Review

Fake news: Why do we believe it?

Catherine Beauvais*

Service de rhumatologie, hôpital Saint-Antoine. AP–HP. Sorbonne université, Paris, France

A R T I C L E   I N F O

A B S T R A C T

Fake news dissemination has increased greatly in recent years, with peaks during the US presidential elections and the COVID-19 pandemic. Research has addressed fake news creation, consumption, sharing, and detection as well as approaches to counteract it and prevent people from believing it. This update addresses only a part of the fake news-related issues and focuses on determinants leading individuals to believe fake news, noting that rheumatology is scarcely represented. Some determinants relate to the ecosystem of media and social networks, such as the availability and rapid spread of fake news, the unselected information on platforms and the fact that consumers can become creators of fake news. Cognitive factors are important, such as confirmation bias, political partisanship, prior exposure and intuitive thinking. Low science knowledge and low educational level are also involved. Psychological factors include attraction to novelty, high emotional state, and the emotionally evocative content of fake news. High digital literacy protects against believing fake news. Sociological factors such as online communities, or echo chambers, and the role of pressure groups have been identified. The implication for practice can be deduced, including education in media literacy and warning tips, reliable journalism and fact-checking, social media regulation, partnership of media platforms' with fact-checkers, warning messages on networks, and digital detection solutions. Health professionals need to better understand the factors that cause individuals to believe fake news. Identifying these determinants may help them in their counseling role when talking to patients about misinformation.

© 2022 Société française de rhumatologie. Published by Elsevier Masson SAS. All rights reserved.

1. Introduction

Although fake news has always existed, its dissemination has increased greatly in recent years, with main topics related to politics and a peak during the US presidential elections [1]. The recent massive spread of fake news during the COVID-19 pandemic was dubbed the "infodemic" [2] and led the World Health Organization to call for the development of international fact-checking organisations [3]. It also led to the definition of "infodemiology" as the science of infodemic management.

Research into fake news has progressed exponentially in the last 5 years (Box 1) [4–7]. Hence, this update addresses only a part of the fake news-related issues and focuses on the reasons leading individuals to believe fake news, noting that rheumatology is scarcely represented.

This update considers successively the external determinants of people's beliefs linked to the media ecosystem and social media platforms (Box 2) and the internal cognitive and psychological

> **Box 1: Key areas of fake news research [4–7].**
> Fake news creation
> Fake news consumption and sharing
> Detection
> Counteracting and prevention

> **Box 2: External factors: ecosystem of media and social media platforms.**
> Availability of false news in the mainstream of news agenda
> Role of social-media platforms
> Vulnerability of traditional media and decline of traditional gatekeepers
> Unselected information
> Individual creators and consumers
> Rapid spread of false news
> Competition between true and false information
> Uncertainty
> False news persistence
> False news creation

* Auteur correspondant. Service de rhumatologie, hôpital Saint-Antoine, Sorbonne université. AP–HP, 184, rue du Faubourg Saint-Antoine, 75012 Paris, France.
E-mail address: catherine.beauvais@aphp.fr

Table 1
Internal and mixed factors: cognitive, psychological, and sociological.

Individual characteristics	Low education level
Cognitive factors	Confirmation bias
	Political partisanship
	Prior exposure and the illusory truth effect
	Repetition and familiarity
	Type of reasoning: intuitive thinking vs. analytic thinking
	Lack of critical thinking
	Little time spend on news
	Lack of crystallised intelligence
	To be "in the know"
	Low educational level
	Low science knowledge
	Trust in "elite" messages
Literacy	Low digital literacy
	Low health literacy
Psychological factors and personality	Novelty
	Emotionally evocative content
	High emotional state
	High arousal emotions
	Low emotional intelligence
	Impulsivity
	Anti-science attitude
Mixed internal and external sociological factors	Selective exposure
	Echo chambers
	False news fabrication and pressure groups
	Stressful environment

determinants as well as mixed sociological factors (Table 1). These latter factors in turn feed the fake news ecosystem in that people may change from consumers to creators of fake news and vice versa [4].

The definition of fake news continues to change over time [4]; one definition is "fabricated information that mimics news media content in form but not in process or intent" [8] with the intention of misleading readers. Misinformation means that the false circulating information may be accidental, whereas disinformation implies intentional fabrication and dissemination [9]. People also use "fake news" to label as unreliable opinions that do not support their positions [1]. Related terms include hoax, conspiracy theories, myths, rumours or propaganda. A rumour is defined as the social phenomena of a news story being spread by word of mouth or through the media or social-media platforms [1]. It can be a circulating story with questionable veracity and apparent credibility producing sufficient scepticism and/or anxiety so as to motivate finding out the actual truth [10]. In social networks, a rumour cascade is defined as the propagation by retweets/new shares of an assertion made by a single user [1].

2. Media ecosystem and social-media platforms

2.1. The information agenda and availability of false news

On the Internet and social-media platforms, information is highly available and people are exposed to a huge amount of news. Although a small number of people are exposed to fake news on mainstream Websites (e.g., a French survey [11] showed that only 5% of people had visited unreliable sites), exposure to misinformation is mainly from social networks [12,13], in line with current events [1]. A trend analysis of fake news on COVID-19 verified by the International Fact-Checking Network and Google Fact Checking Tools [13] showed a 900% increase from January to March 2020. Fake news was found mainly on social-media platforms (88%), whereas other sources were much less involved: 9% on TV, 8% in the press and 7% on websites.

In the pandemic context, the interest of netizens for unreliable or conspiratorial sources tended to increase as compared with

the pre-COVID-19 period [14]. The news channels and newspapers heavily influenced users and gave resonance to serious "fake news" on COVID-19, which caused pronounced spikes of interest from Web users [15].

2.2. Unselected information

On social media, information is unselected and disseminated from a variety of sources whose reliability is not related to their popularity. People who participate in this "public market of information", via a blog or an Instagram or Facebook account, have disrupted symbolic hierarchies, with some YouTubers and influencers being followed by large numbers of people. The situation calls into question the role of traditional gatekeepers (i.e., individuals whose expertise is recognized, such as scientists or journalists belonging to newspapers or media considered to be trustful). Consumers increasingly prefer interactive media, which reduces the boundaries between professional journalists and amateurs and between news consumers and creators [4].

The amount of information creates widespread exposure to false rumours, so people are more likely to believe the rumours, via the familiarity effect (see below, Cognitive factors). Moreover, an empirical study conducted with 241 social network users in Germany during the early stages of the COVID-19 pandemic demonstrated that information overload led to an increased likelihood of fake news sharing by increasing consumers' psychological strain [16].

2.3. Rapid spread of false news

One study analysed true, false, and mixed (partially true or false) stories on Twitter [1] in 126,000 rumour cascades, spread by 3 million people. True news was defined by a 95% to 98% agreement by independent fact-checking organizations. False news diffused faster and deeper than true news: true news cascades diffused rarely to more than 1000 people, whereas the top 1% of false news cascades routinely diffused to 1000 to 100,000 people. The likelihood of being retweeted was 70% higher for false news than true news. An analysis of the role of algorithms (bots) concluded that bots increased the spread of both false and true news and that false news spread was due to the human propensity to be attracted to novelty and by emotionally arousing news (see below, Psychological factors). Other studies have shown that the role of social bots are conducive to the creation and dissemination of fake news. Indeed, it is well known that people's searches on the Internet are processed by algorithms to suggest further information related to previous searches [4]. However, algorithms extracting the emotional signals from the text of claims on social media have been found helpful to differentiate between credible and non-credible claims [17].

2.4. Uncertainty and fake news persistence

Uncertainty is a key element of fake news because the dubious veracity of fake news raises anxiety or strong interest [10], and some news will never be clarified. An analysis of the spread of rumours in a dataset of 330 rumour threads (4842 tweets) before and after their veracity status was resolved showed that false rumours tended to be resolved significantly later than true rumours [10]. Tweets supporting unverified rumours were more widely spread. The denying of unverified rumours (true or false) was low because people did not retweet after the rumour was resolved, so users did not make the same effort to spread debunks of false rumours to let other people know.

In addition to the persistence of any type of information on the Internet, people's neglect of debunks and the existence of strong believers may explain why false or unverified information can

persist over time. This phenomenon of competition between true and false information (e.g., on the first search page of Google) has long been described [18].

3. Cognitive factors

3.1. Confirmation bias and partisanship

Among cognitive factors, confirmation bias is a major determinant and induces individuals to seek or interpret evidence in ways that are concordant with their existing beliefs, expectations, or a hypothesis in hand [19]. In the political spectrum, this bias may explain why people show less discernment toward fake news issued from their own political camp: political affiliation influences their beliefs on which news sources are "fake" [20]. An experimental study [21] tested beliefs in fake news after the 2020 US election: people with more conservative ideology, greater presidential approval of the outgoing president, greater endorsement of general conspiracy narratives and poorer cognitive reflection demonstrated greater belief in false headlines about election fraud. For Pennycook et al. [22], the type of reasoning (intuitive thinking) is more important than partisanship for believing false news, but political convictions influence news sharing, even non-political information [23]. A survey conducted in France in 2020 showed that as compared with people at the centre of the political spectrum, those at the extremes (right or left) were more likely to believe that the COVID-19 virus was created in a laboratory [24]. This study illustrates that debated information such as the undetermined origin of COVID-19 [25] fosters fake news. Confirmation bias is also behind the development of online communities, known as echo chambers (see below, Sociological factors).

3.2. Prior exposure and the illusory truth effect

The illusory truth effect means that prior exposure to a statement increases the likelihood that people will judge it to be accurate, especially in the case of false news [26]. The mechanism is that repetition increases the fluency of the cognitive processing, which in turn is used to infer accuracy. Notably, in an experimental study [26], when participants were exposed to warning tips, the repetition effect was lowered. Similarly, in another experimental study, repetition had an effect on individuals who made an initial assessment of interest in the news but not those who made an initial assessment of its truthfulness, which provides clues to reduce the effect of familiarity [27]. However, the warning tips did not seem to be effective over time and did not stop people from believing an article of false news once they saw it again without a warning [28]. Furthermore, the effect of repeated exposure seems to be enhanced by trust in reliable sources, such as scientific authorities [29,30], so these sources must guarantee the veracity of the information they provide.

3.3. Type of reasoning

In experimental studies, people who have analytic thinking versus those who rely on intuitive thinking are less likely to believe fake news headlines or full-text news [31,32]. Critical thinking is also protective against fake news [33] as well as "crystallized intelligence including lexical knowledge, general information, information on culture" [34]. However, belief in fake news is reduced by deliberation [35], so the use of analytical thinking is difficult to achieve because the time spent on news is low [11].

3.4. To be "in the know"

An experimental study [36] recruited 107 individuals who were exposed to six false and real news items, two health-related, presented in the Facebook format. A qualitative study found four main themes to explain the reasons for the answers. Two have already been mentioned: the false news fitting with personal experiences and pre-existing beliefs of participants. Two additional factors were found: individuals felt "in the know" of a "hidden" problem ("Horrible problem, glad it was pointed out") and were misled by the false news presentation, mimicking visuals, data and graphs from real information ("Good argument, it uses a graph and data from a source"). False news detection was correlated with higher education attainment as well as a higher level of emotional intelligence, defined as the ability to understand and regulate one's own emotional reactivity and correctly link emotion and context [37].

3.5. Trust in "elite" messages

People tend to trust the personalities they see in the media, some with recognised expertise and some, so-called experts with a scientific background, who are great propagators ("super-spreaders") of fake news. One study used a social-media trends analysis tool to collect posts from Facebook, Pinterest, Reddit and Twitter on the early COVID-19 pandemic in Italy [38]. Links containing false information were shared 2,352,585 times, accounting for about 23.1% of the total shares. The fake news that the coronavirus contained human-made HIV inserts accounted for 11% of the news and 78% of the shares, despite fact-checking. This report illustrates the persistent dissemination of false information that has been debunked and the negative influence of an "elite" of super-disseminators, in this case a Nobel Prize winner.

In the survey by Brennen et al. [13], top-down misinformation about COVID-19 was identified from politicians, celebrities, and other prominent public personalities, accounting for 20% of the claims and 69% of total social media engagement. In France, a virologist living in Marseille, France was a great disseminator of false information on hydroxychloroquine (HCQ) [39].

4. Literacy

Health literacy allows people to better use the healthcare system, and digital literacy requires the skills to find, integrate, and apply health information from online environments [40]. An experimental study found that digital health literacy was protective for believing fake news [41]. High digital health literacy and high health literacy, as investigated among US students in terms of COVID-19-related information, were independently associated with greater willingness to be vaccinated [40]. Low health literacy was associated with twice the use of YouTube as compared with high literacy (68% vs. 44%) and significantly higher use of Facebook and Instagram, which are associated with echo chambers [40]. Of note, an intervention to increase digital literacy had a beneficial effect on detecting fake news [42], and people who had undergone health literacy training were more likely to engage in critical social-media posting practices about COVID-19 [30].

5. Psychological determinants

5.1. Emotionally evocative content and emotional state

The use of emotions to attract attention is well known in marketing and is not uncommon in the mainstream press even if the information is supposed to be completely safe. One study [43] examined 7000 articles in the New York Times, coding 2566 for

emotions. The virality, defined as the odds of being on the list of most emailed articles, was correlated with anxiety, anger and awe driven by the article content. A 1-standard deviation increase in anger resulted in a 34% increase in virality.

An experimental study showed similar results for fake news [44]: 409 individuals were exposed to 20 real or false news and were assessed for their state of emotion. Their discernment was calculated as the difference between detecting real and false news. Lower discernment was associated with a general level of emotion and with certain emotions such as "excited", "scared", "upset" or "ashamed", whereas other emotional states, such as "determined" or "attentive", related to analytical thinking, were not involved. Of note, inducing reliance on emotion resulted in greater belief in fake (but not real) news stories as compared with controls.

Several factors may add up and connect to each other, as Morriseau et al. [39] suggested in the case of HCQ misinformation: intuitive framing, anti-science attitudes, impulsivity, stressful environment, lack of control, and sociological factors such as socio-existential issues and agreement with the ideas of the populist "yellow waistcoats" movement were linked among people supporting the HCQ effectiveness theory.

6. Difference between sharing and believing in false news

An experimental study of COVID-19 misinformation recruited 853 participants who were exposed to 30 real or false news [23]. Participants were asked a question about their perception of the accuracy of information and a question about their willingness to share. Better accuracy was found in detecting real news than false news, but false headlines were more often shared (32.4% higher). Cognitive reflection and science knowledge enhanced discernment and reduced news sharing. Medical maximisers (i.e., people who consumed more medical healthcare) showed greater beliefs and shares of both true and false headlines. Republican partisanship made people less prone to share both true and false headlines and in particular true headlines. Again, a simple accuracy reminder at the beginning of the study (judging the accuracy of a non-COVID-19-related headline) nearly tripled the level of truth discernment and reduced sharing intentions. Moreover, no one seems immune to misinformation-sharing: among subscribers to a fact-checking newsletter (CoronaCheck, belonging to the Australia's premier fact-checking organisation), 24% of participants had shared possible misinformation, and this attitude was predicted by a lower belief in science [45]. In contrast, another study in Africa examined the reasons for spreading fake news and found that in addition to reasons related to leisure time and socialising (Box 3), spreading fake

---

Box 3: Individual factors in spreading false news [18,25,47,48].

To pass the time
Socialization
Altruism
Information-sharing
Information-seeking
Psychological strain
Partisanship
Low science knowledge
Intuitive thinking

---

news could be related to altruism, in the hope of warning people about frightening events [46]. Thus, the spread of health-related misinformation probably has other determinants than the spread of political misinformation.

7. Sociological factors

7.1. Echo chambers

An echo chamber is an environment in which the opinion, political learning or beliefs of users is reinforced by repeated interactions with peers or similar sources. The opinions, learning and beliefs result from selective exposure to opinions carried by people with the same interests and values [47,48]. The interactions of these individuals are also determined by factors already described, such as speed of propagation, confirmation bias, the attraction of individuals to novelty and news with high emotional content, and, in some cases, strong partisanship. One study combined these characteristics to examine social-media platforms such as echo chambers [47]: YouTube and Gab played a role in amplifying fake news, whereas other platforms containing fact-checking activity, such as Reddit, reduced their impact. In the study by Brennen et al. [13], the percentage of active false posts about COVID-19 with no direct warning was 59% on Twitter, 27% on YouTube and 24% on Facebook.

Echo chambers can also be contaminated by lobby groups. A French study published in the magazine *Le Point* [49] analysed a panel of 100,000 French Twitter accounts by using the Lucy analysis tool. A sub-population was identified as "alternative media users" linked to 30 questionable accounts. This sub-population was exposed to a higher rate of fake news messages as compared with the rest of the account users in the study: 75% versus 14% were exposed to anti-vaccine messages, 72% versus 13% to anti-5G messages, and 86% versus 24% to pro-HCQ messages (from May 8 to June 8, 2020, the number of pro-HCQ messages posted per day was 230 in this sub-population versus 20 in the sample of Twitter accounts). This observation can be interpreted as a common interest shared by individuals but also by the manipulation of the accounts by the anti-5G lobby, which is very active in France. It was also associated with political partisanship, with 33% of anti-5G individuals following far-left and far-right political leaders as compared with 5% of the sample of Twitter users, although the domain was not related to politics. Similar results were found in another French cohort: those who believed fake news most were more likely to be against or hesitant toward anti-COVID-19 vaccination [50].

7.2. False news fabrication

Disinformation includes intentional fabrication and/or news spreading. In the case of COVID-19, 59% of fake news was found reconfigured from existing news and 38% fabricated [13]. Many studies found that fake news was driven by celebrities or organisations, some in foreign countries [9], with motivations related to political partisanship, geopolitical intentions or money. This topic will not be discussed in detail. However, most fake news has the appearance of the common format of social-media platforms, such as the Facebook format, which leads to a high risk of confusion [36]. Looking for money motives or what the intentions may be is one of the clues that are protective against fake news [51]. The three most common frames used in COVID-19 misinformation visuals were rephrasing information from public authorities (40%), over- or underestimating the spread of the virus or claiming that the disease does not exist (33%), or offering medical information suggesting cures, treatments or prevention of the virus (29%) [52]. Being able to detect fake news' presentation cues is important [53], and knowledge of how and why fake news is created helps in its detection, as shown in the review by de Beer et al. [6] using semantic and syntax analysis and machine learning.

Table 2
Implications for practice [7].

Key fields	Examples
Journalism	Source leaning
	Fact-checking
Education	Media literacy promotion
Governmental responses	Media regulations
Digital platforms	Partnership with fact-checkers
	Warning tips
Computer solutions	Detection algorithms
	Web games

Table 3
Eight ways to spot misinformation [53].

Source suspicion	Vague, untraceable sources
Bad language	Poor spelling, grammar or punctuation
Emotional contagion	Miscreants know that messages that trigger strong emotions are shared the most.
News gold or fool's gold?	If information is reported by only one source, beware, especially if it suggests that something is being hidden from you.
False accounting	Use of fake social-media accounts; Look out for misleading images and bogus web addresses.
Oversharing	If someone urges you to share their sensational news, they might just want a share of the resulting advertising revenue.
Follow the money	Think about who stands to gain from you believing extraordinary claims.
Fact-check	Go past the headlines and read a story to the end. If it sounds dubious, search fact-checking websites.

8. Implications for prevention

8.1. Approaches to counter misinformation

Examining the determinants described above, several types of interventions can be implemented to limit the spread of fake news and prevent people from believing it. A recent review [7] identified five main approaches to counter misinformation (Table 2). Examples of these approaches have already been mentioned, such as media education, social-media warnings or critical thinking skills. Along with these, fact-checking has become an important element. Almost all countries have fact-checking partners in the International Fact-Checking Network. These partners belong to newspapers or TV/radio stations and try to quickly react to disinformation. For instance, an online newspaper was very quick to alert the public to the contents of the conspiracist documentary "Hold up" broadcast on French TV [54]. Some social networks also have notifications of inaccurate or falsified information according to fact-checking. However, it takes time to prevent some conspiracy websites from operating. For example, the online newspaper *France soir*, which which can be seen as a conspiracy site, was only recently banned from Google actualities [55]. Moreover, because of the confirmation bias, fact-checking may not reach strong believers.

8.2. The checklist against fake news

An experimental study [56] enrolled 2077 healthcare professionals (including 128 physicians), non-healthcare professionals, and students with and without a healthcare background. Regardless of their level of education and expertise, individuals were found vulnerable to false news. Healthcare professionals did not perform better than non-healthcare professionals or students even if the news stories were linked to immediate health implications. Therefore, the checklist presented in Table 3 [51] may be useful for everyone.

9. Fake news in rheumatology

Publications on fake news in rheumatology are rare. In everyday practice, rheumatologists are confronted with misinformation on general health topics, as described above, and also with specific fake news in the spectrum of rheumatic and musculoskeletal diseases. A Spanish study [57] analysed the content of a random sample of original tweets on Twitter, mainly about rheumatoid arthritis and osteoarthritis, 1,093 classified as medical and 421 as non-medical. A small rate of false information was found (4.4%), a little higher for therapeutics (5.8%). False information received fewer retweets and likes than accurate information, which suggests a regulation by the Twitter community. Some false news about osteoporosis medication has also been broadcast [58]. The small number of available studies does not provide relevant clues for managing this important topic in rheumatology.

In conclusion, health professionals need to better understand the factors that cause individuals to believe fake news. Although no specific interventions have been described in the literature at the level of the patient-physician relationship, identifying these determinants may help physicians when counselling patients about misinformation. More research is needed about fake news in rheumatology.

Disclosure of interest

References

[1] Vosoughi S, Deb Roy D, Sinan Aral S. The spread of true and false news online. Science 2018;359:1146–51.

[2] Zarocostas J. How to fight an infodemic. Lancet 2020;395:676.

[3] WHO https://www.who.int/news-room/events/detail/2020/06/30/default-calendar/1st-who-infodemiology-conference (01/12/2022).

[4] Kim B, Xiong A, Lee D, et al. A systematic review on fake news research through the lens of news creation and consumption: research efforts, challenges, and future directions. PLoS One 2021;16 [e0260080].

[5] Celliers M, Hattingh M. A systematic review on fake news themes reported in literature. responsible design. Implementation and Use of Information and Communication Technology 2020;12067:223–34.

[6] de Beer D, Matthee M. Approaches to identify fake news: a systematic literature review. Integrated Science in Digital Age 2021;136:13–22.

[7] Caled D, Silva MJ. Digital media and misinformation: an outlook on multidisciplinary strategies against manipulation. J Comput Soc Sci 2021;27:1–37.

[8] Lazer DMJ, Baum MA, Benkler Y, et al. The science of fake news. Science 2018;359:1094–6.

[9] Shahi GH, Dirkson A, Majchrzak TA. An exploratory study of COVID-19 misinformation on Twitter. Online Soc Netw Media 2021;22:100104.

[10] Zubiaga A, Liakata M, Procter R, et al. Analysing how people orient to and spread rumours in social media by looking at conversational threads. PLoS One 2016;11 [e0150989].

[11] Cordonier L, Brest A. How do the French inform themselves on the Internet? Analysis of online information and disinformation behaviors. [Research Report] Fondation Descartes. 2021. hal-03167734. file:///C:/Users/UTILIS~1/AppData/Local/Temp/How%20do%20the%20French%20inform%20themselves%20on%20the%20Internet-1.pdf (01/12/2022).

[12] Pennycook G, Rand D. The psychology of fake news. Trends Cogn Sci 2021;25:388–402.

[13] Brennen JS, Simon F, Dr Philip N. Howard PN, Nielsen RK. Types, sources, and claims of COVID-19 misinformation. RISJ Factsheet. Reuters Institute for the Study of Journalism. https://reutersinstitute.politics.ox.ac.uk/types-sources-and-claims-covid-19-misinformation (01/12/2022).

[14] Rovetta A. The impact of COVID-19 on conspiracy hypotheses and risk perception in Italy: infodemiological survey study using Google trends. JMIR Infodemiology 2021;1 [e29929].

[15] Rovetta A, Castaldo L. Influence of mass media on Italian web users during the COVID-19 pandemic: infodemiological analysis. JMIRx Med 2021;2 [e32233].

[16] Bermes A. Information overload and fake news sharing: a transactional stress perspective exploring the mitigating role of consumers' resilience during COVID-19. J Retail Consum Serv 2021;61:102555.

[17] Giachanou A, Rosso P, Crestani F. The impact of emotional signals on credibility assessment. J Assoc Inf Sci Technol 2021;72:1117–32.

[18] Bronner G. Les croyances à l'heure d'internet. Recherches en communication, 2012;38: 15-28 Bronner G. Les croyances à l'heure d'internet. Recherches en communication, 2012;38: 15-28. file:///C:/Users/UTILIS~1/AppData/Local/Temp/50203-Texte%20de%20l'article-74393-1-10-20191122-3.pdf (02/20/2022).

[19] Nickerson R. Confirmation bias: a ubiquitous phenomenon in many guises. Rev general Psychology 1998;2:175–220.

[20] Michael RB, Breaux BO. The relationship between political affiliation and beliefs about sources of fake news. Cogn Res Princ Implic 2021;6:6.

[21] Calvillo DP, Rutchick AM, Garcia RJB. Individual differences in belief in fake news about election fraud after the 2020 U.S. Election Behav. Sci 2021;11.

[22] Pennycook G, Rand DG. Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. Cognition 2019;188:39–50.

[23] Pennycook G, McPhetres J, Zhang Y, et al. Fighting COVID-19 misinformation on social media: experimental evidence for a scalable accuracy-nudge intervention. Psychol Science 2020;31:770–80.

[24] https://www.jean-jaures.org/publication/lepidemie-dans-lepidemie-theses-complotistes-et-covid-19/(01/12/2022).

[25] Bloom JD, Chan YA, Baric RS, et al. Investigate the origins of COVID-19. Science 2021;372:694.

[26] Pennycook G, Cannon TD, Rand DG. Prior exposure increases perceived accuracy of fake news. J Exp Psychol Gen 2018;147:1865–80.

[27] Calvillo DP, Thomas J, Smelter TJ. An initial accuracy focus reduces the effect of prior exposure on perceived accuracy of news headlines. Cogn Res Princ Implic 2020;5:55.

[28] Grady RH, Ditto PH, Loftus EF. Nevertheless, partisanship persisted: fake news warnings help briefly, but bias returns with time. Cogn Research 2021;6:52.

[29] Nadarevic L, Reber R, Helmecke AJ, et al. Perceived truth of statements and simulated social media postings: an experimental investigation of source credibility, repeated exposure, and presentation format. Cogn Research 2020;5:56.

[30] Melki J, Tamim H, Hadid D, et al. Mitigating infodemics: the relationship between news exposure and trust and belief in COVID-19 fake news and social media spreading. PLoS ONE 2021;16 [e0252830].

[31] Pennycook G, Rand DG. Who falls for fake news? The roles of bullshit receptivity, overclaiming, familiarity, and analytic thinking. Personality 2020;88:185–200.

[32] Pehlivanoglu D, Lin T, Deceus F, et al. The role of analytical reasoning and source credibility on the evaluation of real and fake full-length news articles. Cogn. Research 2021;6:24.

[33] Machete P, Turpin M. The use of critical thinking to identify fake news: a systematic literature review. responsible design. Implementation and Use of Information and Communication Technology 2020;12067:235–46.

[34] Sindermann C, Schmitt HS, Rozgonjuk D, et al. The evaluation of fake and true news: on the role of intelligence, personality, interpersonal trust, ideological attitudes, and news consumption. Heliyon 2021;7 [e06503].

[35] Bago B, Rand DG, et Pennycook G. Fake news, fast and slow: deliberation reduces belief in false (but not true) news headlines. J Exp Psychol Gen 2020;149:1608–13.

[36] Preston S, Anderson A, Robertson DJ, et al. Detecting fake news on Facebook: the role of emotional intelligence. PLoS One 2021;16 [e0246757].

[37] Salovey P, Mayer JD. Emotional intelligence. Imagin Cogn Pers 1990;9:185–211.

[38] Moscadelli A, Albora G, Biamonte MA, et al. Fake news and Covid-19 in Italy: results of a quantitative observational study. Int J Environ Res Public Health 2020;17:5850.

[39] Morisseau T, Branch TY, Gloria Origgi G. Stakes of knowing the truth: a motivational perspective on the popularity of a controversial scientific theory. Front Psychol 2021;12:708751.

[40] Patil U, Kostareva U, Hadley M, et al. Health literacy digital health literacy, and COVID-19 pandemic attitudes and behaviors in U.S. College students: implications for interventions. Int J Environ Res Public Health 2021;18:3301.

[41] Jones-Jang SM, Mortensen TJ. Does media literacy help identification of fake news? information literacy helps, but other literacies don't. Am Behav Sci 2019;65:371–88.

[42] Guess AM, Lerner M, Lyons B, et al. A digital media literacy intervention increases discernment between mainstream and false news in the United States and India. PNAS 2020;117:15536–45.

[43] Berger J, Milkman KL. What makes online content viral? J Mark Res 2012;49:192–205.

[44] Martel C, Pennycook G, Rand DG. Reliance on emotion promotes belief in fake news. Cogn Res Princ Implic 2020;5:47.

[45] Saling LL, Mallal D, Scholer F, et al. No one is immune to misinformation: an investigation of misinformation sharing by subscribers to a fact-checking newsletter. PLoS ONE 2021;16 [e0255702].

[46] Apuke OD, Omara B. Fake news and COVID-19: modelling the predictors of fake news sharing among social media users. Telematics and Informatics 2021;56:101475.

[47] Cinelli M, De Francisci Morales G, Galeazzi A, et al. The echo chamber effect on social media. PNAS 2021;118 [e202330111].

[48] Cinelli M, Quattrociocchi W, Galeazzi A, et al. The COVID-19 social media infodemic. Scientific Reports 2020;10:16598.

[49] https://www.lepoint.fr/politique/anti-vaccins-anti-5g-hydroxychloroquine-quand-la-defiance-deferle-sur-twitter-10-07-2020-2383828_20.php).

[50] Montagni I, Ouazzani-Touhami K, Mebarki A, et al. the CONFINS group acceptance of a Covid-19 vaccine is associated with ability to detect fake news and health literacy. J Public Health (Oxf) 2021 [fdab028].

[51] Fighting coronavirus misinformation. Nature; 2020;583:155-156.

[52] Brennen JS, Felix M, Simon FM, et al. Beyond (Mis)Representation: visuals in COVID-19 misinformation. The International Journal of Press/Politics. Int J Press Polit 2021;26:277–99.

[53] Bryanov K, Vziatysheva V. Determinants of individuals' belief in fake news: a scoping review determinants of belief in fake news. PLoS ONE 2021;16 [e0253717].

[54] https://www.20minutes.fr/high-tech/2908307-20201114-affirmations-hold-up-attestations-attention-intox-semaine (01/12/2022) https://www.france24.com/en/culture/20201118-hold-up-french-documentary-lends-voice-to-covid-19-conspiracy-theories (02/20/2022).

[55] https://www.lemonde.fr/pixels/article/2021/09/10/france-soir-perd-son-acces-a-l-outil-publicitaire-de-google_6094206_4408996.html (01/12/2022). https://thecanadian.news/france-soir-loses-its-access-to-googles-advertising-tool/(02/20/2022).

[56] Grüner S, Krüger F. Infodemics: do healthcare professionals detect corona-related false news stories better than students? PLoS ONE 2021;16.

[57] Abbasi-Perez A, Alvarez-Mon MA, Donat-Vargas C, et al. Analysis of tweets containing information related to rheumatological diseases on Twitter. Int J Environ Res Public Health 2021;18.

[58] Sambrook PN, Chen JS, Simpson JM, et al. Impact of adverse news media on prescriptions for osteoporosis: effect on fractures and mortality. Med J Aust 2010;193:154–6.