The impact of information disorder on the deliberative process in the context of climate change

https://doi.org/10.56418/txt.17.2.2023.2

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Recibido: 04-09-2023
Aceptado: 07-12-2023

Abstract

Deliberative process in the public sphere is negatively influenced by information disorder. To demonstrate this statement, a systematic review of the scientific literature on information disorder in the context of climate change was conducted, following the PRISMA verification method (Page et al., 2021). At the end of the process, we obtained 32 scientific articles published in 2022 and 2023 that address information disorder and climate change. The studies were analyzed considering the Habermasian approach to deliberation and the public sphere. Our research question is: how does information disorder affect deliberative processes in the public sphere, especially in issues related to climate change? The results suggest that the disinformation landscape leads to cognitive distortions and misguided decisions, contributing to the fragility of opinions and debates in the public sphere.

Keywords: Public sphere; climate change; information disorder; misinformation; disinformation.

1. Introduction and State of the Issue

Deliberative democracy is, from a normative standpoint, a highly complex system inspired by Enlightenment ideals of equality and respect for individuality. This system presupposes the inclusion of all citizens in deliberative processes, civic awareness, trust in institutions, ongoing review of decisions, and the discursive quality of contributions to public debate (Habermas, 2022).

Taking the concept of the public sphere as the "discursive process by which public opinion beliefs are produced and legitimized" (de Blasio et al., 2020, p. 2), we assume that the public sphere encompasses the communicative processes inherent in the construction of public opinion and debate.

Recent studies point to a series of factors leading to a crisis in the system: a crisis of democracy, a crisis of citizenship, and a crisis of public communication. We may be moving towards a post-public sphere (Schlesinger, 2020), accelerated by digitization and the 'platformization' of communication (Han, 2022; van Dijk, 2017).

The crisis of deliberative democracies is characterized by social inequalities, the lack of orientation and mediation of discourses for the common good, the end of a shared political culture, viewing political adversaries as enemies rather than opponents, the rise of populist leaders, the precariousness of public opinions and public debates, the disconnect between government actions and voter contributions, passive citizenship, and low rationality in public discourse (de Blasio et al., 2020; Habermas, 2022; Han, 2022; Schlesinger, 2020). "The emancipatory promise of networked communication is drowned out by the desolate cacophony in fragmented and closed echo chambers" (Habermas, 2022, p. 159).

The 'platformization' of the public sphere promotes the depoliticization of citizens and creates a fertile ground for totalitarian discourses rooted in fake news, the discrediting of the press, conspiracy theories, and populist governments (Han, 2022; Pariser, 2011; van Dijk, 2017). This is what Habermas (2022) referred to as the plebiscitary public sphere. "It is not the accumulation of fake news that is significant for the widespread distortion of the perception of the public sphere, but the fact that fake news can no longer be identified as such" (Habermas, 2022, p. 167).

The phenomenon of fake news has been extensively explored not only in academic literature but also by media, social networks, and political leaders worldwide (Allcott & Gentzkow, 2017). However, it is a consensus among most researchers that the concept is insufficient to account for the phenomenon. "Fake news has become a tool that the powerful use both to clamp down on and restrict free speech and to undermine and circumvent the free press" (Wardle & Derakhshan, 2017, p. 952). Therefore, clear terminology reflecting the context of misinformation in the plebiscitary public sphere is needed.

The proposal of information disorder, as presented by Wardle & Derakhshan (2017), proves more appropriate and has been adopted in this study. During the Crosscheck project, which monitored the French presidential election, they listed seven types of information disorders: 1) satire and parody; 2) false connection; 3) misleading content; 4) false context; 5) imposter content; 6) manipulated content, and 7) fabricated content:

> These seven categories can be categorized into three camps, based on truthfulness and intention to harm. Content that is false but not intended to harm is called misinformation. This can include satire, clickbait, or misleading quotes and images. Content that is false and intended to harm is considered disinformation and includes malicious lies, fabricated content, and manipulation campaigns. Finally, truthful information that is intended to harm is considered to be malinformation. ((Wardle & Derakhshan, 2017, p. 954)

In an environment characterized by information disorder, the informed public discourse, as advocated by Habermas (2022), may become compromised. When the topic at hand is climate change, this landscape of misinformation can lead to misguided decisions and pose a threat to human life itself. Climate change issues are inherently intricate, necessitating complex solutions to mitigate environmental harm and facilitate human adaptation to evolving climatic conditions (Santos, 2021). Thus, it is imperative to foster an enlightened and conscientious public opinion regarding climate-related challenges to ensure that solutions are pursued in a democratic, transparent, and effective manner. The requisite change to mitigate damage and adapt to new climate conditions necessitates the active engagement of society in public discourse, access to information, and the consideration of diverse perspectives in the formulation of public policies (Ganapathy, 2022).

The objective of our study is to demonstrate that deliberative process in the public sphere is negatively influenced by information disorder. To do so, a review of the scientific literature on information disorder in the context of climate change was conducted.

2. Methodology

To verify the assumption that the deliberative process in the public sphere has been negatively influenced by information disorder, a literature review was conducted following the PRISMA checklist (Page *et al.*, 2021). The review consisted of four stages: 1) defining the research topic; 2) determining the databases, descriptor groups, and search limits; 3) extracting and categorizing the found studies; and 4) analyzing and interpreting the material.

Stage 1 began with a narrative review of the topics of fake news, the public sphere, and deliberative processes. The concept of information disorder proposed by Wardle & Derakhshan (2017) was adopted because it is more comprehensive than the term 'fake news.' The ideas of the public sphere and deliberative processes considered in this study are inspired by the Habermasian framework. From this theoretical perspective, the research question can be summarized as follows: how does information disorder affect deliberative processes in the public sphere, especially concerning issues related to climate change?

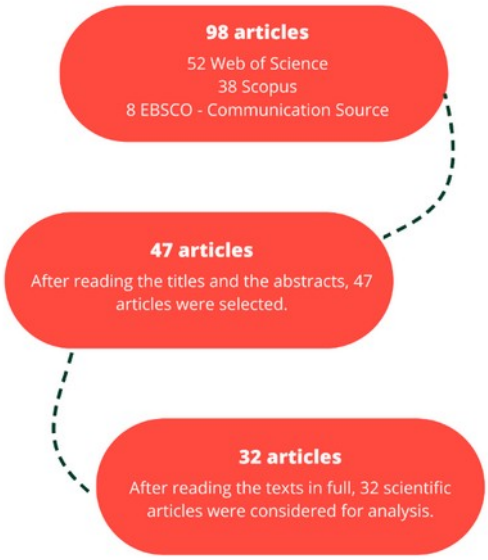
In Stage 2, searches were conducted in databases that relate information disorder to climate change. The strategic plan for these searches is summarized in Table 1. Image 1 outlines the process of selecting texts found in the databases. Duplicate articles and those that did not align with the study's scope were excluded, as shown in Image 1. At the end of this process, a total of 32 scientific articles published in 2022 and 2023, addressing information disorder and climate change, were obtained. The examination of this scientific body of work enabled us to draw conclusions about how an information disorder environment affects the deliberative process within a democratic system.

Tabla 1. *Search strategy for the state-of-the-art review on information disorder and climate change.*

Databases	**Data collection period**	**Descriptor groups**	**Limiters**
Web of Science	August 7, 2023	(TS=("climate change") AND TS=("fake news")) AND (OA==("OPEN ACCESS") AND DT==("ARTICLE")) (TS=("climate change") AND TS=(disinformation)) AND (OA==("OPEN ACCESS") AND DT==("ARTICLE")) (TS=("climate change") AND TS=(misinformation)) AND (OA==("OPEN ACCESS") AND DT==("ARTICLE")) (TS=("climate change") AND TS=("information disorder")) AND (OA==("OPEN ACCESS") AND DT==("ARTICLE"))	Peer-Reviewed; Publication Date: 20220101-20230807; Publication Type: Academic Journal; Full-text, open access, in English, Portuguese, and Spanish languages.
Scopus	August 7, 2023	(TITLE-ABS-KEY ("climate change") AND TITLE-ABS-KEY ("fake news") OR TITLE-ABS-KEY (disinformation) OR TITLE-ABS-KEY (misinformation) OR TITLE-ABS-KEY ("information disorder")) AND PUBYEAR > 2021 AND (LIMIT-TO (SRCTYPE , "j")) AND (LIMIT-TO (OA , "all")) AND (LIMIT-TO (PUBSTAGE , "final")) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SUBJAREA , "ARTS") OR LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "PSYC"))	Peer-Reviewed; Publication Date: 20220101-20230807; Publication Type: Academic Journal; Full-text, open access, in English, Portuguese, and Spanish languages.
EBSCO - Communication Source	August 7, 2023	TX ((AB "climate change" AND AB "fake news")) OR TX ((AB disinformation AND AB "climate change")) OR TX ((AB misinformation AND AB "climate change")) OR TX ((AB "climate change" AND AB "information disorder"))	Peer-Reviewed; Publication Date: 20220101-20230807; Publication Type: Academic Journal; Full-text, open access, in English, Portuguese, and Spanish languages.

Source: Own elaboration.

Image 1. *Selection of texts found in the databases.*

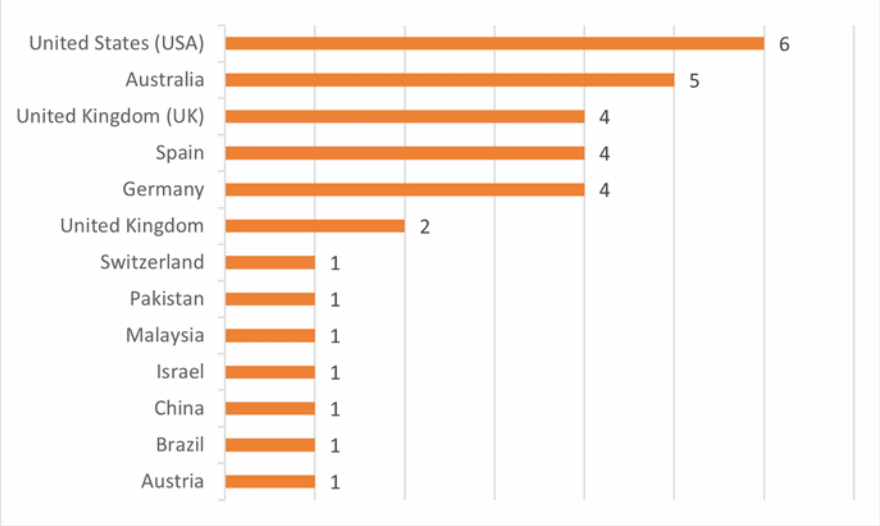


Source: Own elaboration.

3. Analysis and Results

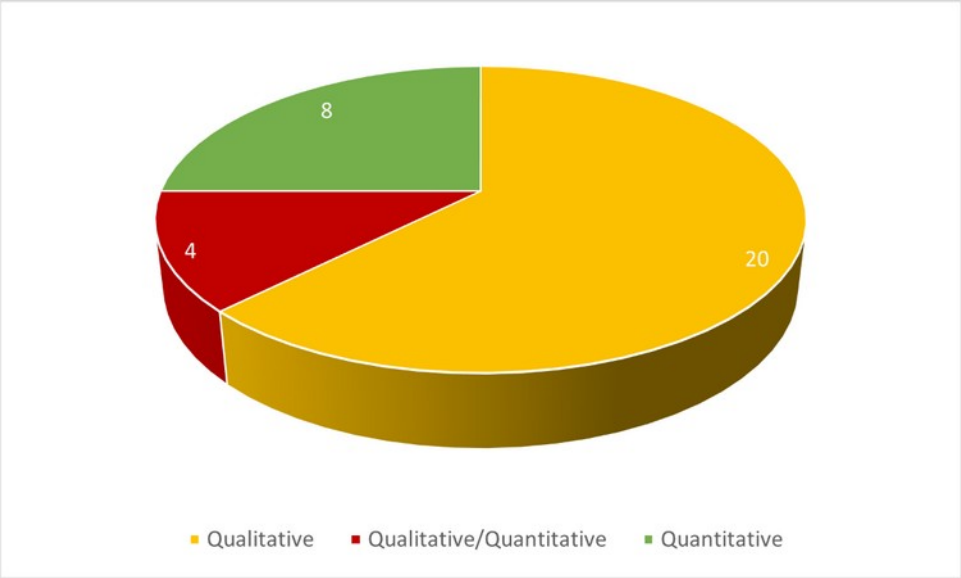
Out of the 32 articles considered for analysis, 21 were published in the year 2022, and 11 were published between January 1, 2023, and August 7, 2023, which is the data collection date. Texts in Portuguese, English, and Spanish were considered, but the publications were predominantly in English. Only one out of the 32 articles analyzed was published in Spanish. Image 2 shows the country where data for each of the publications were collected. Most of the research was conducted in the United States, followed by Australia, Germany, Spain, and the United Kingdom. Australian studies focused on the 2019 and 2020 wildfires. Regarding the methodology of the studies, Image 3 demonstrates a predominance of qualitative or qualitative and quantitative methods.

Image 2. *Country where data were collected.*



Source: Own elaboration.

Image 3. *Methodology used by scientific studies.*



Source: Own elaboration.

3.1. Information disorder and climate change

Despite 97% of climate scientists worldwide asserting that global warming not only exists but is accelerated by human actions (Cook et al., 2016; Green et al., 2022), skepticism regarding climate change is present in almost every country, followed by disinformation and conspiracy theories (Dahlberg, 2023; Daume et al., 2023; Ejaz, Ittefaq, et al., 2022; Ejaz, Mukherjee, et al., 2022; Fernández-Castrillo & Magallón-Rosa, 2023; Schmid-Petri & Bürger, 2022; Schubatzky & Haagen-Schützenhöfer, 2022; Silva, 2022; Woodley, Barr, Stott, Thomet, Flint, Lovell, O'malley, et al., 2022). On digital platforms, discussions about climate change occur in an environment of polarization, echo chambers, and disinformation, negatively impacting public discourse and leading to civic inaction and rejection of public mitigation policies (Treen et al., 2022).

When confronted with new information, we are capable of reasoning and discerning its level of falsehood or truthfulness using two models of cognitive processing - System I and System II. In System I, we use heuristics and mental shortcuts to make quick decisions. In System II, information is carefully elaborated with more time for reflection. In a scenario of information disorder, there are several pitfalls that lead us to incorrect decisions about what is true and false (Cook et al., 2019; Koch et al., 2023; Lewandowsky, 2021; Lewandowsky et al., 2022; Pennycook, 2022). People fail in judgment because they do not pause to reflect sufficiently on their prior knowledge or have insufficient or inaccurate prior knowledge (Pennycook, 2022). Furthermore, the use of heuristics or mental shortcuts also distorts reasoning, as does continuous exposure to false information, which leads to a sense of familiarity (Pennycook & Rand, 2021). "An impactful and sustainable strategy would be to build the habits of good thinking - that is, to think actively openly and question one's own intuitions" (Pennycook, 2022, p. 70).

The public is not typically experts in climate science and, consequently, forms their opinions and attitudes through narratives, stories, emotions, or images, rather than data and scientific analysis. In other words, they employ System I rather than System II cognitive processing. "People can therefore easily fall prey to the misleading techniques" (Lewandowsky et al., 2022, p. 32). In the case of climate

change, for example, there is intentional promotion of information disorder by politicians and big corporations (Calibeo & Hindmarsh, 2022; Emergente Loiola, 2022; Horiuchi et al., 2009; Naderer et al., 2017). Some corporations and ideological interests orchestrate disinformation campaigns that challenge the scientific consensus on climate change (Ejaz et al., 2022). Common disinformation techniques include the use of fake experts, discrediting the scientific field, distortions and fallacies, conspiracy theories, and demanding scientific evidence such as climate data from remote times, which is not possible (Fernández-Castrillo & Magallón-Rosa, 2023). In this literature review, we have identified the seven types of information disorder listed by Wardle (2018), encompassing the cases of misinformation, disinformation, and malinformation.

One of the most common techniques used by climate change deniers is to employ a false expert. The use of a false expert is also commonly associated with the defamation of real experts or distracting readers' attention to unrelated information. For Green et al. (2022), "giving space to different versions of the issue is a false balance that distorts scientific conclusions about climate change."

Research also demonstrates that factors such as political ideologies, level of education, country of origin, community involvement, and media literacy influence decision-making on climate change (Cremades & Stella, 2022; Dahlberg, 2023; Davis & Lewandowsky, 2022; Hassan et al., 2022; Jylhä et al., 2022; Morote Seguido, 2023; Sill et al., 2023; Silva, 2022; Tillery & Bloomfield, 2022; Villagra et al., 2023; Woodley et al., 2022). In Spain, Fernández-Castrillo & Magallón-Rosa (2023) analyzed patterns of misinformation verification and identified two predominant types of climate skepticism: epistemic and reactive. In the case of epistemic skepticism, there is a denial of scientific evidence itself. Questions such as contradictory evidence, climate change repeating for millions of years, lack of consensus, and scientists hiding results that do not point to climate change are raised. On the other hand, proponents of reactive skepticism do not deny the evidence of climate change but discredit mitigation actions as being too complex or due to low global population adherence.

Repeated exposure or familiarity with disinformation is another factor contributing to receptivity to disinformation. Familiarity with information has been shown in various studies to strengthen an individual's belief in that information, even if it is false (Green et al., 2022).

Tillery & Bloomfield (2022) analyzed comments from members of "Watts Up With That" (WUWT) on Facebook, a climate change skeptical group. The authors identified a profile they call hyper-rationalists, people who see themselves as more rational than climate scientists or global warming experts, who are portrayed as irrational precisely because of their commitment to global warming reality:

> In proposing that climate skeptics are more rational than scientists, WUWT members directly commented on what they viewed as rational behaviors. One commenter characterized “true skeptics” as “critical thinkers” who could not be duped by climate scientists and would not “submit to their delusions.” Another WUWT member embraced the label of “Science doubting.” The commenter wrote that doubt “is essential within true science. It can be taken as a compliment.” This commenter appealed to scientific standards of skepticism and questioning as identity labels that heightened the commenter’s own scientific credibility. (Tillery & Bloomfield, 2022, p. 365)

Recent studies on misinformation and climate change also show that trust in science depends, among other things, on the competence of scientists and the institutional and social context in which these scientists are situated (Gundersen et al., 2022; Lewandowsky et al., 2022). Trusting scientific information about climate presupposes having access to and understanding this information, as well as participating in the public debate on which paths to follow. "When science has an impact on policy and

on people's daily lives, two fundamental rights of the public collide: the right to be heard and the right not to be misled." (Lewandowsky et al., 2022, p. 35).

3.1.1. Addressing the issue of information disorder

The literature on information disorder and climate change also discusses possible paths to reduce or reverse the disinformation situation. Among the challenges are the financial costs of mitigating climate change and, consequently, gaining public acceptance of the problem. Additionally, climate change is gradual, and its effects are distributed unevenly across the planet, which represents psychological barriers to understanding the issue (Davis & Lewandowsky, 2022).

As well as motivations relating to social consensus and information seeking, another possible motivation for downplaying global threats may be fear of the anticipated solutions. Acknowledging anthropogenic climate change implies the need for radical changes to individual behavior as well as the way societies are structured, which may conflict with one's value system. (Davis & Lewandowsky, 2022, p. 322)

Daume et al. (2023), who studied communication during forest fires in Australia, observed that experiencing extreme climate events can influence public support for climate mitigation measures, although this may depend partly on pre-existing attitudes toward climate change, and the effect may not be immediate. The researchers also argue that "social media can equally serve to educate, mobilize, and build public support for climate policies but also distribute misinformation, skepticism, and at times even outright climate change denial" (Daume et al., 2023, p. 2).

Another study, also conducted in Australia during the 2019/2020 wildfires, shows that online climate-related discourses can be influenced by specific internal dynamics of the platform but are clearly impacted by external climate events. "In terms of this discursive struggle, in particular between polarized perspectives such as #climateemergency and #arsonemergency, our findings suggest that Australian users within the digital public sphere were actively seeking to delegitimize disinformation campaigns by engaging in climate-related discussions" (Bednarek et al., 2022, p. 11).

Koch et al. (2023) investigated the effects of social endorsement on the credibility of information on social media. The results show that removing social endorsement cues (likes, comments, views...) has a limited effect in combating false news, while warning labels were more effective. Dryhurst et al. (2022) list a series of methodologies that can be adopted by digital platforms to combat disinformation, including using algorithms to prevent the spread of disinformation, fact-checking to correct misinformation, psychological resilience to misinformation through psychological inoculation, and legislative approaches regulating the content that media outlets publish online.

Another strategy is to apply the 'inoculation theory.' Pre-bunking or inoculation is like a vaccine and involves presenting true information accompanied by possible misinformation related to the subject. Thus, prior exposure to misinformation, but in a contextualized manner and accompanied by verification, would act as an immunization, leading the individual to a process of questioning and rationalization (Cook et al., 2017; Davis & Lewandowsky, 2022; Green et al., 2022; Lewandowsky, 2021; Lewandowsky & van der Linden, 2021; Schmid-Petri & Bürger, 2022). "The theory of inoculation posits that people can be protected against misleading information when they are (1) warned that they may be misled and (2) are exposed to a preemptive rebuttal of the misleading argumentation" (Lewandowsky et al., 2022, p. 35).

In Australia, Green et al. (2022) conducted empirical tests to discover which technique would be more effective: active or passive inoculation. The difference between the two methods lies in how counterarguments are encouraged. In passive interventions, the participant must passively read the counterarguments provided in the inoculation message. However, in active inoculations, participants are asked to generate their own counterarguments. Green et al. (2022) did not find significant differences between the tested groups.

Brannon et al. (2022) advocate the inoculation method and argue that if the public knows in advance that they are likely to encounter misinformation and why it is wrong, they are less likely to accept it as true. "Although retraction of misinformation may not fully negate its influence, warnings at the time of initial exposure to misinformation, repetition of the retraction, and corrections that tell an alternative story that fills the coherence gap can increase the effectiveness of retractions" (Brannon et al., 2022, p. 342).

3.2. Information disorder and deliberative process on climate change

Jürgen Habermas outlined a public sphere that operates as an intermediary system between the state and society (Habermas, 2006). It is a space for critiquing power, underpinned by reason. In this public sphere, citizens begin with dissent and, using reason, arrive at a consensus after a deliberative process in which communication plays a central role. Communicative action in Habermas's public sphere is honest, transparent, presupposes the equality of all participants in the debate, addresses issues of public rather than private interest, is accessible to everyone, and is secular in nature (Habermas, 2012b, 2012a).

Habermas's idealized public sphere emerged with the bourgeoisie at the end of the 17th, 18th, and early 19th centuries. During this period, a class of educated citizens with relative economic comfort gathered in salons, cafes, pubs, and scholarly societies in France, England, and Germany. It was this bourgeoisie that occupied the public sphere. However, as history advanced in his theory, the author observed the decline of this public sphere with the industrialization of the media, now oriented toward advertising; the blurring of the boundaries between matters of public and private interest; representative democracy that reduces citizen participation to voting, often instrumentalized by the market-driven logic of exchange; and the reduction of the politically and culturally engaged citizen to a mere consumer (Dahlgren & Sparks, 1991).

Drawing from Habermas's ideas, it is possible to contemplate a potential public sphere for the different levels of representative and liberal democracy that we have today. Acknowledging the colonization of the public and private systems, the blurred boundaries between information, advertising, and entertainment, and the subaltern voices within the institutional complexity in which we find ourselves provides a starting point for shaping new public spheres. These are imperfect situations that need to be studied to aspire to an emancipatory theory built upon these real imperfections.

Looking for alternatives that minimize the effects of information disorder in the deliberative process, researchers point to complementary paths. Solutions involve adjustments to digital platform algorithms (van Dijk, 2017); punishment of producers of false content and limiting the advertising of such content (Manganello et al., 2020); identifying sources of disinformation (Messaoud, 2021); regulating digital media (Messaoud, 2021; Neuwirth, 2022; Polyák & Nagy, 2021; Wardle & Derakhshan, 2017), and literacy programs (Abed & Barzilai, 2023; Cook et al., 2023; Morote & Hernández, 2022; Morote Seguido, 2023; Sill et al., 2023).

Overall, the studies demonstrate that digital platforms tend to favor the polarization of ideas and activist discourses for or against climate change but rarely facilitate a democratic public debate guided by scientific rationality (Villagra et al., 2023). However, a study conducted in the UK on the Reddit platform yielded different results. Treen et al. (2022) identified less polarized behaviors in the architecture of the Reddit social network.

> We do find evidence that Reddit allows for the flow of information between polarized users, in contrast to other social media platforms like Twitter. Potential reasons for this are the subject-themes structure of user interactions, as opposed to networks that are built around users and social interactions, the longer-form text allowing for a deeper level of debate, and the level of moderation on Reddit. (Treen *et al.*, 2022, p. 694)

4. Discussion and Conclusions

The academic corpus on information disorder in the context of climate change has proven to be quite consistent, indicating that this phenomenon negatively impacts the process of deliberation in the public sphere. The landscape of misinformation leads to faulty cognitive pathways and misguided decisions, contributing to the deterioration of public opinions and debates.

The impacts of climate change are exacerbated by human behavior resulting from flawed deliberative processes. Empirical studies suggest that, although levels of trust in science are high, distrust manifests itself in the behaviors, choices, and preferences of the public regarding the implementation of science-based environmental policies. In the quest for solutions, research delves into literacy projects and innovative pedagogical proposals, especially targeting young audiences. Furthermore, the proposals for misinformation inoculation also lack further empirical research. These studies could contribute to reducing information disorder and, consequently, improving the deliberative process.

Reaching socially acceptable decisions about values in environmental science will require models of public engagement with science that provide opportunities for various audiences to contribute to science and build a mutually informative relationship with science (Gundersen *et al.*, 2022).

The revolutionary nature of new media profoundly alters the processes of communication and, consequently, the shaping of public opinions and the public sphere itself. Deliberative capitalist democracy, which was already in decline, now faces even more profound challenges. Initially, with the emergence of digital media, high expectations were generated concerning the public sphere. However, over the years, it has become evident that democracy has given way to an infocracy no longer guided by communicative action and discursive rationality, but rather by a digital rationality in which there is no truth, only a swarm of information (Han, 2022). "A phenomenology of information is necessary to gain a deeper understanding of infocracy and the crisis of democracy in the information regime" (Han, p. 24).

The frenzy of contemporary times agitates the cognitive system and leads us into an infodemic (Hans, 2022). Rationality is sluggish and requires time for reflection and debate. Rational decisions are made in the long term. They are preceded by a reflection that extends beyond the moment, towards the past and the future, a time that digitization does not afford us.

The delirium of the infodemic and overly affective communication steer individuals away from rationality and towards passion, a fertile ground for fake news, conspiracy theories, hate speech, and radicalization. The scenario is the communication crisis, and a deliberative process on climate change is compromised.

In democratic societies, it is legitimate for the public to engage in political debates, and dissenting voices should be heard. The question is how to differentiate legitimate democratic criticism of science from denials motivated by political and economic groups. Climate change and all its consequences are problems that directly affect citizens' lives, and solutions ultimately depend on individual behavioral changes.

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