies, among other reasons (**Wibeck**, 2014). Framing theories (**Nisbet**, 2009) and discourse analysis (**Atanasova**; **Koteyko**, 2015) have been used in the study of CC communication and have helped identify different approaches and discourses present in the media over the years.

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Competing discourses continue to coexist today, but there are more and more actors calling for urgent action on CC (**Bevan**; **Colley**; **Workman**, 2020, p. 33). Any communication addressed to society in general and the public authorities in particular could certainly have an effect on the implementation of new policies, which is why studying such communication is particularly relevant in the case of a major environmental challenge such as CC (**Fesenfeld**; **Rinscheid**, 2021, p. 422).

Posting CC messages on social media contributes to the creation of online communities, sometimes with a high degree of political polarization (**Gruzd**; **Roy**, 2014, p. 28). These groups often become communities that work like echo chambers, in that they only make room for followers with similar views (**Williams** *et al.*, 2015, p. 135). In any case, social networks have become an important forum for discussion on CC (**Auer** *et al.*, 2014; **Cody** *et al.*, 2015), where different and sometimes conflicting perspectives have a voice based on whether or not they accept the existing scientific consensus (**O'Neill** *et al.*, 2015; **Holmberg**; **Hellsten**, 2016; **Jacques**; **Knox**, 2016; **Jang**; **Hart**, 2015).

Facebook is one of the social networks with the highest participation. Its features allow users to share content and interact with other people through comments and reactions, and to set up communities around their tastes and interests (**Coromina**; **Prado**; **Padilla**, 2018, p. 1005). This platform also enables people to communicate and share their opinions and knowledge with a wide audience, thus providing a place for careful consideration of matters of public interest (**Camaj**; **Santana**, 2016, p. 339). Unlike *Twitter*, most *Facebook* accounts are private, so accessing them is mainly based on ties of friendship.

Bearing in mind that *Facebook* is used to "discuss" political issues (**Perrin**, 2015, p. 2), this article addressed the CC communication strategies implemented on *Facebook*. This little-studied platform is highly relevant, given that it is the leading social media venue in terms of the number of users (*DataReportal*, 2021). This study analysed CC communication during *COP 25* because coverage of such events is known to make the topic more prominent and produce developments in the discourse (**Dirikx**; **Gelders**, 2010, p. 740). Users with different profiles were also found to be highly influential (**Williams** *et al.*, 2015; **Abidin**, 2015), especially in relation to these kinds of major events, climate summits and the publication of reports by the *Intergovernmental Panel on Climate Change* (*IPCC*) (**Pearce** *et al.*, 2014; **Holmberg**; **Hellsten**, 2016).

2. Theoretical framework

Social networks have profoundly changed the way the general public, particularly younger audiences, seeks and consumes information on climate change. For this reason, social media networks have been the subject of study in recent years. However, due to the technical complexity of doing research on some of these networks, most of the work being published focuses on the *Twitter* microblogging network, whose application programming interface (API) allows its posts to be downloaded quickly and easily (**Pearce** *et al.*, 2019).

Social media outlets are a thermometer of the social environment (**Casero-Ripollés**, 2018, p. 969). In fact, they have been widely studied from the point of view of social participation and social movements associated with mobilization and protest (**Gil de Zúñiga**; **Jung**; **Valenzuela**, 2012; **Valera-Ordaz** *et al.*, 2019). Social media also provide campaign environments that are different from other channels of political communication. For example, **Kobayashi** and **Ichifuji** (2015, p. 590) identified three main functions of political messages on this platform: to promote problematic positions, to demonstrate positive personality traits, and to improve recognition. Specifically, *Facebook* provides a meeting point for the creation of online groups focused on social and political interests and initiatives (**Zumárraga-Espinosa**; **Silva-Valdivieso**; **Trujillo-Sánchez**, 2020, p. 80). Emotionally charged political messages posted on this platform, regardless of whether the emotions are negative or positive, have a positive effect on users' participatory response through actions such as sharing, liking and commenting on the post (**Heiss**; **Schmuck**; **Matthes**, 2019, p. 1498).

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Since 2018, with the emergence of the student movement *Fridays for future* led by the young activist Greta Thunberg, the social movement *Extinction Rebellion* and other environmental organizations and diverse collectives (including teachers, mothers, celebrities and climate researchers), the climate emergency message has been amplified at street level and has had a notable impact on social networks. *Facebook*, *Twitter*, *Instagram* and *YouTube* have become necessary protagonists in the dissemination of the state of climate emergency. For example, **Katz-Kimchi** and **Manosevitch** (2015, p. 265) highlight *Facebook* "likes", "shares" and "comments" as an easy way to gain public support for activist campaigns (in this case, they studied *Greenpeace* campaigns). The option of scheduling *Facebook* events and inviting others has also proved effective (**Senbel**; **Ngo**; **Blair**, 2014, p. 90).

Aware of the power of this new digital "modern public agora" (**Gallardo-Paúls**, 2017, p. 191), some politicians, driven by potential voters' growing interest in environmental issues, have made full use of it for their CC communication. In fact, CC is one of the most heavily politicized scientific issues of this century (**Abejón** *et al.*, 2020, p. 1283). And although social networks are not always the best channel of communication between elite groups and other users in relation to CC (**Dalrymple**; **Young**; **Tully**, 2016, p. 465), activist organizations, opinion leaders and politicians all take advantage of information on CC to achieve different objectives, such as calling for citizen action, criticizing certain messages and discussing the phenomenon and its implications.

2.1. Communication strategies

The various actors involved in the social media conversation on CC (including companies, national and international public bodies, scientists, intellectuals and activists) pursue different objectives, such as informing, mobilizing and discussing the phenomenon (**Edson** *et al.*, 2017). In the specific case of audiovisual content on CC disseminated through social networks and the media, previous studies (**De-Lara**; **García-Avilés**; **Revuelta**, 2018, p. 17) suggest that the main objectives are to inform and raise awareness without delving into specific proposals for action. Activists fighting CC use social networks to publicize their groups' own activities, which often seek to engage citizens in action to address the challenges arising from CC (**Segerberg**; **Bennett**, 2011, p. 213).

Several authors have drawn up lists of strategies for communicating CC effectively. For example, **Thompson** and **Schweizer** (2008, pp. 29-30) list 10 points, including knowing the audience well, focusing communication on actions and facts, and telling the public what specific actions they can take. Other lists emphasize strategies such as taking into account the audience's cultural values, appealing to mutual benefits and considering the local issues of the target audience (*IPCC*, 2019).

The rhetoric used on *Facebook* about CC has been studied from different perspectives: the debate on denial, which demonstrated that this movement uses the social network to discredit alternative viewpoints (**Bloomfield**; **Tillery**, 2019, p. 10); and the communication strategies of social movements and non-profit organizations (**Hong-Tien** *et al.*, 2020), which actually reflect the different theoretical and practical implications of findings on climate change.

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In this study, we drew on the classification proposed by **Díaz-Barrado** (1989), which identifies eight different kinds of political discourse. We considered it essential to analyse the discourse of certain leading accounts on *Facebook* from the perspective of politics, defined here as the issues affecting society, one of which is CC. The application of this classification to CC communication by **Águila-Coghlan** (2016, pp. 212-213) offers a rich pers-

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pective, since it makes it possible to analyse the different discourses that can be used in close connection with communication objectives. The following discourses were considered:

1) Sublimation

This involves an author giving importance to his or her own discourse and alluding to concepts accepted by the audience in a positive way.

2) Responsibility

Based on the idea that the reader has some responsibility for the problem and can do something about it.

3) Toughening up

Indicates the need for greater restrictions, e.g. by applying tougher rules.

4) Mention

In this form of discourse, there is no perceived position and the problem is mentioned in a neutral way. This can be considered a standard news strategy.

5) Opposition

Confrontation or opposition. It goes against the validity of events. This is the strategy of so-called CC "deniers" and "sceptics".

6) Favour

This strategy consists of winning over the audience through flattery and praise of their good judgement.

7) Deviation

This discourse sides with the audience by presenting content they criticize and reject.

8) Fear

The author attempts to instil fear in the audience by presenting the topic as dangerous.

As we can see, these different discourses often appeal to the emotions.

2.2. Emotions

Academic interest in the role of emotions in content dissemination mechanisms is growing, especially in the digital environment and social networks. The way information is presented has an emotional impact on people. It has also been observed that emotions affect the dissemination of information and that some emotional states can be massively transmitted through social media and trigger an emotional response in the audience (**Kramer**; **Guillory**; **Hancock**, 2014).

With regard to transmitting informative content, the concept of "affective news" has emerged through the understanding that people not only engage cognitively, but also emotionally by sharing such content in a flow that moves from individual to massive transmission as it echoes in different circles of contacts. Emotions thus contribute to the phenomenon of virality in what is considered to be a large-scale emotional contagion (**Papacharissi**, 2015; **Serrano-Puche**, 2016).

In the digital world, expressing emotions involves activating a communication element in the form of a symbol such as "like" or any of the other emotional reactions offered by *Facebook* (**Serrano-Puche**, 2016, p. 23). Research has shown that both positive and negative emotions affect dissemination of content (**Dafonte-Gómez**,

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2018, p. 2143). Some studies confirm that negative emotions, such as anger and fear, motivate the user to be "alert" and seek more information on CC-related issues, and have the potential to transform apathy and indifference into behavioural perceptions and actions (**Thomas**; **McGarty**; **Mavor**, 2009; **Myers** *et al.*, 2012).

Sensationalist and fear-mongering messages are effective in engaging audiences, but can also lead to attitudes of apathy, denial and avoidance of the issue. Some accounts therefore appeal to positive emotions as one of the most promising strategies for communicating CC (**Markowitz**; **Shariff**, 2012, p. 245).

Other studies indicate that associating CC with economic issues and natural disasters can arouse negative emotions, whereas connecting it with outreach actions and contests to spread green culture is linked to more positive emotions (**Cody** *et al.*, 2015).

3. Research objectives and questions

The aim of this study was to analyse the content of the messages on CC posted on *Facebook* by some of the most prominent voices (individuals, movements and institutions). We analysed the topic in the posts as a whole, the objectives pursued, the strategies employed and the emotions associated with the messages through the emoticons posted. Mentions of *COP 25* were also taken into account (each time one of the accounts mentioned the summit in one of its posts), since the event determined the time frame of data collection and the objective was to analyse the importance of this international climate meeting for the selected accounts. Specifically, we asked the following research questions (RQs):

RQ1: How prominent was CC during *COP 25* in posts on *Facebook* of the selected accounts?

RQ2: Did the causes, consequences and solutions of CC form part of the discourse of the selected activists and politicians?

RQ3: What kind of communication strategies generated more interaction and more emotions (more emoticons)?

4. Methodology

The methodology used in the study was based on the collection and analysis of the content of more than 3,000 posts published on *Facebook* by nine preselected accounts during a period centred around *COP 25* held in 2019. The set of posts in their original language was extracted from each of the selected *Twitter* accounts in the reflected period and in terms of the number of followers.

The method employed comprised four distinct phases.

4.1. *Facebook* account selection phase

Because it was not possible to determine the most mentioned accounts on *Facebook* with regard to CC, selecting the accounts to be analysed involved taking a sample from *Twitter*, which provided the basis for the following list (in the study, each time the user's name appeared in a post was considered a "mention"):

1. @GretaThunberg (mentioned in 30,802 tweets)
2. @realDonaldTrump (8,312)
3. @ScottMorrisonMP (7,552)
4. @AOC (Alexandria Ocasio-Cortez, 5,167)
5. @ExtinctionRebel (*Extinction Rebellion USA*, 4,751)
6. @JustinTrudeau (4,444)
7. @BernieSanders (2,771)
8. @UN (*United Nations*, 2,187)
9 @XRebellionUK (2,085)
10. @JaneFonda (1,986).

After assessing the relevance of these 10 accounts as prominent voices of CC, they were considered valid based on the influence and public position of these actors in 2019. Moreover, some of these individuals and institutions have already been the subject of academic study for their contribution to CC communication. For example, Greta Thunberg (**Sabherwal** *et al.*, 2021), Ocasio-Cortez (**Brown**, 2019), *Extinction Rebellion* (**Bell**; **Bevan**, 2021), Justin P. Trudeau (**Chia**, 2021) and Jane Fonda (**Castillo-Esparcia**; **López-Gómez**, 2021) have all been considered active public voices in disseminating messages in favour of the fight against CC, while former US president Donald Trump has been the subject of analysis for his speeches questioning the problem (**Nordensvard**; **Ketola**, 2021).

Twitter data mining was carried out using a *Python* script run continuously during a pre-experiment period (9 September to 11 November 2019 with the search criteria "climate change", "climate crisis" and "climate emergency") on a web app located in a private cloud.

Once we had determined the most cited accounts on *Twitter*, we selected the same accounts on *Facebook*. Due to a data-collection problem, no information was obtained from the posts on the *Facebook* account of *XRebellion US* or from some posts on the Bernie Sanders account (no data were collected from the period before and after the summit, but data posted during the summit were available), which we took into account in the analysis of the results. For this reason, the final number of accounts analyzed in this work is nine.

The *Facebook* accounts analysed included the profiles of seven people and two organizations whose accounts had a page format[1]:

Greta Thunberg ✓
18 year old climate and environmental activist with Asperger's #fridaysforfuture

https://www.facebook.com/gretathunbergsweden

Donald J. Trump ✓
This is the official Facebook page for Donald J. Trump

https://www.facebook.com/DonaldTrump

1. Greta Thunberg, a Swedish environmental activist focused on the risks posed by global warming who has been at the forefront of the social movement in recent years in the fight against what she calls the "climate crisis", with her well-known slogan *Fridays for future*. Number of followers: 3.5 million[2].

2. Donald Trump, former president of the United States, a member of the *Republican Party* and self-proclaimed CC sceptic. Number of followers: 34 million.

3. Scott Morrison, leader of the *Liberal Party* and Prime Minister of Australia. Well-known supporter of the coal industry and reluctant to act against CC. Number of followers: 810,000.

Scott Morrison (ScoMo) ✓
Prime Minister of Australia | Member for Cook

Authorised by Scott Morrison, Liberal Party, Sydney

https://www.facebook.com/scottmorrisonmp

4. Alexandria Ocasio-Cortez, US activist and *Democratic* politician. The congresswoman has proposed some concrete measures for the total decarbonization of the economy in what is known as the *Green new deal*. Followers: 1.8 million.

5. Justin PJ Trudeau, Prime Minister of Canada (*Liberal Party*), considered one of the most influential progressive leaders in the world for his defence of individual liberties, gender equality and the environment, among other topics. Followers: 6.4 million.

Alexandria Ocasio-Cortez ✓
Congresswoman for NY-14 (parts of The Bronx and Queens). 100% people-funded, no lobbyist money.

https://www.facebook.com/OcasioCortez

6. Bernie Sanders, American politician, senator for the state of Vermont. A presidential candidate for the *Democratic Party* during the 2020 primaries, he strongly believes that CC is real, catastrophic and mostly caused by human activities. Followers: 5.6 million.

7. The *United Nations*, the world's largest international organization, with 193 member states. The *United Nations Framework Convention on Climate Change* aims to strengthen global public awareness of climate change issues. It has a page format. Followers: 7 million.

Justin Trudeau ✓
Online Community Guidelines: lpc.ca/a17v.

Lignes directrices pour la communauté virtuelle: lpc.ca

https://www.facebook.com/JustinPJTrudeau

8. *XRebellion UK*, a citizens' initiative and social movement fighting CC with the same grassroots objective as *Fridays for future*, but employing more institutionally uncomfortable ways of drawing attention and stirring up public opinion. It has a page format. Followers: 70,000.

9. Jane Fonda, American actress strongly committed to the environmental cause. She was arrested on 18 October 2019 for protesting against CC. Followers: 660,000.

Bernie Sanders ✓
This is the official page for Bernie Sanders. Join our political revolution!

https://www.facebook.com/berniesanders

https://www.facebook.com/unitednations

https://www.facebook.com/XRebellionUK

4.2. Data mining phase

The sample of *Facebook* accounts includes posts published between 1 November 2019 and 10 January 2020 and is divided into three periods:

- Before *COP 25*: 1 November to 1 December 2019.
- During the summit: 2-13 December 2019, extended to 15 December.
- After *COP 25*: 16 December 2019 to 10 January 2020.

During the stipulated data collection period, a total of 2,250 posts were collected, of which 26.6% (n = 599) referred to CC. In order to narrow down the number

https://www.facebook.com/JaneFonda

of posts referring to CC, we applied the following search keywords to all the posts made by the accounts: "global warming", "climate change", "climate crisis", "climate emergency", "Greta Thunberg", "planet", "green", "fuel", "Spain", "Madrid", "summit" and "COP 25".

4.3. Design of the analysis questionnaire

A coding template was designed based on the previous literature review that took into account studies on CC communication, discourse analysis and content dissemination on social networks, as well as other work with a similar methodology. The items of interest we extracted that could be extrapolated to our object of study are listed below:

- Account
- Objectives
- Communication strategies, understood as the set of topics, types of messages and interactions, among other aspects.
- Allusion to CC causes, consequences and proposed solutions, which have been extensively analysed by many previous studies (e.g. **Badullovich**; **Grant**; **Colvin**, 2020).
- Mention and relation to *COP 25*.
- Emotions. The emoticons offered by *Facebook* are "like", "sad", "love", "angry" and "lol". The total number of interactions on each post and account was automatically extracted using a script created specifically for the research study by a computer programmer on the team.

4.4. Pre-testing, coding and reliability work

Once the 599 CC-related posts had been extracted, initial coding and preliminary analysis were carried out on approximately 5% of the sample (a total of 30 posts) by two coders. In a first phase, the results were compared and appropriate adjustments were made to ensure a reliability of 95%.

Once the entire sample had been coded, an inter-coder reliability test was carried out consisting of independent coding of 10% of the sample. **Cohen**'s kappa (1960) was then applied to obtain a level of agreement of 0.74, i.e. "substantial agreement" in accordance with the scale proposed by **Landis** and **Koch** (1977) for this coefficient.

5. Results

5.1. Volume of CC-related posts

Table 1 shows that two accounts, those of Scott Morrison and Donald Trump, did not publish any CC-related posts during the analysis period, which is why they are not present in the rest of the analysis of results.

Table 1. Posts related to and not related to CC

Facebook account	Before COP 25		During COP 25		After COP 25		Posts on CC	% of posts on CC
	Total posts	CC posts	Total posts	CC posts	Total posts	CC posts		
gretathunbergsweden	74	56	44	36	25	14	106	74.1
DonaldTrump	221	0	216	0	157	0	0	0.0
scottmorrison4cook	31	0	17	0	36	0	0	0.0
OcasioCortez	19	2	18	0	36	4	6	8.2
JustinPJTrudeau	52	11	36	6	39	1	18	14.2
berniesanders	107	16	327	41	0	0	57	13.1
unitednations	92	19	49	27	88	19	65	28.4
XRebellionUK	192	142	133	98	117	68	308	69.7
JaneFonda	61	16	26	7	37	16	39	31.5
Total	**849**	**262**	**866**	**215**	**535**	**122**	**599**	**26.6**

As shown in Table 1, young activist Greta Thunberg published the most CC-related posts of her total posts (74.1%), followed by *Extinction Rebellion UK* (69.7%). Actress and activist Jane Fonda ranked third (31.5%) and the *United Nations* fourth (28.4%). The politicians' *Facebook* accounts fell far short of these figures. Canadian Prime Minister Justin Trudeau came out on top among his fellow politicians (14.2%), while the US president and the Australian Prime Minister did not even mention CC. Americans Bernie Sanders and Ocasio-Cortez did mention it to some extent.

However, the sample accounts performed very differently in the pre-summit, summit and post-summit periods. While those of Jane Fonda, *Extinction Rebellion*, Greta Thunberg, Justin Trudeau and Ocasio-Cortez reduced the number of posts on CC during the summit, the accounts of Bernie Sanders and the *United Nations* increased their posts. In the post-summit period, there was an overall decrease in posts in comparison to both the summit period and the pre-summit period.

5.2. Communication objective

Different objectives were pursued by each account and, although in most cases we found posts that fell into different types, one or two objectives generally predominated over the rest in each case. In general, the most common objectives were "informing" and "reminding of the problem", as well "calling for action", as shown in Table 2.

Table 2. Posts on CC, classified by objective, in relation to total posts of each account

Account	Inform / remind		Call to action		Criticize		Build a positive image	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
gretathunbergsweden	81	76	80	75	23	21	12	11
OcasioCortez	1	17	2	33	2	33	1	17
JustinPJTrudeau	17	94	0	0	0	0	18	100
berniesanders	8	13	3	5	26	43	23	38
unitednations	23	29	33	50	8	12	13	20
XRebellionUK	132	43	139	45	151	49	16	5
JaneFonda	23	59	6	15	14	36	9	2

Building a positive image was important for the Canadian Prime Minister (100% of his posts), but for the politician Ocasio-Cortez, calls to action and criticism were more important (33% in each case). The *United Nations* stood out for the number of calls to action (in 50% of cases), as did activist Greta Thunberg (who also published many informative posts). *Extinction Rebellion* opted for critical messages and Jane Fonda for informative ones.

5.3. Type of discourse

According to the categories proposed by **Díaz-Barrado** (1989) and applied to discourse on CC by **Águila-Coghlan** (2016, p. 213), communication discourse can range from neutral and conciliatory to more confrontational and oppositional (Table 3). The results show that, in general terms, the predominant discourses were, in order of prominence: appealing to responsibility, mentioning the problem without analysing it, and advocating tougher rules to deal with the issue. However, a specific study of each account once again showed that each voice on *Facebook* used different communication discourses. They were not homogeneous.

Table 3. Percentage of posts, classified by strategy, of the total posts of each account on CC

Account	Sublimation		Responsibility		Toughening up		Mention		Opposition		Favour		Fear		Deviation	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
gretathunbergsweden	6	5	33	28	6	5	85	71	22	18	5	4	4	3	1	1
OcasioCortez	2	33	2	33	1	17	3	50	1	17	0	0	0	0	1	17
JustinPJTrudeau	0	0	12	67	11	61	10	56	0	0	2	11	0	0	0	0
berniesanders	2	1	28	17	28	17	12	7	22	13	5	3	3	2	0	0
unitednations	6	10	47	76	12	19	15	24	4	6	6	10	10	16	0	0
XRebellionUK	0	0	212	70	60	20	96	32	130	43	7	2	31	10	18	6
JaneFonda	0	0	21	54	3	8	25	64	11	28	0	0	5	13	1	3

Mention was the type of discourse used the most by activist Greta Thunberg (in 71% of her posts) for her objective of informing. Her discourse was replete with references to her trips, including indications of where her meetings and demonstrations were taking place. In her longer posts, she used the opposition strategy against sceptical politics and inaction.

Responsibility (67%) and toughening up (61%) were the main kinds of discourse used by Justin Trudeau to fulfil his objectives of informing and building a positive image. In his discourse, he appealed to the need to design responsible progress and combat CC through tougher action. The responsibility strategy was also used by Ocasio-Cortez to construct her discourse (33%) and achieve her objectives of criticizing and calling for action. To the same extent, she appealed to the will of her audience and to their commitment to the issue through sublimation (33%).

The *UN*, which is committed to calling for action, also used its discourse to appeal to accountability (76%). The percentage of posts that instil fear (16%) stands out when compared to other accounts. These messages evoked images of an irreversible climate crisis and the need to adopt tougher measures (19% of posts).

Extinction Rebellion also used responsibility (70%) and opposition (43%) as its primary approaches for critical messages. Activist and actress Jane Fonda, who had an informative objective, used a mainly neutral discourse (64%), but also appealed to responsibility to a large extent (54%).

A mention of the concrete causes and consequences of CC can provide an indication of the depth and rigour of communication strategies. In general, the accounts recognized the existence of CC, but offered few concrete explanations of the causes and consequences of the problem, as reflected in the predominance of simply mentioning the problem without analysing it (Table 4).

Table 4. Mention of causes, consequences and solutions, in relation to total posts on CC

Account	Mentions causes		Mentions consequences		Mentions solutions	
	Frequency	%	Frequency	%	Frequency	%
gretathunbergsweden	7	6	5	4	2	2
OcasioCortez	0	0	0	0	0	0
JustinPJTrudeau	0	0	0	0	0	0
berniesanders	10	5	3	10	29	50
unitednations	10	16	5	8	16	26
XRebellionUK	92	30	93	31	51	17
JaneFonda	8	21	7	18	7	18

The accounts of two of the politicians, Ocasio-Cortez and Justin Trudeau, did not mention concrete causes or consequences. Hashtags and slogans were used to propose solutions, but no specific proposals were offered. In the case of Ocasio-Cortez, the need to implement the *Green new deal*, one of her flagship issues, was promoted and insisted upon, but the plan to be followed to achieve it was not explained in the posts analysed. The Canadian politician supports the fight against CC, but once again failed to provide a discourse on specific measures to be adopted. In contrast, Bernie Sanders' communication discourse included a more in-depth description of the causes and consequences of the problem, and he enumerated concrete solutions for tackling the climate crisis in half of his posts. It will now be interesting to see if Sanders' reference to causes and consequences garnered more reactions.

If we look at social movements and committed activists, we see that the account with the most references to these issues is *Extinction Rebellion*. In 30% of its posts it mentioned the causes and consequences of the problem, while in 17% it proposed solutions to mitigate it. Jane Fonda and the *United Nations* also addressed the causes, consequences and possible solutions, albeit to a lesser extent, in around 18%-20% of their posts. Greta Thunberg did so even less frequently (under 10%).

The analysis of the prominence of *COP 25* in the discourses of the selected accounts allows us to reflect on the importance of the need for a global commitment to tackle the climate crisis. We can see that *COP 25* was scarcely mentioned in the posts on CC. In fact, it was mentioned in only 8% of cases. With regard to mentions by the politicians analysed, it is surprising that the summit was not referred to even once by Trudeau or Ocasio-Cortez. The *United Nations*, one of the organizers of the event, naturally mentioned it in 35% of its total posts on CC.

5.4. Emotions

Table 5 shows the capacity of each post to arouse emotions in the audience, which are expressed by clicking on the corresponding emoticons. Greta Thunberg's posts received a much higher average number of "likes" than the other accounts (more than 28,000 per post). She is followed by Canadian politician Trudeau and American politician Ocasio-Cortez, who have much lower figures (around 7,000-8,000 likes on average per post).

In terms of the other emotions, Greta once again led the way by receiving the highest number of "sad" reactions on average per post. In fact, she aroused the most emotions on average whenever she posted on *Facebook*, except for "angry" reactions. The account with the highest number of "angry" reactions to posts was Bernie Sanders' (216 on average).

In Ocasio-Cortez's posts, "likes" and "loves" predominated (7,855 and 1,445, respectively), as was the case with Jane Fonda's posts, although her average number of reactions was much lower (868 and 274, respectively). The *United Nations* also generated similar reactions, especially "likes" (1,137 on average). Of the politicians analysed, Trudeau received the most "lols" (*lots of lough*) on average with his posts.

Table 5. Average emotions generated by each post on CC, by account

Account	Posts on CC	Averages of emotions generated					
		"Like"	"Sad"	"Love"	"Anger"	"Lol"	Total average
gretathunbergsweden	106	28,374	873	6,459	168	507	36,382
OcasioCortez	6	7,855	467	1,445	0	52	818
JustinPJTrudeau	18	8,651	0	969	0	164	9,785
berniesanders	57	2,426	125	517	216	54	3,338
unitednations	65	1,135	26	114	0	16	1,291
XRebellionUK	308	72	4	16	4	1	98
JaneFonda	39	868	1	274	0	1	1,144

6. Discussion

6.1. CC prominence and depth of discourse

Based on the number of posts on CC in the *Facebook* accounts studied, the accounts can be divided into three different groups:

(i) accounts with a high percentage of posts on the topic;

(ii) accounts that simply discuss CC as one topic among many; and

(iii) accounts that completely ignore the issue.

The first group is made up of climate activists *Extinction Rebellion* and Greta Thunberg; the second includes the *United Nations*, actress Jane Fonda and certain politicians who are inclined to take action against CC; and the third includes politicians who have openly declared their scepticism on the issue.

Some of the accounts in the sample behaved very differently in the pre-summit, summit and post-summit periods. While the accounts of Jane Fonda, *Extinction Rebellion*, Greta Thunberg, Justin Trudeau and Ocasio-Cortez reduced the number of posts on CC during the summit, the accounts of Bernie Sanders and the *United Nations* increased their posts.

A look at the accounts of these three non-sceptical politicians shows that the communication strategies of Ocasio-Cortez and the Canadian prime minister were broadly similar, with communications that mentioned slogans and the need to fight CC, but without providing details on concrete proposals (taking into consideration the limited number of posts made by these accounts in

> The strategies that work best to achieve a greater impact do not appear to be those that offer a deep, well-argued discourse or involve frequent posting. What works best is emotion and the sense of community

the period analysed). However, Bernie Sanders' strategy differed from the others in that it involved a greater number of posts in which the issue was more prominent and details were provided regarding concrete actions to be taken to tackle the climate crisis. This strategy was closer to those of the *United Nations* and the *XRebellion UK* movement, which also provided explanations. In other words, Bernie Sanders appears to have adopted a more rational discourse than his political peers, whose appeal to emotions gave them a greater return in terms of interactions with their followers. Of the accounts analysed, the one that stands out as the funniest (with the highest average number of "lol" emotions) was Justin Trudeau's, whereas Sander's account had the most "angry" reactions.

> The results clearly show that on *Facebook* more rational, serious discourses are not rewarded in terms of interaction (they do not receive emoticons)

With regard to the prominence of *COP 25*, the discourse on *Facebook* did not appear to be affected by the organization of this type of event, unlike what generally happens in news agendas and traditional media. Of the three politicians who believe in CC, Bernie Sanders was the only one who mentioned the *COP 25* during the period analysed, which indicates a more traditional strategy in tune with the need to reach global agreements. This strategy was more like the one used by the *United Nations*. As an organizer of the event, the *UN* naturally centred its discourse on the climate summit.

6.2. Discourse and communication objectives

Each account pursued different objectives. Building a positive image was important for the Canadian prime minister, but for Ocasio-Cortez, also a politician, calls for action and criticism carried more weight. The *United Nations* excelled at calling for action, as did activist Greta Thunberg, who also disseminated many informative posts and published a number of posts in which she simply mentioned where she was on her journey. Similarly, *Extinction Rebellion UK* opted for critical messages and Jane Fonda chose informative ones.

These results indicate that discourse designed to win over the audience by using different strategies is based either on building a positive image, mentioning the problem without analysing it, or using messages with a moderate tone that appeal to mobilization. In the specific case of US politician Ocasio-Cortez, leader of the *Green new deal*, we can see that she predominantly used discourse based on sublimation when referring to concepts, realities and situations embraced by the members of her audience. In other words, she sought the complicity of her followers by ratifying the existence of the problem.

This moderate tone contrasted with that of the social movement *XRebellion UK*, which built its argument by criticizing inaction, thus making it the account with the most confrontational approach. The *United Nations* account, which was also committed to calling for action, mainly used arguments that appealed to responsibility. However, a high percentage of *UN* posts (compared with the other accounts) employed the fear strategy by presenting the problem as a danger or threat in order to draw greater attention to the climate crisis message. As we can see, the strategies used by different accounts ranged from a conciliatory approach to attitudes of criticism and confrontation.

6.3. Emotions and interactions

Studying the interactions generated by the posts can provide an idea of the success of the different strategies adopted in terms of their potential to generate interactions with account followers. In our study, the account that generated the highest number of emotions on average per post was activist Greta Thunberg, who was far ahead of the other accounts. It was surprising to see that the *XRebellion UK* movement, the account that most actively mentioned CC, did not manage to generate a proportional number of reactions. In fact, the average number of reactions generated by its posts was surprisingly low compared to the other accounts in that it received fewer than a hundred interactions per post.

These results suggest that the accounts with a page format, i.e. the non-personal accounts, seemed to generate less of an emotional impact among their followers. This is confirmed if we look at the other account with a page format, the *United Nations*, which was also one of the accounts that received the fewest reactions from its audience. Therefore, in terms of generating more emotional impact on *Facebook*, the results suggest that it is not really a question of being a politician or an activist or even a question of providing arguments in posts. This result is a reflection of the strategy announced by *Facebook* in 2018 of giving priority to content published by family and friends as opposed to posts from companies or the media. In the words of its creator, this was a way of "fostering community".

However, let's not forget that behind the accounts of famous politicians (including those analysed here, even the *United Nations*), marketing departments design and plan the accounts' communication strategies. Therefore, the strategies that work best to achieve a greater impact on this social network in terms of CC do not appear to be those that offer a deep, well-argued discourse or involve frequent posting. What works best is emotion and the sense of community, as generated by activist Greta Thunberg and, to a lesser extent, American politician Ocasio-Cortez and Canadian politician Trudeau.

> One of the most interesting conclusions is the scant importance given to CC and *COP 25* by politicians and institutions, with the obvious exception of the *United Nations* and, to a lesser extent, Bernie Sanders

7. Conclusions

This preliminary study examined the characteristics of climate change (CC) communication on *Facebook* by analysing some of the most important public voices on the subject. The results clearly show that more rational, serious discourses are not rewarded in terms of interaction (they do not receive emoticons).

Based on preliminary results with regard to the presence of CC as a topic, we observed three different strategies: omission, simple mention and high presence. If we focus on the interaction achieved, we see that emotional posts received more emoticons than analytical posts with less interaction. Therefore, taking into account the diversity of discourses and objectives described in the results, we differentiated three communication strategies:

- one characterized by not mentioning the topic, a tactic typical of sceptics;
- a second type that focused on emotions, although it did not delve into the causes or consequences of the phenomenon; and
- a third strategy, more belligerent, which explained the problem, but did not achieve interaction.

While the accounts of the sceptics analysed choose not to mention CC, other politicians included CC in their discourse with moderate prominence. In these cases, the main strategy involved calling their followers to action by mentioning the problem without analysing it. This was the case of Justin Trudeau, who adopted an emotional discourse that achieved more interaction, as translated into the different emoticons offered by *Facebook*. Other people and organizations, such as Bernie Sanders and the *United Nations*, opted for a rational discourse that included arguments, but did not manage to attract as much interaction in the form of emoticons.

We also observed discourse with a belligerent tone, typical of accounts in opposition to the few measures adopted to deal with the problem. These posts issued a call for action and highlighted the need to take action on the problem. In these accounts, CC featured prominently among the topics discussed, and its causes, consequences and solutions were frequently mentioned. However, these accounts do not stand out for attracting significant interaction with their posts. The most representative case was the *Extinction Rebellion UK* movement.

The accounts of Greta Thunberg and Jane Fonda displayed features of both emotional and belligerent discourse. These accounts gave CC a very prominent role in their posts and attracted considerable interaction, especially Greta Thunberg's account. However, the discourse pursued emotions over explanations, as there was no predominant mention of the causes, consequences or concrete solutions of the problem. Once again, this was especially true in the case of Thunberg's account.

The depth of the posts (analysed by studying mentions of causes, consequences and solutions) prompts us to reflect on the lack of an educational and dissemination function for CC on this social network. One of the most interesting conclusions that can be drawn from the study is undoubtedly the scant importance given to CC and *COP 25* by politicians and institutions, with the obvious exception of the *United Nations* and, to a lesser extent, Bernie Sanders. In other words, mentioning CC was not a general priority for most of the political accounts analysed.

This study helps improve our knowledge of how discourse on CC is constructed on *Facebook*, the social network with the most users. More in-depth study of communication of this global problem, which is not merely an environmental issue, but also a political, economic and social predicament, will allow us to make proposals for improving the quality of communication on the phenomenon on social networks, which are fundamental forums for public debate among audiences.

8. Notes

1. *Facebook* pages are used to manage communities around a brand and have specific features, such as the possibility of segmenting the audience and having a personalized URL.

2. The number of followers of the 10 accounts studied has been updated to March 2022.

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