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The COVID-19 infodemic in social media: Political exaggeration and communicative autonomy

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Abstract

This study aims to assess the difficulty of maintaining the interpretative autonomy of communication professionals and citizens, in the face of information about the global pandemic. At the same time, this research analyzes critically the World Health Organization's accusation of an 'infodemic'; was it confirmed or should it be regarded as political exaggeration? An analysis was made of 15,000 tweets around the world, with more than 1,000 RTs for each one, that circulated from 6 February to 18 March 2020. The results demonstrate that it is not so much possible to speak of infodemic but of a remarkable difficulty in interpreting information, together with a preponderant weight of opinion and emotionality. Academia is responsible for disseminating concepts; corporations, for filtering ethically their content; the political class, for not hiding behind the infodemic to lower the challenge of managing the pandemic.

Contents

1. Introduction

On 13 February 2020 in Barcelona, Spain, a social and political discussion broke out when the Mobile Congress, which attracts thousands from all over the world to the city, was cancelled because of the coronavirus. At that time, political authorities insisted "that there was no health risk" [1]. The notion of an infodemic appeared to be justified in light of what was thought to be exaggerated fear had taken away city revenue as a result of the Congress (Gutiérrez-Rubí, 2020). On 4 February, the director of the World Health Organization's (WHO) Department of Global Infectious Hazard Preparedness, Sylvie Briand, argued that the main problem affecting the Covid-19 outbreak was an infodemic (*El Plural*, 2020), and not that it had become a pandemic.

The international medical community of the twenty-first century has previously faced respiratory ailments of global proportions: SARS (Severe Acute Respiratory Syndrome) in 2002 and H1N1 Influenza (influenza virus A subtype H1N1) in 2009. Drazen and Campion (2003) documented the ease with which they were

able to distribute their research via wireless networks in the SARS crisis. During the epidemiological emergency represented by H1N1 influenza in 2009, in the community of Madrid (Spain) they documented that the daily automatic capture of data from electronic medical records constituted a particularly useful source of information in monitoring the evolution of the pandemic and strategic decision-making (Esteban-Vasallo, *et al.*, 2010).

Communication technologies transformed the way of dealing with pandemics on the media. Chew and Eysenbach (2010) argued that traditionally, mass media such as newspapers, television and radio were the main transmitters of information to public health agencies to mitigate risks. However, during the H1N1 health emergency, people saw the Internet as their most used source of information about the pandemic. Signorini, *et al.* (2011) conducted a study to determine the impact of Twitter on that pandemic, confirming that "Twitter traffic can be used not only descriptively, tracking users' interests and concerns about H1N1 influenza, but also to estimate real-time disease activity" [2].

These early global pandemics inaugurated studies of the role of networks in their course. On the coronavirus pandemic, one of the first analysis on an infodemic was Strzelecki and Rizun's (2020) analysis of Google Trends in China. Since then, medical and social science literature has been immersed in a discussion of fake news, disinformation and social media.

Previous research mainly focused on demonstrating the presence of fake news around COVID-19 in social media. The underlying critical perspective of this paper does not minimize the importance of the effect of fake news in the public sphere but shifts towards a consideration of misinformation that includes the difficulty of differentiating types of messages. This approach diverts the preeminent attention from the misuse of networks to the need to train an entire population in information and media literacy. Administration and education leaders can use these data to guide training programs at all age levels.

2. Literature review

2.1. Digital disinformation, misinformation and infodemic

Throughout history, the construction of false collective messages has been transformed. Today, the conceptualization of fake news has resurfaced in modern politics and online technologies (Brummette, *et al.*, 2018). Cabezuelo and Manfredi (2019) warned that, derived from fake news or alternative facts, realities are created that are defined under the structure of post-truth, considered "a lie assumed as truth or even a lie reinforced as a belief or as a shared fact in a society through the different digital tools existing today." [3]

The problem of providing access to genuine online information has been attributed to a huge amount of data, "as it concerns different information objects (Web pages, online accounts, social media posts), different online platforms (portals, social networking services, question-answering systems) and different domains and purposes (detecting fake news, retrieving credible health-related information, reducing propaganda and hate-speech)" (Saracco and Viviani, 2021).

The category of *fake news* itself is still under discussion (Alemanno, 2018; Albright, 2017), since some have considered jokes or satire as fake (Salaverría, *et al.*, 2020). But humor is part of a form of communication that linguistic pragmatics integrates into language, although its forms are related to specific times and sociocultural contexts (Siurana Aparisi, 2013). Likewise, it is effective as a form of relationship and cultural knowledge of each group (Critchley, 2010), so not all forms of humor or jokes can be treated as misinformation. Disinformation can be interpreted in the sense of Bennett and Livingstone (2018), who included intentional falsehood, and misinformation as a category of errors (Fetzer, 2004).

Aparici and García-Marín (2018) asserted that "the new media ecosystem is characterized by the overabundance of information and the oligopoly of a handful of platforms whose business model constitutes the ideal breeding ground for the propagation of lies." [4] Other researchers (Alonso, *et al.*, 2020; Tagliabue, *et al.*, 2020; Fernández García, 2017) predicted very direct socio-political consequences as large proportions of the population are informed on networks, such as disruptive ones in the public sphere, which attacked trust in institutions (Neto, *et al.*, 2020; Bennett and Livingstone, 2018).

Infodemic has been equated with the circulation of rumors, falsehoods, misinformation and conspiracy theories (Su, *et al.*, 2022; *Lancet Infectious Diseases*, 2020). It can be considered a meta-category more journalistic than academic, taking into account verbal parallelism established with *pandemic*.

In the case of Twitter's virality (Esser and Strömbäck, 2014), this has also been linked to bots, robotic automatism to drive discussion through mass messages. For Hu, *et al.* (2012, in Luque, *et al.*, 2020) "on Twitter, people (and bots) who post specific information have the ability to convince a large number of users before receiving confirmation from the original source or media" [5]. Consequently, this specific social network has a remarkable capacity to affect public opinion.

2.2. Twitter in the face of the pandemic

During COVID-19, information distributed in networks acted as an active media agent to inform or misinform with the growth of the pandemic. Reception studies in various countries pointed to the Internet as the main source of information on COVID-19 (Wang, *et al.*, 2020). For Fernández-Pedemonte, *et al.* (2020) "the rhetorical war" that already existed before COVID-19, worsened [6].

The COVID-19 crisis has also become, in addition to a public health crisis and economic crisis, an information crisis (Pérez-Dasilva, *et al.*, 2020). Information has flowed through social networks and unfiltered private networks such as WhatsApp, Facebook, Twitter, YouTube and TikTok (Canovaca de la Fuente, 2020; Patel, *et al.*, 2020). The international community warned about the potential growth of 'infoxication' (Ölcer, *et al.*, 2020; Tasnim, *et al.*, 2020); during the pandemic it was called 'infodemia'.

The discussion around misinformation on Twitter during the pandemic is extensive. Baloglu (2020) warned that "for example, the Bat Soup video recorded in Palau in 2016 is one of the first steps in the wave of hatred against Chinese nationals on YouTube and Twitter after the COVID-19 outbreak" [7]. Sentiment analysis was used to classify misinformation messages on Twitter (Charquero, *et al.*, 2021).

Kouzy, *et al.* (2020) pointed to a troubling problem in light of the global COVID-19 epidemic, plagued by a huge amount of information. For them, "some tweets or Twitter accounts were associated with an increased likelihood of spreading false and unverifiable information". A Twitter database study by Sharma, *et al.* (2020) noted that there were several critical directions for future work to address the large-scale infodemic surrounding COVID-19, warning that "the proportion of Twitter users in the United States is higher than in other countries, such as China, which use alternative social networks" [8]. Sharma, *et al.* called for making disinformation visible from a more global spectrum on all other platforms (Cerón, *et al.*, 2021). The infodemic has been indeed studied by an analysis of statistical patterns from a epidemiological perspective (Gallotti, *et al.*, 2020).

Rajput, *et al.* (2020) and Silva-Souza (2020), among others, placed the content about the pandemic posted on social networks such as Twitter and Facebook in the spectrum of human emotions. For Solanilla (2020), political crisis communication in a pandemic scenario cannot be managed only "with bold, creative or emotional stories or speeches, but with a transparent, proactive, close, clear and useful way of communicating, generating new coalitions" [9].

2.3. Communicative autonomy and technological maturity

Communicative autonomy can be understood in a Kantian sense of autonomy in ethics but adapted to a human capacity to process (create, understand, rework, share and disseminate) content independently and

without external manipulation and imposition. In this sense, part of the concept would address communicative competence (Widén, *et al.*, 2021; Bermúdez and González, 2011; Hymes, 1972), which implies a compendium of skills to participate strategically in a community. The strategic component of communication in social networks has been confronted in maturity/immaturity duality, especially in engineering and internal communication processes of organizations, where maturity models were proposed to manage social networks for internal operations (Johansson, *et al.*, 2019; Jami and Jafari, 2018; Farias, *et al.*, 2016; Boufim and Barka, 2015; Lehmkuhl, *et al.*, 2013).

The sense of autonomy and technological maturity in the face of social networks is fully evidenced by the use of social networks during the COVID-19 pandemic. This came at a time when traditional media consumption declined and many were informed only through social networks (Juárez, 2021; Silva-Souza, 2020). According to some research, it is the number of likes and emotive content that drove acceptance of certain messages. Alluding to a 2017 study in Spain, 86 percent of individuals who consumed news did not differentiate fake from real news, although 60 percent claimed to be able to do so. According to these data, only 5.8 percent claimed to compare information. The same data was reported by Sheares, *et al.* (2020), with 62 percent of respondents claiming to distinguish disinformation and conspiracy theories over COVID-19. Distrust in social media decreased with age, according to Sheares, *et al.*.

In this context of little contrasting, less consumption of professional and filtered media (Miller and Bartlett, 2012) and difficulties in discerning truthful information from hoaxes the so-called tsunami of information, as some named it, appeared with each pandemic (Briand, 2020). With this avalanche emerges the difficulty of consuming information, especially distinguishing it from opinion or emotional messages (Grüner and Krüguer, 2021), in the midst of a situation of great social pressure, fear for health and economic meltdown in many countries.

Hence the challenge proposed in this article is to discern whether Twitter should be accused of spreading hoaxes or to diagnose where communicative autonomy is stuck, from the point of view of an interpretation of truthfulness and a guarantee of sharing content.

3. Method

3.1. General objective

The main objective of this research is to assess the difficulty of maintaining the interpretative autonomy of communication professionals and citizens, in the face of challenges to information about the global pandemic. The purpose is to test the ease or difficulty of contrasting information on networks, and how this can jeopardize the communicative autonomy of professionals and citizens active in social media.

3.2. Research questions

RQ1: What kind of content has been distributed about the coronavirus on Twitter at a time when social media were accused of inducing an infodemic and being relatively conspiratorial about COVID?
RQ2: Which relevant actors used the platform and for what purposes?
RQ3: What was the real weight of disinformation, understood as intentionally false or misleading information? What was limiting the communicative autonomy of users?

3.3. Analysis approach and categories

The approach of this study was both quantitative and qualitative, with analysis of textual content and various communicative resources, such as links, photographs or videos. A semiotic diagnosis was not applied to them, but in terms of the information that they conveyed. Neither used automatized programs, as the objective was to reproduce human consumption and understanding of Twitter messages. Other approaches, such as sentiment analysis, already provided by Tweet Binder, were not suitable for the purpose of this research.

Categories correspond to location, scope, transcription and type of message. They are:

- Number of tweets
- Author
- Complete date (month, day, time)
- Number of retweets
- Number of likes
- Classified content:
    - Informative: they offer data or report events
    - Opinative: arguments, criticism or beliefs
    - Emotive: calls for encouragement, hope, recovery
    - Humorous: jokes, satire or puns
    - Unrelated: topics unrelated to Covid and its scope
    - Link only: links that do not provide media with content

With informative content, it could be identified by subcategories:

1. When potentially fake news is identified, it is classified as:
   • True: The information has been proven to be true when compared with reliable and verified sources. The TweetDeck application was also used to confirm that they were not bootstrapped accounts, checking sources of the same information and the place and time of the first tweet of that data.
   • False: The information was proven to be false when contrasted with reliable and verified sources.
2. No information: No data was found in other sources to contrast the information

In the case of informative or opinionated content, three more subcategories were noted:

1. Rumor (only if detected through different sources or lack thereof).
2. Racism (to note attacks based on territorial affiliation, nationality or race).
3. Conspiracy (for unsubstantiated theories and against certain countries or entities).

3.4. Sample

The total sample of tweets was 15,000, corresponding to the hashtags #coronavirus and #Covid19 or #Covid-19. These were worldwide tweets with more than 1,000 retweets each, provided by Tweet Binder, so the impact of the real sample was much broader.

The delimiting dates of the sample were from 6 February to 18 March 2020, the days in which a formal accusation of infodemic towards the media and social networks was made by a variety of political authorities.

Out of these 15,000 tweets, the analysis was limited to the three most used languages in the sample and having more than 1,000 tweets: English (55.2 percent of the total), Spanish (21.5 percent) and Portuguese (6.2 percent). English-language tweets came mostly from the United States, Portuguese-language tweets from Brazil, and Spanish-language tweets from Spain, Mexico and Colombia. Thus, the sample analyzed amounted to 82.9 percent of the total (*n*=12,442 tweets).

3.5. Team of analysts

Since these are tweets of global scope, a team of inter-coders of different nationalities and cultures was formed. In addition to the authors, four more individuals participated in inter-coding. Despite multilingual and multicultural composition, the interpretive challenge of the messages on the network was evident. The process involved double inter-coding and triple inter-coding only in some doubtful cases. Considering Cohen's Kappa, inter-coders reliability coefficient (Anderson, *et al.*, 2001) was of 0.97.

3.6. Limitations of the study

The main limitation of the study rested in the global composition of tweets, with diverse contextual elements. The double inter-coding process was not sufficient to avoid some doubts when annotating the nature of the categories. The cultural differences in interpreting have to be taken into account by multicultural research teams, and also when is necessary to approach an analysis of a multilingual and multicultural sample, such as the one in this study.

4. Results

4.1. Much emotion, few fakes and perplexity in the face of information

The first results demonstrated a presence of messages quite far from purely informational. Out of 12,442 tweets reviewed, opinionated ones numbered 5,819, representing 43.7 percent of the sample. Those considered directly emotive were 819 (6.5 percent) and humorous 1,721 (13.8 percent). In a generic differentiating division between emotion (opinion, humor and emotionality), information and advertising, messages with emotional content accounted for 64 percent of the entire sample.

On the other hand, after passing through different inter-coding screens, informative messages totaled 3,836, or 30.8 percent of the sample. Direct advertising ones were scarce with 148 tweets, or 1.1 percent of the sample, although political propaganda could be hidden in information from and opinion of certain political figures.

Completing 100 percent of the sample would be messages considered advertising, both of products and of political events or personal profiles, a total of 155 (1.2 percent), the links without any further contribution (37) and messages unrelated to the subject of the coronavirus (64).

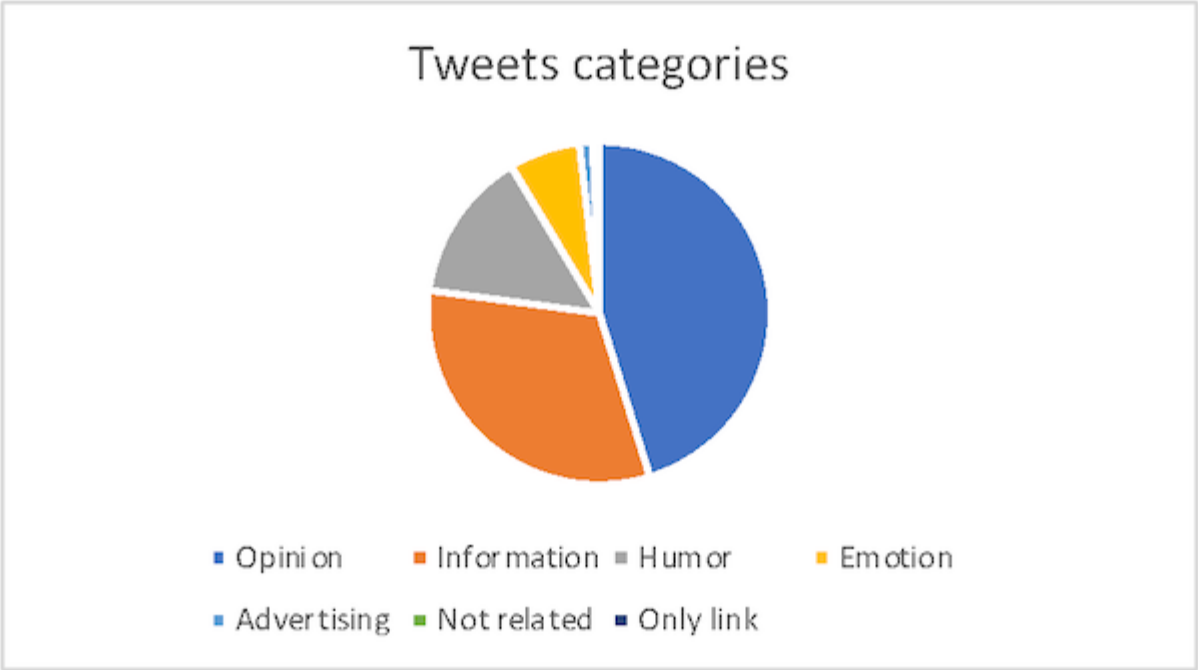

Figure 1: Share of tweet categories by weight.

Focusing on the subcategories as detailed in methodology, it is worth mentioning that within the block of informative items, 78.3 percent were confirmed to be true, that is, certified with inputs from different social information media, such as newspapers in the area of the news item in question and television channels, confirming that all these media shared the same information. This study does not intend to analyze how fact-checking works, but to reproduce the usual user information consumption process, surrounded by media agendas that impose filters according to proximity, and with the same news appearing in different media. The team of seven analysts had instructions to use fact-checking tools only if they considered that it was necessary.

In the same category, 20.2 percent of the messages were considered informative because of the type of text that they posed, but without the certainty of considering them true or false, as there was not enough information circulating for the tweet to be confirmed or refuted.

Informative messages contrasted as fake news accounted for only 1.9 percent of the sample. The type of fake news ranged from a hoax that circulated involving soccer player Cristiano Ronaldo, who had seemingly lent his hotels to COVID patients in Portugal, to the death (prematurely announced) of a relative of the wealthiest Mexican businessman. There were also reports of different cures for the coronavirus in several countries.

A low percentage of fake news does not diminish the importance of the phenomenon of the circulation of misinforming content, but the results illustrated a greater challenge: tweets that, without access to fact-checking tools, could not be easily catalogued. This, coupled with the highly opinionated and emotive components of Twitter, offered a disturbing perspective on the network considered to be the most rhetorical with the highest level of social dialogue.

As for the messages categorized directly as rumors, a total of 303 were identified, whether they were conveyed as information or opinion. Among the tweets that fell into this category, two false rumors stood out:

1. The accusation of Oprah Winfrey of sex trafficking of minors. The rumor started with alleged news that Winfrey has been arrested. Her name quickly became a trend. It was denied in multiple media in the U.S. such as CNN and Fox, and replicated in international newspapers such as *El País, El Heraldo* and *Milenio*, among others.
2. Another rumor derived from fake news involved American actor Tom Hanks. It was spread that news stating that he had tested positive for COVID-19 was false, only covering up that he was in a child trafficking network with other actors and had been arrested in Australia. In this case, it was confirmed that he had not been arrested and that there was no open case against him.

Other rumors involved Bill Gates and the simulation of a virus outbreak, mass cremations of bodies in China, as well as assorted rumors about personalities, journalists and politicians infected with COVID-19.

Those containing racist or conspiratorial messages numbered 110 and 109, respectively; in some cases, tweets were both racist and conspiratorial. As for conspiracy theories, the artificial creation of the virus, with a different origin and purpose, was one of the most widespread, with the accusation of murder of patients in China, one of the most outrageous. In some cases, the rumors were aligned with racist and conspiratorial overtones; for example:

> "CHINA seeks world domination! Where are the Hong Kong protesters? Protesters who honored, folded our flag with reverence. Is China culling their population? Coronavirus developed to quiet ppl? IS THE WORLD NOW COLLATERAL DAMAGE? Communism kills! https://t.co/1Tby5LKHM0" (24 February 2020).

4.2. A showcase of political figures

The presence of political actors in the sample was concentrated in opinionated ones, the majority of tweets with virality occurring in the first days of pandemic management. In terms of topics, those with political overtones contained repeated accusations against the Chinese government. Alternatively, they were concentrated on accusing or defending former U.S. president Trump in the management of the coronavirus crisis. In third place, there was strong criticism against the Mexican government, considering that Mexico was one of three countries from which most tweets in Spanish originated. Twelve percent of the entire sample contained the word "Trump", either because of content criticizing the former president or because it contained information about his administration.

It is precisely the management of the crisis that occupied the second largest block of topics, criticism on how the United States, France, Spain or Italy managed this problem. The third group of tweets came directly from political figures, a very long list of well-known personalities.

As an example, one of the most active participants was Team Trump, and their fight against Democrats, which took great prominence in the sample. Bernie Sanders, Kamala Harris, Ted Cruz, Elisabeth Warren, Hillary Clinton, Nancy Pelosi, Joe Biden, Marco Rubio, Ben Shapiro, as well as various U.S. senators and governors, used the platform to express their opinions. Emmanuel Macron, Lenín Moreno, Matteo Renzi, Pedro Sánchez and Nayib Bukele were other presidents from different states who also participated. The list of political figures, especially from the United States, Spain and Colombia, was extensive. Most of Trump's tweets were opinionated, but a portion could be considered informative, although he often emphasized errors of opponents. For example, this tweet was released by Team Trump (16 March 2020):

> "In the #DemDebate, Joe Biden and Bernie Sanders:
> ✖ Mixed up the coronavirus with Ebola — twice
> ✖ Claimed we've been through the coronavirus before
> ✖ Referred to the "N1H1" virus (it's H1N1)
> ✖ Forgot the name of "what happened in Africa" (Ebola)

> They aren't up for this. https://t.co/28FyUQ7DMe"

Although the participation of politicians was the most relevant, especially occupying Twitter as an arena of political confrontation between Democrats and Republicans in the case of the United States, other well-known actors also stood out, such as Melania Trump, Chelsea Clinton or activist Greta Thumberg. Other prominent figures appeared, but in national settings, such as Dr. Oriol Mitjà from Barcelona (Spain), a media figure throughout the pandemic, whose Twitter account had 201,700 followers as of January 2022. He may be similar to immunologist Anthony Fauci, but he did not participate in this sample, although he is cited as a source of informative and opinionated messages, on 91 occasions.

In the early days of the pandemic (February-March 2020), China was a repeated location in the tweets, the great protagonist of comments. This occurred because discussion ranged from accusations for China for being the focus of COVID, to criticism against racism triggered against Asians, passing through the memory of Dr. Li Wenliang, the Chinese doctor who warned about the pandemic, and died on 7 February 2020 because of COVID-19.

Another recurring theme was the parallel drawn by many tweets between the fight against the pandemic and the necessary fight against climate change or male violence:

> "The people who reject the scientists warning about climate change but immediately buy every bottle of hand sanitizer when scientists warn them about coronavirus prove that it was never about believing or disbelieving. It's about what doesn't directly affect them and what does" (10 March 2020).

4.3. Challenges to communicative autonomy

The challenges to the consumption and disclosure of information in social networks became evident in the great crisis of the SARS-CoV-2 pandemic. An important share of messages classified in the sample as informative were reports of contagion both in number of affected people and of celebrities confirmed COVID-19 cases. It was difficult to keep track of a fake news when it was a tweet citing a number of cases, deaths or infected per country, as figures from authorities and the media usually took longer to be published than when journalists tweeted them. It should be noted that journalists' profiles had a Twitter verification stamp and could generally be deemed reliable.

Followers, for their part, seemed not to distinguish between opinion and information. Some authors shared links to traditional media news by adding personal comments, which could generate a pre-judgment or bias towards the information for the rest of the users. For example, rumors about the number of infected people in China reported by common profiles, not media or authorities, appeared more frequently than official information, which could generate "noise" and low reliability. It was evident that communication and media literacy appeared as a need to be further explored, from the distinction between facts and opinion to the use of more sophisticated fact-checking tools.

Those considered in the sample as rumors were triggered by profiles of real people and not bots, since the criteria of account creation date (age), the number of followers (high and verifiable that they are real people), number of tweets published, date of latest tweets (not simply retweet and shared) and interactions (if they reply to followers) were taken into account. To these checks, confidence may be boosted if the author had a Web site or associated accounts. In some cases, it could be confirmed by an image representing a real person or company logo. If a personal or artistic name was used, this could be verified with other active social networks. The Twitter seal of verified account mark was also an indication that the user was a person and not a bot.

But such thorough and devoted analysis demanded users a much longer reading time, which was estimated to be less than three seconds per message (McNugh, 2015), and context, which largely occurred on mobile

devices. It was highly unlikely that an ordinary user would engage in this kind of fact checking.

In the case of tweets categorized as false or uninformed information, the most prominent authors correspond to freelance journalist profiles. Verification was simple when the topic was already under investigation on a verification page. It became more complicated when media publish it as an alleged rumor but did not provide more details. If it was the case of independent journalists who were not directly related to a traditional medium, it was difficult to confirm their information because in some cases they seem to working on an 'exclusive' or were based on autonomous investigations. The rush to discover a scoop gave rise to rumors because they were shared on Twitter without prior confirmation.

During the pandemic, the credibility of alternative versus traditional media was tested. Some verified and true informative topics were based on complaints from alternative media, but also from non-media sources, such as a lawsuit for patent rights of 3-D masks or a complaint against a Brazilian company that forced its workers to work despite the COVID alert.

Research on pandemic content consumption concluded that respondents in the United States had been very confused about pandemic information. Social networking sites focused attention but conveyed anxiety, while trusted sources kept disillusionment and alternative facts at bay (Bratu, 2020).

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5. Discussion and conclusions

This study concludes that the attack to communicative autonomy of Twitter users was not based on the spread of fake news or the profusion of conspiracy theories, but a difficulty in distinguishing between information and opinion. The predominance of opinion, weight of emotive content and sheer number of tweets that were difficult to classify as true or false made Twitter a platform far from simply informative (Ferré-Pavia and Perales, 2015), closer to mis-informative. The categories '*disinformation*' and '*misinformation*' are debatable, but this research accepts 'disinformation' as defined in Bennett and Livingstone (2018).

Political intervention in this sample focused on opinion. Twitter appeared as a political arena in American bipartisanship, differently compared to other research findings (Pérez-Dasilva, *et al.*, 2020).

The primordial presence of emotion appeared as a constant on Twitter paradoxically considered the most rhetorical network (Pascual-Ferrá, *et al.*, 2021; Everett, 2018). In Twitter text and image have a more balanced weight and relationships of potential dialogue are established among distant individuals without personal involvement, unlike Facebook, Instagram or WhatsApp, for different reasons. The study of Twitter has been closely linked to politics, at least as much as to information (van Kessel and Castelein, 2016; Feroz Khan, *et al.*, 2014).

This paper argues that Twitter conveyed — in the relationship between number of RTs and virality — fake news. The results in this study agree more with Pulido, *et al.* (2020); they found more truthful information than misinformation in a sample of tweets about COVID.

Another debatable point focuses on the categories of tweets. This research expressly opted to consider humor in a way that was far removed from disinformation. It is true that the team of analysts had verified the difficulty of interpreting humorous tweets when not sharing language and context, but this characteristic of humor, the necessary knowledge of the referents that it satirizes, does not make it fake by itself.

The study also concluded the WHO's statement declaring that the worst face of the pandemic was the

infodemic seemed to be a political exaggeration and somewhat trivialized. If academia does not agree with the infodemic side of the online conversation, putting the infodemic ahead of deaths, disease, international and personal isolation and economic impact (not yet the great crisis when this accusation was made) is disrespectful, to say the least.

The disruptive effects of a bad information diet are real, especially in terms of political distrust (Bennett and Livingstone, 2018) and healthcare management, but other researchers have highlighted how social media, during the pandemic, helped citizens with emotional and mental support (Cheng, *et al.*, 2020). It is clear that the pandemic generated paradoxical data in research.

A limitation encountered in the study was that the most active participating countries in the selected sample, such as the United States, Spain or Colombia were not victims of disinformation in the same way. In the U.S., if a political figure made statements on Twitter, it was checked whether those remarks were true or false. This made it easier to check tweets from the U.S., while in Latin America and Spain it was more complicated. Some researchers also pointed out that "the English-centric nature of the resources helping identify unreliable news sources probably exacerbates the intrinsic Twitter demographic limitations towards well-educated English-speaking users" (Gallotti, *et al.*, 2020).

Despite efforts demanded of Facebook, Twitter or WhatsApp to curb fake news and conspiracy messages, the challenge of checking information on Twitter is still on the table, since fact-checking tools require a certain effort and time (Martins, *et al.*, 2021; Alonso and Terol, 2021). Twitter's truthfulness seal is a good initiative, but not all information on Twitter is objectively informative.

The limitations of this study, with worldwide tweets, also served to test the challenges to communicative competence and autonomy of users. Media literacy including critical thinking and capacity to contrast information, distinguishing true and false, appears as a unique tool to vaccinate against misinformation (Thomas, *et al.*, 2022).

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Notes

1. Salvador Illa, Minister of Health of Spain during 2020 ands 2021, stated: "There is no public health reason to adopt any measures regarding any event planned in Barcelona, Catalonia or Spain".

2. Signorini, *et al.*, 2011, p. 7.

3. Cabezuelo and Manfredi, 2019, p. 472.

4. Aparici and García-Marín, 2018, p. 2.

5. Luque, *et al.*, 2020, p. 51.

6. Fernández-Pedemonte, *et al.*, 2020, p. 157.

7. Baloglu, 2020, p. 76.

8. Sharma, *et al.*, 2020, p. 9.

9. Solanilla, 2020, p. 20.

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