



The Impact of Misinformation and Fake News on Climate Change Perception and Response: A Comprehensive Review

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Abstract

This paper examines the impact of fake news and misinformation on human behaviour in response to climate change through adaptation and mitigation. Even though there is broad scientific consensus regarding climate change, the public has become divided over important issues such as whether humans drive global warming. Communication tactics rarely lessen polarisation and target of the problem: politically motivated misinformation spread through social and traditional media. Several implications are drawn from the available literature on explaining climate change and spreading awareness. This is a literature review paper that relied on material that is publicly available. People's acceptance of science can be increased by educating them about climate change, especially by explaining why it occurs, how to mitigate the impacts and adaptation thereof. The greatest way to combat climate change fake news and misinformation is to inoculate against it beforehand, although debunking strategies can also be effective.

Keywords: *Climate Change; Adaptation; Mitigation; Misinformation; Fake News*

Introduction

Although misinformation has been spread by the media since the beginning of mass communication, researchers and critics assert that "the development of the misinformation society" has only recently occurred (Pickard, 2020). Fake news has existed for as long as human civilisation, but it has been accelerated by digital technologies and the global media landscape upheaval. Nonetheless, defenders of fact and truth have tools to maintain integrity in social, political, and economic settings (Higgins, 2017). While falsehoods and historical mistakes were formerly successfully conveyed through word of mouth, literature, and even tapestries, modern technology has created new channels. The term "post-truth" describes a society in which lying in public is becoming more commonplace and truth is no longer a given.

Misinformation is becoming more common worldwide and in various contexts, including health, environmental, and consumer issues, as well as political and social debates. Misinformation is mainly distributed through social media and text messages, raising concerns about how much control and self-regulation these corporations have. Because these corporations are intermediary platforms rather than content producers, they have largely eluded regulation. The rise of "the fake news genre," which is the deliberate spread of false information disguising itself as legitimate news in order to achieve political objectives or earn cash (Egelhofer & Lecheler, 2019), is another source of misinformation.

This paper makes the argument that conventional news outlets contribute to the issue and distribute fake news in a rather contradictory manner. News organizations must repeat inaccurate information in order to correct it, and when lies are repeated, it is more challenging to dispute them (Lewandowsky & van der Linden 2021). Climate change is another key topic touched by misinformation. This paper suggests that ignorance regarding climate change has perplexed the public, stalled popular support for mitigation efforts, and led to legislative inaction (Brulle, 2020).

Although some basic studies have been performed in this area, such as looking into who is involved or what can be done to prevent climate change misinformation, there is a lack of a comprehensive analysis. In their extensive analysis of social media and climate change, Pearce, Özkula, Greene, Teeling, Bansard, Omena, and Rabello (2019) only mention misinformation briefly. In contrast, this study provides a comprehensive overview of the topic. Fake news sites and the consumption of fake news items online are only accessible to a small portion of the population. Thus, many people may be exposed to fake news stories through major news outlets. The paradoxical situation occurs in which mainstream media that cover misinformation assist in its proliferation, despite their stated goal of correcting deception.

Contextualising Fake News and Misinformation

It is important to define "misinformation" before diving into a detailed analysis of online climate change misinformation. Although there are multiple, and at times conflicting, definitions of misinformation in dictionaries and reference materials, the scholarly literature on misinformation frequently provides neither a definition nor merely cites one from a dictionary (Karlova 2018). Misinformation is sometimes defined as information that is erroneous, false, or misleading. Information can be misleading even if it is true. Definitional variations relate to the purpose of false information. While some definitions state that misinformation must be intentionally manufactured and transmitted to deceive, others permit it to be inadvertently created or spread without any such goal. In other middle-ground definitions, deception may or may not have been intended (Merriam-Webster, 2019). The term "fake news" describes news reports that are fundamentally false, i.e., they don't contain reliable information, sources, or quotes. Sometimes, these stories could be sensationalized pieces written for commercial gain, or they could be propaganda meant to mislead the reader. It's important to understand that "fake news" is a difficult problem, though. Despite the fact that the dictionary describes "fake news" as "false stories that appear to be news, circulated on the Internet or through other media, typically produced to influence political opinions or as a joke," it can be challenging to tell what is false and what is not. There is a tremendous deal of disagreement over which information should be included and which should be excluded. The expression itself has acquired a political meaning and is commonly used to denigrate any opposing viewpoint. Some utilize it to cast doubt on the reliability of particular media outlets, their rivals, or hot-button topics (Nielsen & Graves, 2017). Furthermore, as people share more and more information online, technological developments like the emergence of social media enable the rapid and easy dissemination of false information.

Misinformation spread by the media is not new. Since the invention of the earliest writing systems, it has existed (Crain, 2017). As more individuals use Internet platforms, particularly social

media, as their primary news source, misinformation appears to have found a new avenue (Marcus, 1993). The digitisation of news has called into question conventional notions of news. Nonjournalists now have a space to reach a huge audience because of online platforms. The advent of citizen journalism questions the connection between journalists and the news since nonjournalists began participating in journalistic activities to produce journalistic outputs, including news. Initially, the only form of citizen journalism was blogging. Ultimately, social media gave individuals who were not journalists a larger platform to conduct journalism (Wall, 2015). Facebook has evolved from a platform for sharing personal thoughts and updates with friends to becoming a hub for users to create, consume, and share many forms of information, including news. Social media platforms are distinguished not only by their large user bases but also by the quick exchange and dissemination of information they enable. Unfortunately, they have also helped to propagate false information, such as fake news.

There is not much research that uses the term "misinformation" directly when discussing misinformation related to climate change. However, there has long been academic discussion of systematic efforts by different players to undermine climate science and muddle the political debate on climate change by challenging well-supported hypotheses and offering substitute, frequently incorrect interpretations of the evidence. In the climate change issue, misinformation is not linked to a certain ideological viewpoint. Climate change denial has the potential to be perceived as fake news or misinformation.

The Mainstream Media as a Source of Fake Climate Change News

Significant changes are being made to journalism. Unprecedented forms of communication and global reach are now possible thanks to new digital platforms that have liberated creative journalism approaches. Regarding climate change disinformation, there are relatively few studies that directly utilise the term "misinformation". However there has long been scholarly discussion of concerted efforts by different actors to undermine climate science and muddle political discourse on climate change by questioning well-supported hypotheses and offering alternative, frequently wrong interpretations of evidence. Global warming is being caused by human-generated CO₂ emissions, which have been observed by experts for centuries (Mashamaite, 2021). Despite this, a small but vocal group has succeeded in undermining widely held beliefs by denying scientific evidence and presenting irrational claims.

Contrarily, false information, commonly referred to as "fake news," spreads more quickly and affects how people view current affairs. Many information systems have become increasingly polarized and adversarial as a result of the major actors, citizen journalism, and the growth of talk radio and news channels. In contrast, traditional media has lost the public's trust. Information mobilization and manipulation were commonplace throughout history even before modern journalism established standards that distinguish news as a genre based on certain integrity requirements (Posetti & Matthews 2018). In the twenty-first century, information has been weaponized in a way that has never been seen before, claims Gent (2017). Thanks to potent new technology that allows for content editing and straightforward fabrication, social networks significantly multiply lies spread by an uncritical public and promoted by the government, populist politicians, and dishonest business groups. Fake news and sophisticated disinformation campaigns are particularly problematic in democracies, and there is growing discussion about how to address these issues without jeopardizing the advantages of digital media. To overcome these challenges and preserve an open, democratic system, the government, industry, and consumers must collaborate. Governments should encourage news literacy and strong, professional journalism in their society.

To build public trust and correct false information without legitimizing it, the news industry must provide high-quality journalism. Technology firms should spend money on systems that identify fake

news, restrict financial incentives for those who profit from spreading false information, and encourage online accountability. The primary goal of educational institutions should be to educate individuals about news literacy. People should read and watch news from a variety of sources, but they should also be wary of what they are reading and seeing. The landscape of the news industry has changed dramatically during the previous several decades. Digital sources have had a significant positive impact on journalism, social media, and citizen engagement (Pew Research Center, 2017). It is now standard practice to check the news online, whether on Google, Twitter, Facebook, the websites of major newspapers, or those of local media. People around the world can get the most recent updates in real time through mobile applications and smartphone alerts. Young people frequently use mobile devices for communication and prefer to get their news from internet sources.

In 2017, 55% of smartphone users reported receiving news notifications, according to the Pew Research Center. Various types of content, from the purely personal to the purely political, fuel social media. Governments, as well as a sector of public relations agencies employed by political or commercial groups, have generated various examples, both implicitly and explicitly. Many bloggers, Facebookers, Instagram influencers, and YouTube celebrities openly advocate for companies and politicians without disclosing that they are paid to do so. Anonymous commentators who seek to affirm, denigrate, or intimidate people on online forums are also paid. Journalism loses ground amid this and becomes a target of reasonable criticism but also existential assassination.

The news media significantly impacts public opinion on various subjects, including climate change. As the importance of climate change has grown, ordinary citizens are now far more likely to be exposed to news coverage than in the past. It is unclear how this news coverage has evolved, even though it could have a significant impact on public support and engagement in the fight against climate change. The importance of the news media is recognised by science communicators. The public's interest in the way climate change is discussed has been piqued. On any topic, communicators can strategically choose which concerns to emphasise and which to minimise. The issue frames that flourish in political discourse are the outcome of their decisions. This is especially true when dealing with a difficult topic such as climate change. It is a topic that spans science, economics, and value issues, trade-offs, unequal effects within and across countries, and future estimates of uncertain results.

Public support for combating climate change and willingness to act on these beliefs in a variety of ways, including voting for environmentally friendly candidates, taking individual actions to lessen one's carbon footprint, and even engaging in political discourse, are likely to have an impact. If citizens are exposed to framing that portrays climate change as an ideological fight, expensive mitigation, or questionable climate science, their desire to support and engage in climate action should be appropriately revised (Hornsey & Fielding 2016).

Role-Players in the Dissemination of False Information on Climate Change

In their assessment of the literature on climate change denial, Bjornberg et al. (2017) found that there are at least six kinds of persons and organizations that reject climate change research: Governments, think tanks, foundations, and institutes from the political and religious spheres; scientists; the steel, mining, and automobile industries; the media, particularly those with right-wing sympathies; and the general public, particularly politically conservative white men. Industry frequently focuses on the oil sector. According to Ding et al. (2011), the way that climate change is covered in the mainstream media creates a "false balance". Environmental journalists continued to give contrarians significant media attention despite abandoning the traditional practice of ensuring balance, especially when a specific set of circumstances were present: contrarian authors, in a right-leaning media outlet, in a country with elite voices, and activists who supported the disregard for the facts on climate change.

Goldberg et al. (2020) investigated 14 pairs of subsequent election cycles. They argue that oil and gas industries often donate money to "anti-environmental" lawmakers whose stances and voting records on the issue fit their objectives. Farrell (2016) identifies a network of 164 organisations, including think tanks, foundations, trade groups, and grassroots lobbying firms, as well as 4,556 people connected to these organisations, as the climate change countermovement. Farrel (2016) examines 40,785 written and verbal texts produced by this network between 1993 and 2013 and finds that corporate funding affects the thematic content and discursive prevalence of this material. He also finds that organisations with corporate funding are more likely to have written and disseminated texts intended to polarise the climate change issue.

Difficulties in the Digital Media Landscape

As the media landscape has changed, there have been numerous worrying occurrences. Some people have utilized social and digital platforms to deceive, mislead, and harm others by creating and disseminating fake news and disinformation, as opposed to using digital technology to educate people and encourage civic discourse. Fake news is produced by organizations that pass for real news sources while disseminating false or misleading information to mislead the public. When these actions transition from random and intermittent to organised and systematic efforts, they become disinformation operations with the capacity to disrupt campaigns and governments across entire countries. Even though times and technologies have changed, history can help us understand the causes and consequences of the current "information disorder" phenomenon, which this paper seeks to address. According to Hunt and Matthew (2017), journalists, journalism trainers, and educators should investigate misinformation, propaganda, hoaxes, and satire as historical elements of media ecology.

Using fraudulent accounts or mechanical "robots," fake news pieces are sometimes amplified and distributed quickly. Most robots are innocuous, and numerous major companies, including Facebook, have prohibited and attempted to remove them; however, there are social robots that are "malicious creatures made purposely to hurt." These robots deploy rumours, spam, viruses, disinformation, slander, and even noise to confuse, exploit, and manipulate social media conversation (Emilio et al., 2016). In recent years, the public's trust in mainstream media outlets has decreased dramatically (Newman 2018). The consequences of this lack of trust are most visible in times of crisis and uncertainty when citizens are most in need of reputable sources of current and reliable information.

The public's trust in the major media could be damaged by fake news, leaving people less informed and more prone to disasters. Their trust in the media might be weakened by the information contained in fake news stories. Citizens' trust in news organizations can be eroded by dishonest reporting and a tabloid-style concentration on scandals. Because their authors attempt to increase viewing through provocative and polarizing material, many fake news stories exhibit these characteristics. Addressing global climate change raises several important issues. Modern global concerns, such as global climate change, cannot be solved individually or straightforwardly without the participation of all stakeholders and the general public, as experience has shown. The paper examines state and media activities aimed at adapting to and mitigating the effects of climate change issues. Today's state political decisions on global climate change responses are linked to the transition to a low-carbon economy. International firms are also implementing specific and effective climate policies. On the one hand, global media undertake their own climate measures; on the other hand, they shape international public opinion on the climate crisis.

Fake News, Misinformation and Climate Change Implications

The Intergovernmental Panel on Climate Change (IPCC) publishes an overview of the state of climate change science every six years or so. From "a perceivable human influence on the global climate" in the Second Assessment Report (Houghton 1996) to "human influence has been the dominant cause of the observed warming since the mid-20th century" in the Fifth Assessment Report, their claims about

human contribution to recent global warming have grown more compelling over the past few decades. Other studies that have been conducted have aimed to measure the degree of agreement on human-caused global warming among climate experts in parallel with the growing scientific consensus in the IPCC reports. Climate change has raised the subject of fake news. While there is widespread scientific agreement on climate change, the public is divided on fundamental issues such as human-caused global warming. While scientists agree on climate change, the public disagrees. People who are exposed to this type of misinformation are less likely to support mitigation actions, which makes it harder for policymakers to take effective climate action.

Big tech corporations such as Google and Facebook have taken steps to limit their spread. Most countries, including South Africa, have illegalised the spreading of false information. Fake news and conspiracy theories became commonplace following the 2020's lockdown. People have circulated incorrect information on social media, whether intentionally or unintentionally, to the point where the topic has resurfaced in worldwide news, raising concerns among health officials about its impact on virus management (Grobler 2020). Some people argue that the problem is caused by ignorance and lawlessness, if not both, while others take a more rational approach. It has thus been argued that post-COVID-19, social media and mainstream media might be politically biased, where it falsifies facts, and misinforms the public to tap into the public sentiment (Naeem, Bhatti & Khan 2020). This is especially the case when powerful leaders use this platform to share information about important government concerns. Informed individuals who can discriminate between truths and falsehoods are required in deliberative democracies.

Eaton (2020) argues that the best course of action is to educate the public, regardless of how angered or sincerely disturbed one may be by the spread of false information during the crisis. Notably, during times of uncertainty, these conspiracies and false claims provide emotional support for people who are afraid. People are openly voicing their sincere worries about the future, in which they might fall ill or lose their employment as social systems come to a standstill, and in which they are deeply disturbed. They convince themselves that the coronavirus was produced by criminals to kill innocent people in order to soothe their tensions and that the old systems would soon return to normal operation (Eaton, 2020). A crucial line of defense against misinformation and deception is the use of news reporting standards for moral and responsible reporting.

The norms and principles that guide journalists have evolved to give journalism its specific goal and method of operation. As a result, verified data and knowledgeable commentary are shared in the public interest. These are the variables that support the credibility of journalism. They are interlaced throughout this paper. Using Eaton's insights, this study focusses on the sociopolitical repercussions of deception. Pickard (2020) contends that "fake news" has become a "magical, all-encompassing phrase to characterise a range of things: from blatantly phony clickbait websites to legitimate news companies". In South Africa, "fake news" has delayed effective climate change action. The fight against climate change is complicated by the fact that, although people are faced with the genuine problem of climate change, misleading news and misinformation are making them unsupportive of mitigating measures such as Bus Rapid Transit (BRT). South Africans need to understand more about climate change to avoid falling prey to 5G scams, which have resulted in the removal of cellular towers across the country (Naeem, Bhatti & Khan 2020).

Fake news' effect on political confidence has broad ramifications for democracy. Public trust in political institutions affects people' civic and electoral behavior, with doubtful citizens more likely to forgo voting or support a populist candidate (Karlova, 2018). While high levels of cynicism and mistrust may lead people to disengage from politics, in other cases, citizen mobilization in response to poor governance can happen. Negative or slanted news, in accordance with Hunt & Matthew (2017), reduces political trust and fosters cynicism and indifference.

The public's perception of climate change has been impacted by false information about fossil fuels. A lower acceptance of climate change is positively correlated with higher per-capita CO₂ emissions (Hornsey 2020). Researchers have found that incorrect information supplied by fossil fuels has contributed to the current level of the public divide on climate change since there is a correlation between societies depending on fossil fuel energy and polarisation on this topic (ibid). The whole economy must transform to address climate change. Even though many tools are available for climate mitigation, the necessary reductions in CO₂ emissions cannot be achieved without new legislation, such as carbon taxes or clear emission limits, which will cause the economy to shift from fossil fuels to renewable energy sources. As a result, mitigation presents a big challenge to those whose personal identities and worldviews are deeply rooted in free-market economics. Therefore, it is not surprising that multiple studies have discovered a strong association between right-wing or libertarian worldviews and the denial of climate science.

Fake news may be subject to similar problems. Politically motivated fringe organisations and foreign actors are accused of disseminating false material in the shape of journalism to destabilise democratic institutions (Wardle & Derakhshan, 2017). Financially motivated fake news organisations create spectacular content to increase views by appealing to partisan bias, inciting unpleasant emotions, and igniting political debates. Scandal and incivility in news coverage can attract public attention while eroding popular trust in politicians (Pickard 2020). In a democratic society, fake news and disinformation are inconsistent with the real essence of participatory democracy and journalism. The role of the media and information is critical to the long-term viability of a good democracy, which is defined as a political system with a stable institutional framework that realises citizen fairness and freedom and strives to meet citizen expectations through the legitimate and proper functioning of its institutional arrangements (Graham, Greenhill, Shaw & Vargo 2015). The latter requires a vibrant network of volunteer organisations of various types, through which residents may administer their affairs and influence government policy. Despite strong scientific consensus, a sizeable portion of the population is still confused about the existence of artificial global warming.

Understanding and addressing the cause is necessary to address the problem of public antagonism over climate change. In this situation, decades of politically motivated misinformation tactics have been a significant factor in the antagonism over climate change (Diamond, Bernauer & Mayer 2020). There is false information regarding climate change in several sources, including the news and social media (Harvey et al., 2017). Theoretical frameworks are needed to better explain the effects of climate misinformation, the sorts of arguments used, and effective interventions to respond to online climate change misinformation. The negative effects of misinformation have been increasingly studied in the literature. With just a small quantity of climate misinformation, such as a few erroneous data, people can become less accepting of climate change.

A more damaging element of misinformation is its capacity to undermine the benefits of accurate knowledge. It has been shown that several climate frames have less effect when denialist frames are present. This dynamic has a large impact on how the mainstream media covers climate change (van der Linden et al., 2017). Sceptics' ideas typically carry the same weight as those of climate scientists since it is common practice for journalists to cover both sides of a dispute fairly (Bjornberg, Karlsson, Gilek & Hansson 2017). It has been demonstrated that erroneous media coverage causes the general public's perception of scientific consensus to deteriorate. Another detrimental effect that is frequently disregarded is the tendency of false information to silence people. Less than half of the population discusses climate change with friends or family, even though the majority are concerned or worried about it (Ding et al., 2021). This self-silencing is mostly brought on by the myth of pluralistic ignorance, which claims that most of the population concerned about climate change are unaware of their massive number (Bjornberg, Karlsson, Gilek & Hansson 2017). This mistake perpetuates itself, creating a "spiral of silence".

Remedial Actions

It is almost difficult to dislodge false information from someone after they have accepted it (Lewandowsky et al., 2012). Even after people are reminded of the myth's debunking, the influence remains. When a person's worldview is thought to be in danger in more dire circumstances, a refutation might even serve to reinforce misconceptions. Similarly, debunking arguments that focus too heavily on the debunked myth increases the risk that it will subsequently be resurrected as true (Nielsen & Graves 2017) Researchers have compiled a list of best practices that can be used to effectively dispute false information (ibid). As an illustration, a factual replacement that matches the causal explanations first provided by the disproved misinformation is necessary for an effective refutation. To ensure that readers are cognitively alert and less likely to be swayed by the presentation of the myth, a refutation that includes the myth being refuted should also warn receivers before addressing the myth (Ecker et al., 2015).

The debunking strategy, commonly referred to as the "inoculation theory," has also been tested by Cook and van der Linden (2020). These authors aim to increase people's resistance to these strategies by educating them about specific rhetorical devices used to promote climate misinformation, such as relying on phony "experts," cherry-picking just the statistics that support one viewpoint, and logical fallacies.

Cook and Lewandowsky (2011) assert that three key components are necessary for effective debunking. To prevent inaccurate information from becoming more widely known, the refutation must first concentrate on the facts rather than the myth or false belief. To alert the public to impending misleading information, statements of erroneous material should be preceded with warnings. Third, the refutation must offer a counterargument. Finally, less but stronger arguments are typically more effective than more but weaker arguments to avoid the "unnecessary backfire effect," which occurs when the refutation fails to convince the audience because there are too many counterarguments. Adding labels to warn users of potential misinformation is another tactic that social media businesses are increasingly using. Examples of these labels are those that Facebook and Twitter introduced in 2020 for the COVID-19 epidemic and the US presidential election. Cooperation is necessary to address the global problem of catastrophic climate change. It requires informed, involved citizens who are prepared to support elected officials who take climate change seriously. To protect the world, there is a need to have a common understanding, faith in science, and a shared feeling of urgency.

Climate change is already a threat, as is abundantly clear from multiple IPCC reports. Therefore, to mitigate the worst effects of the changing climate, decision-makers must act swiftly and decisively. They cannot be prevented from doing so, eroding public support for climate action and wasting precious time in an information environment that promotes climate misinformation and encourages climate sceptics to spread even more misinformation.

Conclusion

Misinformation is a subject that has received much attention lately. However, decades of research have shed light on how to recognise and combat false information, indicating that misinformation is historical. Knowing how to communicate science is a necessary but insufficient prerequisite for communicators aiming to raise public levels of climate literacy. While combating the effects of misinformation is important, research also demonstrates that poorly thought-out measures can have negative effects. Misinformation is a prevalent and complex social problem that demands robust, all-encompassing solutions. Technology-based solutions used through social media that primarily target misinformation can be used as an intervention to safeguard the public against it. Ambitious, ground-breaking solutions can only be produced at a rate that matches the spread of misinformation through multidisciplinary partnerships that bring together specialists in psychology, computer science, and critical thinking.

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