



Characteristics of Misinformation Discourses Related to Scientific Knowledge Created by Bolsonaro Networks on Twitter

Gabriela Fasolo Pivaro  • Gildo Giroto Júnior 

Abstract

As much as we know that discourses attacking the credibility of science and the manufacture of fake news are not a recent phenomenon, they have been gaining greater visibility with the popularization of social media. Due to the algorithms that govern the content shown to the user, ideological bubbles are created, in which misinformation finds fertile ground to propagate. Thinking about the Brazilian context, we conducted an ethnographic study for the internet and analyzed the characteristics of misinformation discourses related to scientific knowledge on the social network Twitter, among users who take part in support networks for former President Jair Bolsonaro. By the categorization of the reported content, we discuss not only the discursive characteristics present in the analyzed tweets, but also how the processes of teaching-learning in science and the lack of certain knowledge involving the way scientific knowledge is built can influence the spread of misinformation. We present results that relate personal and immediate experience, hidden causal links, and identity belonging as characteristics that affect the spread of misinformation online. We compare these characteristics with gaps in science teaching-learning processes. We conclude by highlighting the importance of both understanding how the content filter of social networks works and promoting an education that develops ways of thinking seeking generalizations of content as ways to fight misinformation.

Keywords: misinformation, bolsolarism, social media

Características dos Discursos de Desinformação Relacionados aos Conhecimentos Científicos das Redes Bolsonaristas no Twitter

Resumo

Por mais que saibamos que discursos de ataque à credibilidade da ciência e a fabricação de notícias falsas não sejam um fenômeno recente, eles vêm ganhando maior visibilidade com a popularização das redes sociais. Devido aos algoritmos que regem o conteúdo mostrado ao usuário, criam-se bolhas ideológicas nas quais a desinformação encontra terreno fértil para se propagar. Pensando no contexto brasileiro, realizamos uma etnografia para a internet e analisamos as características dos discursos de desinformação relacionados aos conhecimentos científicos na rede social Twitter, entre usuários que participam de redes de apoio ao ex-presidente Jair Bolsonaro. Por meio da categorização do conteúdo reportados, discutimos não só sobre as características discursivas presentes nos *tweets* analisados, como também sobre como os processos de ensino aprendizagem em ciências e a falta de certos conhecimentos envolvendo o modo como conhecimentos científicos são construídos pode influenciar a propagação de desinformações. Apresentamos resultados que relacionam a experiência pessoal e imediata, os elos causais ocultos e o pertencimento identitário como características que influenciam a propagação das desinformações on-line. Comparamos estas características com lacunas em processos de ensino e aprendizagem em ciências. Concluímos destacando a importância tanto do entendimento de como funciona o filtro de conteúdo das redes sociais, como de uma educação que desenvolva modos de se pensar buscando por generalizações de conteúdos como formas de combate às desinformações.

Palavras-chave: desinformação, bolsolarismo, rede social

Características de los Discursos de Desinformación Relacionados con el Conocimiento Científico de las Redes Bolsonaristas en Twitter

Resumen

Sabemos que los discursos que atacan la credibilidad de la ciencia y la fabricación de noticias falsas no son un fenómeno reciente, pero han ido ganando mayor visibilidad con la popularización de las redes sociales. Debido a los algoritmos que rigen el contenido que se muestra al usuario, se crean burbujas ideológicas en las que la desinformación encuentra un terreno fértil para propagarse. Pensando en el contexto brasileño, realizamos una etnografía para internet y analizamos las características de los discursos de desinformación relacionados con el conocimiento científico en la red social Twitter, entre usuarios que participan en redes de apoyo al ex-presidente Jair Bolsonaro. Por categorización del contenido denunciado, buscamos discutir no solo las características discursivas presentes en los tuits analizados, sino también cómo los procesos de enseñanza-aprendizaje en ciencias y la falta de conocimientos ciertos que involucran la forma en que se construye el conocimiento científico pueden influir en la difusión de la desinformación. Presentamos resultados que relacionan la experiencia personal e inmediata, los nexos causales ocultos y la pertenencia identitaria como características que influyen en la difusión de la desinformación en línea. Comparamos estas características con las lagunas en los procesos de enseñanza y aprendizaje de las ciencias. Concluimos destacando la importancia tanto de entender cómo funciona el filtro de contenidos de las redes sociales, como de una educación que fomente formas de pensar, buscando generalizaciones de contenidos como formas de combatir la desinformación.

Palabras clave: desinformación, bolsonarismo, red social

Introduction

It is notorious that our current scenario is constituted by a historical period that stands out for a great proliferation of misinformation in social media, with abundant reports and research aimed at disseminating and studying this phenomenon (Giroto et al., 2022; Oliveira et al., 2020; Petrola, 2019; Pivaro & Giroto Jr., 2022; Recuero & Gruzd, 2019; Recuero et al., 2020; Recuero & Soares, 2021; Soares et al., 2021). Although fake news, rumors, and conspiracy theories are not a new phenomenon, their spread has been amplified due to the popularization of the internet and electronic media (D’Ancona, 2018; McIntyre, 2018). It is recognized that different areas have been the target of misinformation in social media, and, in this text, our analysis will focus on the attack on the credibility of science and its institutions.

The attack on science is also not a recent phenomenon. As Rabin-Havt (2016) and Oreskes & Conway (2010) point out, the tactic of discrediting scientific knowledge was initially promoted by the tobacco industry in the 1950s to avoid economic losses when studies began to find links between cigarette use and respiratory diseases. The tobacco industry inflated public debate by hiring its own professionals to discredit an “other side” of the “academic dispute,” paying for newspaper advertisements and stimulating public debates that challenged the authority of science on the grounds that there were two equally valid sides to the dispute. The jargon, as it became known, was that victory would be achieved when doubt was implanted in the population, because, in this way, the sales of their products would not be affected (D’Ancona, 2018).

This tactic, of inflating a confusion in the population about the credibility of scientific findings and information to advance projects that favor certain sectors, proved successful and was later used in debates on climate change, on the “hole” in the ozone layer, on the use of nuclear weapons (McIntyre, 2018; Oreskes & Conway, 2010; Rabin-Havt, 2016), and recently on the Covid-19 pandemic. Within the Brazilian context, the spread of a climate denialist discourse is fostered by ruralist politicians and entrepreneurs, who have found support within the Bolsonaro government (Miguel, 2020; Rajão et al., 2021), in addition to the federal government itself being accused of spreading misinformation regarding the pandemic on social media (Fernandes et al., 2020; Oliveira, 2021; Recuero et al., 2020).

The massive proliferation of fake news, and misinformation in general, is a strong characteristic of post-truth¹ (McIntyre, 2018). The term became popular after two major events: the election of Donald Trump in the United States and the withdrawal of the United Kingdom from the European Union (the Brexit). Both events were marked by a large amount of fake news that circulated on social media with the intention of manipulating the popular vote, in which the efforts of experts to debunk the lies were not enough. As D’Ancona (2018) comments, as much as lies aimed at a political result are not a new phenomenon, what changes with post-truth is the reaction of the population, which rewards with victory those accused of spreading lies.

Cesarino (2021) complements this idea by stating that, in the era of post-truth and social media, the cost of changing reality and spreading misinformation is low, and can be done by potentially anyone with practically no major consequences. The author understands what has been called post-truth as a condition in which “different realities seem to proliferate in a context of deep epistemic disorganization, in which the scientific community and the expert system more broadly cease to enjoy the social trust and credibility that they previously held” (2021, pp. 77–78).

Cesarino understands post-truth as a moment of transition in the breaking of paradigms, using Thomas Kuhn’s nomenclatures, in which trust in the expert system was destabilized without a new arrangement having yet been structured. Since, for the author, “the great meta-function of science in complex societies like ours is to produce order, through social trust in a system of experts” (2021, p. 77), then post-truth would be a crisis in the population’s trust in scientists.

With confidence in scientists in crisis, the frequency of spreading misinformation involving scientific knowledge increases and, added to the popularization of social media and algorithms of the “filter bubble” type (Pariser, 2012), virtual communities called scientific denialists are created, which disagree, without appropriate justification, with the current scientific knowledge and research institutes. In them, misinformation finds fertile ground to propagate, since scientific denialism can be understood as a community culture, and information that reinforces previous worldviews is often shared without encountering resistance.

1 A term that in 2016 had its meaning associated with “relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief” (English Oxford, 2016, online).

Reflecting on the current national context, in which members of the federal government share misinformation in their own social media, and knowing the possible impacts of their influences on the behavior of the population that follows them, we consider it important to analyze the characteristics of scientific denialist discourse within Bolsonaroist online networks. This understanding allows us to reflect on possible ways to design strategies that aim to mitigate the proliferation of misinformation in social media.

This study is structured into three sections. The first addresses the research methodology of ethnography for the internet, in which we follow a community of supporters of the Bolsonaro government on the social network Twitter to analyze the ways in which misinformation is shared and what are its characteristics. In the second, we seek to describe the characteristics found and how the behavior of users is linked to an attack on the credibility of science and the press as institutions. Based on the theoretical framework of Cesarino (2019, 2020, 2021), who studied the discursive characteristics of online supporter networks of President Jair Bolsonaro during the 2018 elections, we sought to weave relationships with these identified characteristics along with our views on our ethnographic results.

In the third section, we discuss about the learning processes in science and how the lack of specific knowledge about the way scientific knowledge is built can influence the spread of misinformation in social networks structured in ideological bubbles. To illustrate our argument, we bring examples of discourses found in the community we follow, as in the second section.

We hope our study will contribute to debates related to the spread of misinformation on social media, especially those related to scientific denialism, being aware that the topic in question is complex and is not limited to our discussion. We bring a specific framework involving virtual networks of supporters of the Bolsonaro government and its denialism related to scientific knowledge because we understand the influence that the posture of a head of State has on its supporters and in the public debate.

Ethnography of the Social Network Twitter

First of all, it is important to understand what we mean when we use the term *misinformation*. Wardle and Derakhshan (2017) use the term informational disorder to refer to the set of *dis*, *mis*, and *mal-information*. The authors define *dis-information* as information that is false and deliberately created to harm people, social groups, or organizations; *mis-information* as false information, but not created to cause specific targeted harm; and *mal-information* as information that is based on reality but used to direct harm at people, groups, or organizations. These categories include rumors, conspiracy theories, and fabricated information, to which we will refer, without discrimination of use of term, as misinformation, since it is not the scope of this study to delve into the different nomenclatures.

To follow the dynamics between different actors within a Bolsonarist community to see the ways in which misinformation is shared and what its characteristics are, we chose ethnography for the internet (Hine, 2000, 2015) as a research methodology, and the social network Twitter as a place for data collection. For the choice of this network, we considered not only the fact that Jair Bolsonaro and his children use this network a lot to communicate with their supporters, but also the conclusions of research that reinforce the relevance of Twitter as a political mobilizer (Recuero, 2014; Recuero et al., 2015), that the speech of Bolsonaro and/or his supporters is directly related to the misinformation propagated in this network (Penteado et al., 2022; Recuero & Soares, 2021; Seibt & Dannenberg, 2021; Soares, 2020), and that Twitter is used for the propagation of misinformation and scientific denialist discourses (Araujo & Oliveira, 2020; Recuero et al., 2021; Soares et al., 2019).

Seeking delimitations on specific strategies to fight misinformation of a scientific nature that circulate in virtual environments, we aim to understand how “it is to be” someone within a virtual environment with tendencies to spread misinformation so that, from this understanding, reflections relevant to our area of study can arise. Considering our research a case study, we used ethnography for the internet to conduct it and collect data.

Ethnography is the systematic description of the behavior and social organization of a culture based on first-hand observation of a community (Howard, 2002). We understand a community as a construction of limits in which identities and meanings are shared (Guimarães Jr., 2005). Ethnography for the internet transposes the so-called “traditional” ethnography (carried out in physical spaces) to the virtual environment by understanding that communities are not physically limited by the space they occupy, but by the meanings they share.

To carry out an ethnographic research, after studying the existing theoretical references about the community to be analyzed, it is necessary to spend considerable time among the members, to then start writing (Uriarte, 2012). In “traditional” ethnographic research, it is customary to establish a year as the time necessary to follow social cycles of communities; however, in virtual environments, this time is usually shorter, and the sensitivity of the choice to stop depends on the researchers (Guimarães Jr., 2005). In our research, we followed a community of Bolsonaro supporters for eight months, beginning in December 2020.

To carry out the research, we created an exclusive profile on Twitter for this purpose and, as a first action, we followed Jair Bolsonaro and his sons, Carlos, Eduardo, and Flávio. Based on this, we followed a technique of *snowballing* (Howard, 2002; Parker & Scott, 2019) by algorithmic recommendation, in which, through initial profiles (seeds), the Twitter algorithm recommended us other similar accounts to follow, which was done. From our frequent observation, of at least one hour, from four to seven times a week, we could perceive other profiles that frequently appeared in the timeline. Due to the frequency and relevance of these accounts, assessed by our observation, they were

followed. This fed the Twitter algorithm based on our profile, which recommended new accounts to follow, and the cycle continued. At the end of our research, we were following 150 open profiles, including politicians, entrepreneurs, digital influencers, and ordinary users.

We understand influencers as high-visibility users who are able to direct discussions and influence other users to have the same positioning (Recuero & Soares, 2021). Regarding digital influencers or ordinary users, due to the possibility of the profile not being of a well-known person, we took due care not to follow bot accounts, that is, automated accounts, analyzing the tweets of each account. We know that bot accounts have the potential to increase the flow of propagation of themes and inflate certain discourses, being often used to propagate specific misinformation (Marlow et al., 2021; Recuero & Soares, 2021) and, in fact, such profiles appeared with a certain frequency in interactions. However, our interest lies in the interactions between real users.

We are aware that there is no external validation on the selection of research members, who we believe belong to the same community. This validation comes from us, as researchers, through observation, analysis, and systematic and constant reflections on users, which are typical actions of ethnographic research.

Our collected data were saved in a field diary, in which we contextualized and annotated comments about the observed interactions, as well as tweets that we think are relevant in some way. For the writing of the results, new readings of the data were made, so that, now with a broader vision of the community, the reflections would lead us to perceive patterns and coherence of the community. The categories presented in this work have not been established *a priori*, for this is a characteristic of ethnographic research, thus being able to adapt to the complexity of the analyzed social life and allow an interpretative description of how people organize their lives and interpret the world (Hine, 2000). However, they were interpreted based on the discussions present in Cesarino (2019, 2020, 2021) on characterization of Bolsonaroist misinformation networks, and Mortimer (1996), Santos and Mattos (2009), and Lago et al.(2020) on teaching-learning processes. The results presented are excerpts from our research, and we intend to deepen the ethnographic descriptions in future studies.

The Characteristics of Bolsonaroist Misinformation Networks

When studying the circulation of misinformation on social media in Brazil, within the context of the Covid-19 pandemic, Recuero et al.(2020) highlight how “political and health authorities have a fundamental role in legitimizing and spreading misinformation about Covid-19 on social media” (p. 6). Among other points, the authors discuss how misinformation about Covid-19 is framed as a political-partisan issue, in which concern for public health is in the background. Therefore, misinformation is used as a political weapon of manipulation of popular opinion, since political authorities choose to spread misinformation on their social media and thus influence their followers.

Cesarino (2021), analyzing large support groups for President Jair Bolsonaro on messaging applications during his election campaign, describes three cognitive reorganization strategies that relate to the absence of trust in the expert system. These are attitudes of government supporters who seek to verify authenticity not by modern structures, such as science, the press, and the institutions of the democratic state of law, but by personal and immediate experience, hidden causal links, and identity belonging. Based on the author, we describe these characteristics below.

Immediate experience can be summed up with the expression “seeing is believing”. It is a common behavior pattern of the members of this community to resort to the experience of personal senses to validate a reality. The ease with which shared videos reach the members’ cell phones brings the feeling that events reach them directly at the moment they happen, generating an illusion that there is a direct participation of people in the events.

The legitimacy of individual experience advances “(...) from the crisis of confidence in the ways of producing reality from the scientific method” (Cesarino, 2021, p. 80). It is common among the participating supporters of these groups to have a conception that scientists and academics live in an *ivory tower*, failing to separate the “real world” from the university. For his supporters, the president, because he is a common man and of the people, succeeds and, therefore, has access to the truth.

As an example of validation by the experience of personal senses, Cesarino (2021) comments on how common it is for members in online groups to express statements such as “only those who lived through the military regime know it was not bad for the good citizen.” The characteristic of a historical negationist discourse of narrative dispute, which delegitimizes the means of knowledge production, is also a conclusion of Silva’s (2020) research on President Bolsonaro’s interactions on the social network Twitter. The characteristics of the mode of propagation of discourses are the same among Bolsonarist digital media.

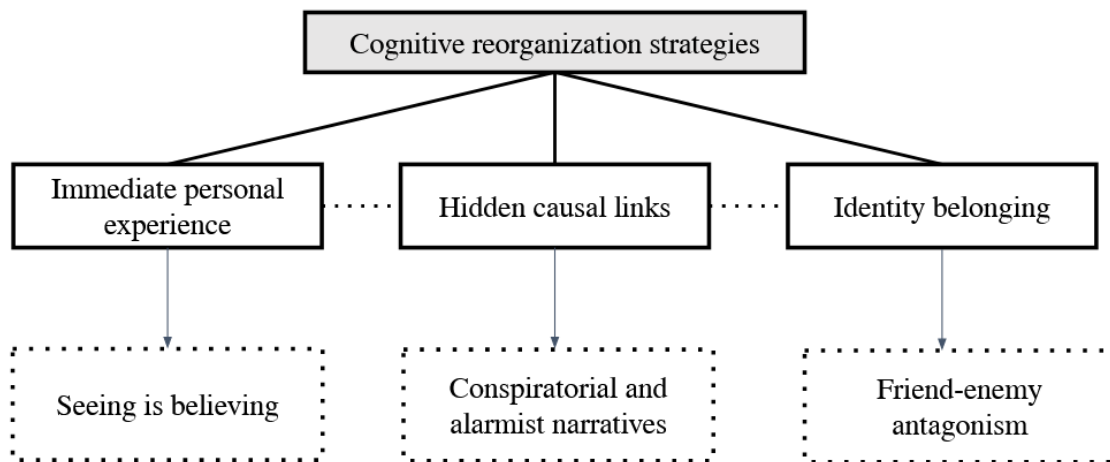
Hidden causal links are the replication of conspiratorial and alarmist narratives, often drawing on pseudosciences to construct one’s own version of reality. Each user “(...) connects sparse evidence by an additive logic, justifying their incompleteness precisely by the conspiratorial character of enemies who allegedly conduct them in a hidden way” (Cesarino, 2021, p. 82). The hidden links to fill the gap of something missing can be any signifier one desires, such as China, the São Paulo Forum, NGOs, globalism, cultural Marxism, etc.

Finally, identity belonging is based on a friend-enemy antagonism, in which the side of the border on which the emissary is classified is more important than the content of the message for the discourse to be characterized as true or false, which is also a striking characteristic of post-truth. Cesarino (2020) highlights how the reduction of complexity, by limiting itself to a friend-enemy confrontation approach, is also a characteristic of a digital populism to add stability to the leader-people system. The leader-people system comes from the creation of a direct channel between the leadership and the public (such

as the official Telegram groups and the Facebook *lives*), which delegitimizes the means of knowledge production such as the academia and the professional press (Cesarino, 2019). This communication strengthens the illusion that there is direct communication between the leader and the people, reinforcing the feeling that the mediation of the press is unnecessary. Figure 1 illustrates the conceptualization developed by the author.

Figure 1

Cognitive reorganization strategies and actions



Source: prepared by the authors based on Cesarino's ideas (2019, 2020, 2021).

Cesarino (2019, 2020, 2021) began her discussions about Bolsonarist digital networks from the historical context of Bolsonaro's election campaign, which was strongly influenced by digital media. Through our research, situated in another historical context — of the Covid-19 pandemic —, we were able to share similar views of the stances and speeches of Bolsonaro and his supporters regarding the spread of misinformation on social media.

As a way to exemplify these discussions, we bring results of our ethnographic research in a virtual community of supporters of the current Brazilian federal government (2018–2022) on the social network Twitter. The tweets that perhaps appear as a way of exemplifying a type of discourse were chosen from several that could also exemplify it. We have chosen to keep anonymous the tweets of ordinary users, that is, those who are not public figures, for an ethical reason.

We begin by describing how belief by immediate experience is related to the spread of misinformation from some interactions in the network, which can be observed in Figures 2 and 3. The monitoring of this network of supporters allowed us to observe, with great frequency, reports of successful cases of the use of the so-called “early treatment” against Covid-19 (remedies that if proven effective, such as ivermectin and hydroxychloroquine, supposedly would prevent the user from developing a severe case of Covid-19, or even becoming infected with the virus). We collected several

interactions in which users shared reports of experiences that they (or their family members and acquaintances) claim to have used the drugs and that, with it, everyone was cured without major concerns.

Figure 2

Follower interaction with President Bolsonaro on the effectiveness of early treatment



Note. Translation: Jair M. Bolsonaro: — Early treatment saves lives. — The emergency vaccine (after being certified by @anvisa_oficial), and not mandatory, is on the way. Link on YouTube. User replies: My two children have had early treatment and are doing well. I took care of both of them, I use the early treatment and was not infected, I am in the risk group. I have all the tests to prove it.

Source: retrieved from Twitter.com.

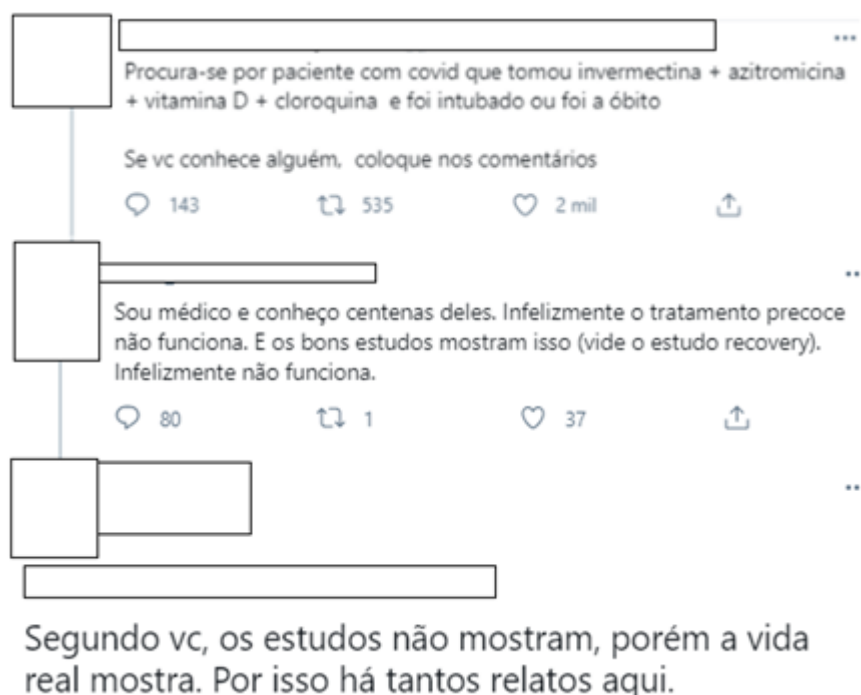
In Figure 2, we see a follower interacting with a tweet in which the president claims that early treatment saves lives, in January 2021, and she talks about her experience, in which she used the drugs and was not infected. What we highlight in this follower's speech is her affirmation that she has the tests to prove that she was not contaminated, as if this proof that she did not catch the virus legitimized her conclusion that she did not get infected because she took the suggested set of medicines. Misinformation, in this case, appears by stimulating a false association that the drugs prevented contamination.

The large amount of similar comments in this community about these personal experiences fosters a feeling that *everyone* are making use of early treatment. In addition, it was rare to find comments about deaths of people who were using early treatment. This creates a view of reality that this treatment is actually saving lives, again spurring misinformation about the use of early treatment.

In Figure 3, we see an example of a rare mention that people who used the early treatment also died from Covid-19. The figure shows the interaction between three users, in which the first, intending to prove that there are no deaths in these cases, provokes his followers to show the evidence of these deaths by asking them to comment on whether they know someone who died in these conditions. The second user of this interaction is, by what he claims, a doctor and, by the content in his profile, a supporter of the president. He claims that the treatment does not work, which prompts a third user to comment.

Figure 3

Interaction between users on the effectiveness of early treatment



Note. Translation: First user: We are looking for a Covid patient who took ivermectin (sic) + azithromycin + vitamin D + chloroquine and was intubated or died. If you know someone, put it in the comments. Second user: I am a doctor and I know hundreds of them. Unfortunately, early treatment does not work. And the good studies show that (see the recovery study). Unfortunately it doesn't work. Third user: According to you, studies don't show it, but real life does. That's why there are so many reports here.

Source: retrieved from Twitter.com.

The phrase "studies don't show it, but real life does" is loaded with meaning, because it induces a thought of disconnection between research and real life, as if research were done outside of life in society. As a consequence, this way of thinking

leads to a discrediting of scientific institutions (and the communication channels that support them), since they would not be revealing “the truth.” In this case, it is implied that this “truth” can be found by the interactions of users, who can freely communicate in these virtual communities.

From the interactions shown in Figures 2 and 3, it is possible to draw a parallel between these results and the influence of non-understanding on the scientific process for the belief and the spread of scientific misinformation on social media. We know that, historically, science education is focused on what is known, and not how it is known, so that science is presented as a set of data without discussing the methods that support them (Camillo & Mattos, 2014). Thus, it is possible to relate that the lack of understanding of how the scientific process is and that it guarantees scientific reliability can influence a misinterpretation of results. Data found without a theoretical framework that supports them can be interpreted in different ways and not necessarily in the correct way. It is observed, in these reports, how individual results of supposed cures due to early treatment are interpreted with a generalizing potential, that is, that can be applied in other diverse contexts. In third section, we expand the discussion on the processes of generalizing knowledge in learning and their relationship to the spread of misinformation.

Still regarding the search for the truth by free interactions between users, in Figure 4 we find a speech by an influencer in this network of supporters stating that the “press” died for allegedly not reporting demonstrations in favor of the Bolsonaro government². This user shows his confidence that, if it were not for social media, the population would not be able to truly inform themselves about the facts that are happening. By his speech, he insinuates that they are wanting to censor the networks to control the information and, with that, control the “narrative.” This feeling that they “want to control the narrative” is also very present, with the word “narrative” in particular being used a lot.

Figure 4

Tweet from Bolsonaroist influencer stating that the “press” died

Não fosse pelas redes sociais, não teria como saber que aconteceram as maiores manifestações no Brasil em mais de ano.

A "imprensa" morreu e esqueceram de avisar.

Por isso o desespero para impor a censura nas redes, possibilitando o controle da narrativa.

228

2,5 mil

11 mil



Note. Translation: If it were not for social networks, I would not have known that the largest demonstrations in Brazil took place in more than a year. The “press” died and they forgot to tell us. Hence the desperation to impose censorship on networks, making it possible to control the narrative.

Source: retrieved from Twitter.com.

² It is common, in this community, for users to either put in quotes what they are demeaning, or write it in the wrong spelling. As an example, it is common for them to write “sience” or “siensse” when they express their discontent with some scientific knowledge.

This speech points not only to the attempt to discredit traditional media as sources of information, but also exemplifies how hidden links can fill in the gaps of the reader's own imagination, since the user does not explain who are the masterminds of this attempt to control the narrative. The intention with this speech is to increase the attack on traditional media so that the link between community members strengthens and increases the feeling that the press is unnecessary. By encouraging the demoralization of traditional media, alternative media show themselves as a more reliable means of information, and it is precisely in them that misinformation happens the most.

In Figure 5, we seek to illustrate the idea of identity belonging. The highlighted tweet, from a government supporter, responds to a tweet from a columnist in the newspaper *Estado de São Paulo* talking about the current president. In the columnist's view, he would be responsible for the deaths of Brazilians who died from Covid-19. By the interpretation of the user, the newspaper is promoting misinformation in an attempt to damage the image of the president, and he points out the importance of social networks to bring freedom to the population, which no longer depends on the monopoly of the "garbage of professional journalism." Still according to the tweet, "social media has broken the monopoly on misinformation for good."

Figure 5

Tweet from government supporter about how "social media has broken the monopoly on misinformation"

Estão gastando todas as balas e nada. O homem só cresce. As redes sociais quebraram o monopólio da desinformação de vez. Sobraram só meia dúzia de jumentinhos pra trás que ainda dão credibilidade a esse lixo de "jornalismo profissional".
Liberdade afinal.

7:00 AM · 11 de dez de 2020 · Twitter for Android

2 Retweets 31 Curtidas

Note. Translation: They are spending all the bullets and nothing. The man only grows. Social media has broken the monopoly on misinformation for good. There are only half a dozen jackasses left behind that still give credibility to this garbage of "professional journalism." Freedom at last.

Source: retrieved from [Twitter.com](https://twitter.com).

Just like others tweets, the one highlighted in Figure 5 shows an example of how identity belonging acts, in which it does not matter who speaks, but to whom the criticism is directed. For the user, the columnist is on the "other side," delimiting a border that separates what can or cannot be trusted. The columnist cannot be trusted, as well as the "half a dozen jackasses" that are also on the "other side," demarcating, in his view, the "professional journalism." For the user, freedom has arrived because it is no longer

necessary to depend on those who are “on the other side,” and social media give people the freedom to seek supposed true information, beyond the “garbage of professional journalism.”

As a consequence of professional journalism losing its credibility, trust in parallel means of disseminating information increases, which may appear more reliable only because they are in favor of the government. With this attitude of unwavering trust in media that do not have commitment to the truth of objective facts, there is consequently an increase in the proliferation of misinformation, as these media can potentially disseminate any information they want without worrying about losing their credibility, since credibility is not aligned with the quality of information, but with who it “attacks” or “defends.”

We sought, by the examples presented, to illustrate the different ways in which misinformation, in a denialist community on Twitter, can manifest itself, based on Cesarino’s framework (2019, 2020, 2021). Although other forms of manifestation may be recognized, we sought to bring to light the discussion of how the attack on professional media is aligned with attacks on the credibility of science and its institutions. Once this phenomenon is identified, we surround ourselves with another question: why does this misinformation get such a wide terrain to proliferate in social media?

We understand that there is a relationship between the proliferation of misinformation on social networks and a favorable environment for this to occur, and we consider that a set of elements contributes to massive dissemination. However, in our conception, misinformation involving scientific knowledge is particularly more likely to be stimulated due to an absence of contact with what is different, which is essential to stimulate cognitive conflicts in teaching-learning processes that direct the individual to new and better cognitive structures involving scientific knowledge. In the following section, we describe these processes in more detail and seek to bring, although in the theoretical framework, a first discussion related to how such processes are similar to what we observe in denialist communities and the spread of misinformation.

The Ideological Bubbles in Social Media and Teaching-learning Processes

When talking about the teaching-learning processes and their possible relationships with virtual spaces, we must initially situate ourselves concerning the way of use and communication in networks in their temporal changes. We can say that we are in a moment of Web 3.0. Web 1.0 was fundamentally extended during the 1990s, characterized by users having a passive viewer posture, without being able to develop content on the websites they visited (Almeida, 2017). During the initial years from 2000 to 2016, there was the shift to the so-called Web 2.0, which allowed a greater collaborative participation among users, mainly due to the development of social network platforms that allowed dynamic content — created and published by users, who can interact with each other (Choudhury, 2014). Web 3.0, on the other hand, is characterized by, through the collection of online user data, providing an organization, a visualization, of personalized content for each one (Almeida, 2017).

This personalization of the online experience is a result of the processes of customizing content to the user through algorithms. Silveira (2019) defines an algorithm as a sequence of well-defined steps for solving a problem. The set of initial instructions, which trigger the sequences of steps, is programmed by a human being. Even with the artificial intelligences of *deep learning* and *machine learning*, which allow the algorithm to modify itself, the initial programming step of the code is done by humans. Thus, we emphasize that we agree with the view of Silveira (2019) when the author states that there is no neutrality in algorithms. If they are created by humans, they have a bias, whatever it is.

Assuming that social networks profit from selling ads, it is in their interests that users spend more and more time using them, so that sales also increase. That is, they have as one of their objectives to provide such a good personalized experience for users for them to use the platform more and more. This personalized experience is the result of the use of algorithms that, by collecting data and examining what the user apparently likes, try to make extrapolations and predictions about their behavior based on the idea that the users' interactions on the network define who they are. Therefore, a universe of personalized and exclusive information is created for each individual who browses the network, and Pariser (2012) names them filter bubble algorithms.

There are serious consequences when the visualization of the content of our own social networks and of searches on search engines is conditioned by what the algorithms determine. With the direct filter of what we see, there is a selection of content without users even being able to choose how this process is carried out.

It is customary for interaction on networks to take place with content that is already familiar and that users already "like" previously. The more we interact with such content, the more the algorithms show us related content. Thus, algorithms limit access to what is different and, consequently, the contact with worldviews that differ from those that users are used to accessing and their own. Such a process incurs a curtailment of access that causes imprisonment in ideological bubbles in which the participating people have very similar characteristics. There is, therefore, a drastic drop in the encounter with the unexpected, with the different, removing the possibility of the unusual causing awareness (Silveira, 2019).

As human beings, we possess cognitive biases that often prevent us from being objective and certainly prevent us from being neutral. One of these biases is the so-called confirmation bias: the tendency to believe what reinforces our pre-existing convictions. Pariser (2012) highlights how the filter bubble tends to dramatically increase this bias because, in a way, this is its ultimate goal. This constant visualization of content that reinforces what we already know/think/agree, not opening much space for the exchange of different ideas, results in strengthening the confidence we have of our worldviews.

Concerning teaching-learning theories, Moreira and Massoni (2015) point out that there is no single theory that fully explains the complexity of the human mind, so there are several theories that focus on different and important aspects of the learning

process. Among different frameworks, in this study we will reference authors who work within a constructivist vision of knowledge, that is, who consider that learning occurs by the active involvement of the learner and that previous ideas play a prominent role in the learning process (Mortimer, 1996).

Thus, regarding learning, it is well established that, for there to be changes in the conceptions of the subject, one must have cognitive conflicts (Mortimer, 1996). One can argue about what kind of experiences cause these conflicts; about whether conceptions are abandoned or new meanings are added to existing conceptions; about the importance not only of conflicts, but also of information gaps, etc. Nevertheless, these are discussions that start from the principle that, to think about new ideas, one must have contact with the different, with the new.

A cognitive conflict occurs when the subjects' conceptions are not able to explain something new that they are faced with. Moreover, how to cause conflicts if all content that reaches the user is a repetition of issues with which they already agree? Filter bubbles impair learning on an essential principle by making encounters with the different difficult.

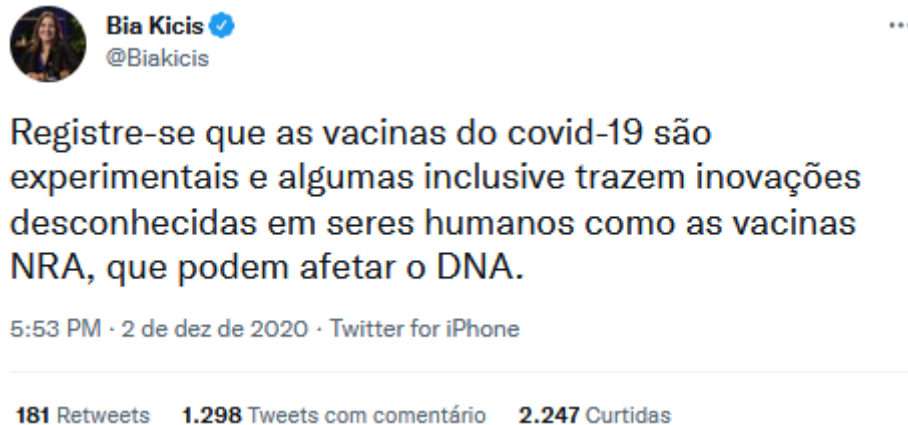
We emphasize that social media are not places of formal science learning. However, as Lévy (2015) points out, it is possible for the cyberspace to indeed be a constitutive space not only for access to information but also for the development and exchange of knowledge. The encirclement process implemented by the bubbles hinders this possibility.

As highlighted in the previous section, non-contact with different conceptions causes a unitary behavior that all subjects are acting in the same way (for example when making use of early treatment). Another example refers to the behavior of users who stated that they would not vaccinate against Covid-19 and that, if they could, they would prevent their own parents and family members from doing the same. When one finds oneself in an ideological bubble that repeats this discourse, that vaccines are experimental and the risks unknown, one fosters this conception that *everyone* know that getting vaccinated is a risk.

To illustrate this fact, we highlight in Figure 6 a tweet by federal deputy Bia Kicis, publishing a scientifically wrong conception about the functioning of vaccines. The deputy, ally and defender of Bolsonaro, uses a misinformation already known among the anti-vaccine movement: the fear of vaccines altering human DNA. This statement stems from the misunderstanding of how vaccines work and appeals to a statement that has a scientific tone when talking about "DNA" and "RNA," seeming credible. With algorithms concentrating antivaccine discourses in ideological bubbles, it is possible to create this illusion that science itself does not know the risks of new vaccines and, in the absence of a contrary discourse, it is possible that the individuals present in these bubbles formed by the algorithms are not aware of the existence of knowledge that falsifies this statement.

Figure 6

Tweet of federal deputy publishing a scientifically wrong conception about the functioning of vaccines



Note. Translation: Please note that Covid-19 vaccines are experimental and some even bring innovations unknown in humans such as NRA vaccines, which can affect DNA.

Source: retrieved from Twitter.com.

It is also possible to discuss how the processes of learning construction are barred in filter bubbles by the studies of Santos and Mattos (2009) and Lago et al.(2020), which, in turn, are influenced by the works of authors such as Vygotsky and Davydov. Moreira and Massoni (2015) describe that Vygotsky's constructivism is a reconstructivism, in which subjects, immersed in their socio-historical-cultural context, internalize and internally reconstruct knowledge that has already been constructed externally. Thus, cognitive development cannot be understood without reference to the social and cultural context in which it occurs (Moreira, 1999). Vygotsky understood that human activity, socially significant, can be considered as a generator of human consciousness, and that the potentialities to be developed can emerge from it (Camillo & Mattos, 2014). This is one of the central theses of the so-called Activity Theory, a theory that in turn gave rise to Davidov's proposal for developmental teaching (Lago et al., 2020).

Relying on these authors and their works, Santos and Mattos (2009) and Lago et al.(2020) discuss how the construction of knowledge is a continuous movement of looking at the immediate concrete, structuring a generalist cognitive abstraction (in the sense that a generalization is sought), and looking again at the real concrete.

The immediate concrete is a part of the whole that is found when looking at an isolated aspect of the world, while the real concrete is the turn of the subject's gaze on the immediate concrete, now with the understanding of the abstract thought carried out seeking a generalized explanation and that, therefore, also encompasses other situations that can be explained by the structure of this thought. This thinking seeks to articulate increasingly complex concepts as they intertwine with other contexts. Learning, then, is understood by the authors as the process of knowledge construction that seeks to understand the generalization of a concept in various contexts.

Therefore, when in ideological bubbles, which are repetitions of the same set of information and thoughts, one cannot achieve a repertoire diverse enough to weave generalizations. Thus, two possibilities follow: either subjects treat the events they encounter as a specific case, without performing the search for an abstract thought that can generalize other contexts; or subjects perform the step of immediate concrete/abstraction/real concrete, and end up arriving at a generalized abstraction. However, we consider this generalization a “false generalization,” since it is only a localized generalization, carried out between immediate concretes that differ little from each other. Both possibilities compromise learning.

We see that the belief in immediate experience, reported in the previous section, is a consequence of this “false generalization,” caused by the absence of contact with difference that results in the user performing a cognitive process of searching for explanations within a limited context. There is an attempt to explain phenomena, but this attempt is restricted by knowing only what is already known, without conjecturing about other possibilities of explanations.

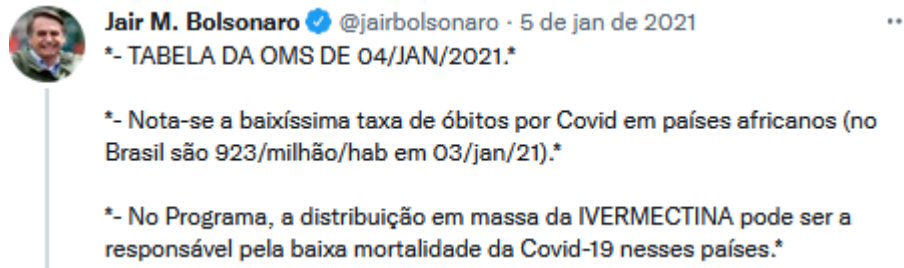
Hidden causal links can also be interpreted in a similar way. The difference occurs in the attempt to explain a phenomenon by searching for information that goes beyond an immediate belief. It is possible that individuals, in their search for explanations, look at an event that occurs in the immediate concrete and initiate an investigative thought in abstraction. Nevertheless, by not having access to the information that would be necessary to fill the gaps in their search process, since access is limited to what happens around them by algorithms that show only what is already known, it is plausible to assume that individuals use hidden links as a way to fill this gap. We see that, in these cases, there is a search for generalization that, however, is a search that is sustained in using hidden links to go around the abstraction to the real concrete, characterizing a conspiratorial behavior.

We can see in Figure 7 a tweet from President Bolsonaro, in January 2021, insinuating that the low death rates in African countries were due to the population's use of the drug ivermectin, one of the drugs included in the early treatment. The immediate concrete, in this situation, is to look at the low death rate in these countries. Then, it is expected that an abstraction is made so that, then, one turns to look at the real concrete, explained by the abstraction made that sought the explanation of the phenomenon.

What we notice in this case is that abstraction, that is, the attempt to explain the event, was stuck to the previous notions that one already wished to use. No reflection was made looking for what could influence this low rate beyond the potential use of ivermectin. A questioning sequence of thoughts should consider other diverse contexts, from each African country, that could explain these numbers without being limited to an explanation that has not been scientifically investigated to analyze whether there was a correlation. By using the medicine as a response to the search for abstraction, one arrives at a “false generalization,” and the process of looking at the real concrete is biased by limited previous conceptions.

Figure 7

Tweet from President Bolsonaro insinuating that the low death rates from Covid-19 in African countries were due to the use of the drug ivermectin



Note. Translation: * - WHO TABLE OF JAN/04/2021*

* - Note the very low rate of deaths from COVID in African countries (in Brazil they are 923/million/inhab on jan/03/21).*

* - In the Program, the mass distribution of ivermectin may be responsible for the low mortality from COVID-19 in these countries.*

Source: retrieved from Twitter.com.

We see, then, that there is a strong relationship between the spread of misinformation on social media and the way in which they are structured to show the user only certain content. Social networks are propitious places for the formation and proliferation of misinformation by not stimulating user contact with different conceptions and worldviews. Strategies that aim to fight this proliferation should focus not only on helping users understand the limitations of access to content on social media, but also on developing in individuals a search for thoughts capable of making explanatory generalizations of various phenomena.

Our Considerations

As McIntyre (2018) exposes, the rise of digital social media has helped blur the lines between news and opinion, as people have begun to share stories of blogs, alternative news websites, or any other type of publication from unknown sources, as if they were true. And one of the reasons fake news attracts so many clicks is that they tells us what we want to be true, they please our convictions, as opposed to fact-based content that sometimes makes us confront realities we don't want.

In 2012, even with discussions about misinformation in social media still not so popular, Pariser (2012) summarized the problem that has been worsening: "the consumption of information that fits our ideas about the world is easy and pleasant; the consumption of information that challenges us to think in new ways or to question our concepts is frustrating and difficult" (pp. 81–82). We have to agree with the statement of McIntyre (2018), of "how ironic that the Internet, which allows for immediate access to reliable information by anyone who bothers to look for it, has for some become nothing but an echo chamber." (p. 95).

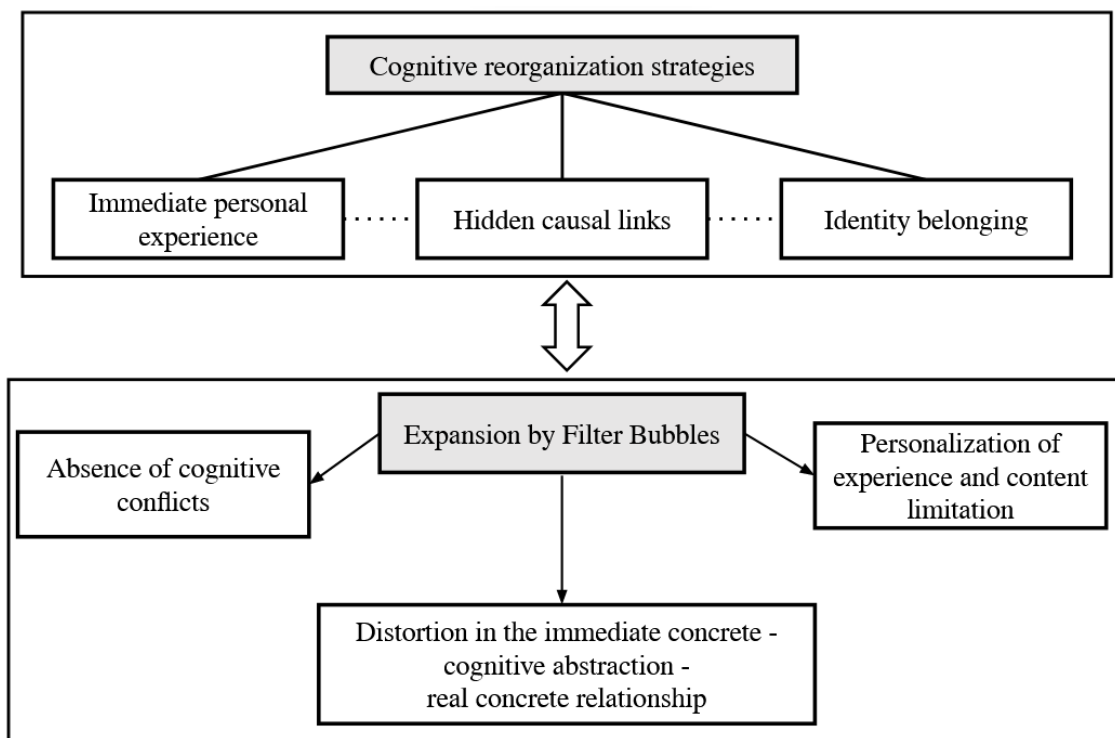
Pariser (2012) compares filter bubbles to lenses that distort our reality, which transform the world we experience by determining what we see and what we don't see. So if we want to understand how the world really is, we have to understand how these filters work, how they shape and distort. If bubbles in social media caused by algorithms act like lenses, distorting what we see, then for us to conjecture what the image looks like without being distorted, we have to understand how distortion takes place. We have to understand how algorithms select the content that comes to us. And more than that, we have to ask ourselves "who controls the invisible power of the algorithmic systems of the platforms?" (Silveira, 2019, p. 67).

We are aware of the complexity of the issue and the multiple challenges that must be faced to fight the massive proliferation of misinformation on social media. These challenges span different scales and institutions. The development of a critical sense for individuals to make their own analysis of the information they receive on social media involves teaching already in basic education about the functioning of virtual environments, as well as needs educational development that stimulates a search for generalizing cognitive schemes of explanations of phenomena.

Analyzing the ethnographic research data from the perspective of references, it is possible to weave connections between cognitive reorganization strategies, the characteristic of social media, and relationships with teaching-learning processes. Figure 8 illustrates this perspective based on the construction elaborated throughout the text.

Figure 8

Relationships between cognitive reorganization strategies and filter bubble characteristics



Source: prepared by the authors from the analysis of the data based on the references.

It is possible to consider that the intentional action of users in networks with a clear objective of propagating ideas and conceptions is reinforced by filter bubbles and that such processes affect the way information is considered by a broader set of users who are part of the same bubble, limiting them in the elaboration of knowledge. Understanding this process is of fundamental importance to understand the technological revolution and dissemination of knowledge that we are experiencing and to develop mechanisms for a media education that fundamentally involves numerous sectors of society, among which formal education is an integral part.

Nevertheless, even understanding the challenges and their complexities, we believe in the potential of their developments. The topic of misinformation on social media a constant focus of reports, and several researches seek to address the topic in the classroom. We believe that this shows us the concern, and the consequent desire for change, on the part of educators who aim for a future, and a present, with less misinformation.

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 **Gabriela Fasolo Pivaro**

Universidade Estadual de Campinas
Campinas, São Paulo, Brasil
gfpivaro@gmail.com

 **Gildo Giroto Júnior**

Universidade Estadual de Campinas
Campinas, São Paulo, Brasil
ggirotto@unicamp.br

Editor in charge

Alice Alexandre Pagan

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Compliance with Ethical Standards

The authors declare this study was conducted following ethical principles.
