

Fake News and Social Processes: A Short Review



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Abstract The explosive growth in social media, social networking, and messaging platforms has seen the emergence of many undesirable social phenomena. A common thread among many of these social behaviors is *disinformation propagation*, through falsehoods of many shades and grades that are quickly propagated to millions of people. In this chapter, we focus on disinformation propagation mainly in the garb of *fake news*, which contains deceptive, distorted, malicious, biased, polarizing, inaccurate, unreliable, unsubstantiated, and unverified or completely false or fabricated information. We examine the literature related to the sociological analysis of the fake news phenomenon and its impact on social processes such as elections and vaccination. We also outline directions for further research.

Keywords Fake news on social media · Disinformation in elections · Disinformation in anti-vaccine propaganda · Disinformation propagation · Rumors

1 Introduction

The world is witnessing an explosive growth in social media, social networking, and messaging platforms (which we collectively call *information sharing channels*, or just *channels*) and their deepening reach into all strata of societies across the world. Along with many benefits, this has also led to the emergence of several types of undesirable online social behaviors, including rumors, fake news, fake reviews, fake images, fake videos, spam emails, identity theft, cyber-stalking, phishing, etc. [3].

A common thread among many of these online social phenomena is *disinformation propagation*, which consists of dynamic, distributed social processes for the creation and dissemination of deceptive, distorted, malicious, biased, polarizing, inaccurate, unreliable, unsubstantiated, unverified, or completely false or fabricated

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information, often as a coordinated *campaign* spread across multiple channels, targeting specific classes of users and achieving a specific impact or goal. Typical goals include promoting (or attacking) specific religious/political views, promoting (or attacking) specific people/organizations/products, spreading fear/hatred/ anger, causing confusion/suspicion, influencing social events such as elections/protests, and influencing strategic decisions. The disinformation is often expressed in the form of fake news, fake images, fake videos, fake documents, and fake textual messages or posts, although the expression could be much more subtle instead of being outright false, e.g., misleading information crafted around a core of true facts. Disinformation campaigns are typically created and launched by *campaign managers*, who, behind the scenes, coordinate, sustain, and manage the spread. Fake accounts and bots play an important role in initiating and sustaining the campaign. Still, a disinformation campaign continues due to the active participation in its dissemination of supporting or interested users on different channels [32], who are often unaware of the true intentions of the managers. Disinformation works because it appeals to simple factors in human nature: humans respond to emotional triggers; humans share disinformation if it appeals to or reinforces their existing beliefs and prejudices; and humans long to belong to groups sharing similar beliefs (*echo chambers*) [33]. The voluntary participants in disinformation campaigns add weightage and credibility to them.

In this chapter, we will focus on disinformation propagation involving fake news, although, in our opinion, the use of other channels should be considered to construct an integrated view of a disinformation campaign. After the advent of the Internet, the traditional sources of news—such as newspapers, news magazines, and television—are seeing a rapid decline in the access of their original print avatars, and most have switched to online digital formats. While many digital newspapers remain behind paywalls, news aggregators, such as Apple News, Google News, and Upday, are gaining importance as they provide personalized online news access to users. Platforms such as Facebook, Instagram, Twitter, and WhatsApp are becoming primary sources for getting, sharing, and discussing news [18].

Since it is now easy to create and quickly disseminate user-generated content at scale, as mentioned earlier, a new class of undesirable online social phenomena has emerged. Important among these is the phenomenon of fake news. *Fake news* can be defined as a text (or other media such as image, audio, or video) content, masquerading as real and authentic news, that intentionally and verifiably contains falsehoods and disinformation presented as true facts. A wider definition might allow for the presence of more subtle (not directly verifiable) falsehoods, such as insinuations, misinterpretations, etc. Fake news has the appearance of authentic news but whose source is not any well-known, official, trustworthy agency and which often contains targeted, usually negative, malicious, biased, polarizing, unverified, unsubstantiated, unreliable, inaccurate, and even completely false or fabricated information [5, 25, 32, 35]. The fake news phenomenon consists of dynamic, distributed processes of creation and dissemination of disinformation, often through online social media or messaging platforms. Fake news campaigns often evoke counter-processes, such as detection, control, and retaliations.

Fake news campaigns generally target influential persons, organizations, products, or countries in order to damage (or boost) their activities, finances, or reputations. Widespread prevalence of fake news has resulted in the reduction of trust in the news circulating on various platforms, despite efforts by these platforms to build public confidence. Across all countries, the average level of trust in the news is about 42%, and less than half of the users trust the news media they themselves use [18]. Facebook, WhatsApp, Twitter, Instagram, and other such platforms often allow dissemination of content within closed, opaque groups (*information black holes*) without any serious fact-checking validations, control, or judgment, making it difficult to control the dissemination of falsehoods. Several initiatives have been created to help in the detection of fake news, e.g., publicizing lists of known fake news publishers, public-domain datasets of fake news, associations such as the International Fact-Checking Network (poynter.org/ifcn/)/European Union Disinformation Lab (disinfo.eu), and fake news detection websites such as FactCheck.org, snopes.com, and altnews.in.

While fake news and other disinformation campaigns may benefit some in the short run, it will almost certainly have large social and political costs in the long run, if the falsehood remains persistent and widespread. Some of the long-term effects of fake news are fragmentation and polarization of societies, social unrest, distrust of democratic institutions, and misgivings about scientific temper. In individuals, fake news may result in feelings of alienation, confusion, suspicion, cynicism, and distrust of authorities.

In this chapter, we review fake news related to social and political processes. Since fake news affects many social processes and events, we further narrow down our review to elections and vaccine hesitancy. Fake news is being used to influence election outcomes and thereby wreak havoc with the foundations of democratic institutions [6, 12]. Fake news is also being used to create and fan social unrest, to push political/religious agenda, to create anger/hatred in society, to damage reputation/legitimate activities of political opposition, and to create fear/confusion in vulnerable sections of a society (e.g., vaccine hesitancy). Figure 1 shows two



Fig. 1 Examples of disinformation

examples of recent fake news. One is based on a fake letterhead that “shows” how the Delhi state government “appeased” Muslim citizens during recent communal riots [11]. The other is a claim that the Indian Prime Minister was invited to head a task force against Coronavirus. Interestingly, there was another related fake news which involved a claim by an Indian Union minister that Prince Charles was cured of COVID-19 with Ayurvedic treatment, which was promptly denied by the British authorities [20].

2 Sociological Studies of Disinformation

Research in disinformation (and fake news in particular) can be grouped into two broad (sometimes overlapping) categories: computational and sociological. Computational research into disinformation investigates several questions, as follows:

1. **Origin of misinformation:** While anyone can see isolated posts, messages, fake news stories, etc., across different channels, how can we collect them, link them, and group them into *campaigns*, having specific beginning and end points in time, geographical spread, etc.? Can we identify people or accounts (i.e., *managers*) that initiated, coordinated, and fueled a campaign? Which channels are more effective for fake news campaigns?
2. **Contents of disinformation:** What was the *level* of the disinformation, on a scale from 0 (no disinformation) to 1 (completely false information)? Can we identify the broad conceptual categories of disinformation? How was the disinformation expressed, e.g., as text, images, video?
3. **Spread of disinformation:** How long did a campaign last? How and why did it die? How many people did a campaign reach? How many of the receivers participated in its further spread? What were the strategies used to increase the *spread* of a campaign? Was there a serious opposition to the campaign?
4. **Participants:** How to identify the shared characteristics (e.g., demographics) of users who were the true targets of a campaign? What are the shared characteristics of the people who supported the campaign and participated in its dissemination? How persuasive was the campaign, i.e., what was the probability that a receiver would participate in its further spread after seeing n messages?
5. **Questions related to the impact of misinformation:** Was the campaign able to affect the responses (e.g., voting decision) of a significant number of receivers? How many receivers actually agreed with the common message of the campaign? How can the success or impact achieved by the campaign be measured?

Sociological studies attempt to understand fake news as a social behavior:

1. What is the extent of the prevalence of fake news in different news categories, e.g., health, politics, business, entertainment, etc.?
2. How well does fake news succeed in manipulating and influencing public opinion, decisions, and policies?

3. What factors affect the success of fake news campaigns? What are the demographic factors (sex, age, gender, education, income, ethnicity, political orientation) of the susceptible population segments targeted by fake news? Does fake news affect across countries?
4. What situational factors drive people to share fake news? How do people judge the reliability of the information (e.g., news) they receive on social media or messaging?
5. How many “views” of different fake news stories does a user typically need to see before they accept the common viewpoint of these fake news stories?
6. What should organizations and governments do to control fake news and reduce its impact?

In this chapter, we will largely focus on sociological research into the phenomenon of fake news.

3 Vaccine Hesitancy

Most modern governments have a compulsory vaccination program for children, which typically includes vaccines for measles–mumps–rubella (MMR), diphtheria–pertussis–tetanus (DPT), polio, and hepatitis B, among others. Fake news has played an important part in creating the social phenomenon of *vaccine hesitancy*, which refers to reluctance, confusion, distrust, suspicion, fear, anger, or hostility in the minds of parents toward vaccination of children. Vaccine hesitancy makes children susceptible to easily preventable diseases and thus is a major threat to the health of millions of children worldwide.

Fake news has been used to spread disinformation and conspiracy theories about vaccines. An example is a fake news that claimed autism as a potential side effect of MMR vaccines, often quoting a paper that was later retracted and proven to be fraudulent. Disinformation about vaccines often goes much beyond (false) claims of autism as a side effect. Other examples of disinformation about vaccines include [7] messages claiming that babies have died or suffered severe disabilities and other claims that sow seeds of doubts. For example, “so, a baby can handle 8–9 viruses all at once via vaccination, but cannot handle one single virus when it’s wild caught?” Such disinformation has several logical fallacies; this example ignores the fact that the viruses in a vaccine have carefully attenuated virulence, unlike viruses in the wild. In general, such disinformation often mis-appropriates scientific terms, hides relevant facts, makes unacceptable assumptions, and has errors in its inferences.

Of course, no link between MMR vaccine and autism was found to exist [17]. Nevertheless, according to the WHO, measles cases increased by 30% globally in 2018, and in 2019 and a state emergency was declared in Washington, USA, due to a measles epidemic. While the controversy was specifically about MMR vaccine, researchers have noted that there were *spillover effects*, which led to hesitancy about other vaccines. This indicates the potential of fake news to create damage

that goes beyond its *prima facie* goals. Moreover, such fake news creates feelings of disillusionment, powerlessness, and distrust in the authorities and in the minds of parents, which is a more dangerous consequence.

Smith et al. [28] demonstrated a significant increase in MMR non-receipt after the media coverage of the MMR-autism controversy, which was fueled by fake news. In the 1995 cohort, only 0.77% of children had not received MMR vaccine, which rose to 2.1% in 2000, coinciding with the emergence of the controversy. They also noted the return of the MMR vaccination rates to the pre-controversy levels, after the media coverage (and the associated fake news campaigns) had died down.

The uptake of MMR vaccines in the UK dropped by over 5%, before it rose again [2]. Rather surprisingly, by analyzing the data from local health authority areas, the authors showed that the uptake rate of MMR vaccines declined faster in areas where most parents had higher educational levels than in areas where most parents had relatively less education.

Jolley and Douglas [15] empirically established negative influence of anti-vaccine conspiracy theories on health-related behaviors. They conducted two surveys that (1) demonstrated negative correlation between beliefs in anti-vaccination conspiracies and vaccination intentions and (2) revealed that participants exposed to anti-vaccination conspiracy theories showed less intention to vaccinate than those in controls.

Chang [9] established that (1) in the USA, the MMR-autism controversy led to a decline in vaccination rates in the immediate years; (2) there were negative spillovers onto other vaccines; (3) more highly educated mothers had developed higher levels of vaccine hesitancy (refusal or delay of vaccination); and (4) the vaccine hesitancy was proportional to the media attention to the controversy. Point (3) was also noted in [2]. A possible explanation is the so-called *health allocative efficiency* hypothesis, which states that this education gradient in health outcomes is due to greater access, absorption, and response to online health information by more highly educated individuals. Clearly, this is not an adequate explanation, since higher education should instill better discerning and reasoning abilities.

Finally, we note that the disinformation and fake news campaigns related to vaccination, combined with other social factors such as prevalence of religious fundamentalism, have led to serious violence against and killings of health professionals delivering vaccinations to children. Such violence has persisted even in 2019 [16], indicating the alarmingly long life of the lies about vaccinations.

We should also analyze *why* people run vaccine misinformation campaigns. What are their motives? What do they want to achieve? Can we develop techniques to detect whether any communities are being formed on social media consisting of anti-vaccinationists or of people having vaccine hesitancy? What are the factors that convince people with vaccine hesitancy to change their health behavior (e.g., refuse or delay vaccine to a child)? Such drivers may include a general tendency to believe in conspiracy theories, beliefs in alternative healthcare systems, a general distrust of authorities, and so on [7].

Obviously, the usual informative campaigns explaining the real benefits of vaccinations should continue. Several social media platforms have responded posi-

tively [7]. Pinterest ensures that searches for vaccine-related topics will only show links to reputable public health organizations. Instagram has blocked hashtags that make patently false claims such as #vaccinescauseaids. YouTube has removed advertisements from anti-vaccination, videos so that their posters will not make any money. But such responses are clearly not enough because the platform owners probably worry about censorship or restricting the freedom of speech. Hence, AI, healthcare, and social scientists need to develop proactive detection, control, and retaliatory strategies that governments and other institutions can use to stop controversies and control the spread of disinformation campaigns, whenever they surface, and whatever channels they use—whether fake news, fake videos, or disinformation messages on messaging platforms.

4 Elections

Elections constitute an important political process in a democracy, and even in other institutions, for which factually well-informed electorate is an essential prerequisite. Since elections are a road to political power, it is not surprising that political parties, candidates, and their supporters would use all possible means, including fake news, to influence voters and win elections. In 2018, it was discovered that a company called Cambridge Analytica used the private account data of Facebook users in order to make targeted delivery of political campaign material and to manipulate political opinions [24]. As mentioned earlier, fake news was delivered not just through fake news websites, but also Twitter, Facebook, and WhatsApp, among others, were important channels for disinformation during elections.

The US Election in 2016 was among the first major elections in which a large number of fake news campaigns appeared; many other later elections (e.g., in Europe) also were victims of fake news. The role of fake news in the 2016 US election is well studied, and we will summarize some findings here. Examples of highly circulated fake news prior to the 2016 US elections are as follows: FBI agent suspected in Hillary email leaks found dead in apparent murder-suicide; Pope Francis shocks world, endorses Donald Trump for president; and Hillary sold weapons to ISIS [23]. Figure 2 shows examples of political disinformation of the kind seen during elections in India [4]. Broadly, election-related disinformation typically maligns political parties or leaders or tries to mislead voters, often through links to fake news websites, fabricated images of screen grabs of TV news, or doctored screenshots of newspapers.

The main motivations for the creation and dissemination of political fake news are economic or ideological. Teenagers in a Macedonian town flooded primarily pro-Trump fake news in the 2016 US elections, not for any ideological reasons but because that gave them much higher click-based advertising revenues [30]. Ideological motivation stems from the fact that fake news can serve as a propaganda vehicle to influence voters to support a particular political party, candidate, or party position about an issue.



Fig. 2 Examples of political disinformation

Grinberg et al. [12] studied 16,442 Twitter accounts in the USA from August to November 2016 and found that 5% of tweets received by them and 6.7% of the URLs in tweets generated by them came from fake news sources. Only 1% of them consumed 80% of the volume from fake news (*superconsumers* and *superspreaders*), showing that not everybody had an equal affinity for (or were targets of) fake news. Their demographic analysis showed that individuals most likely to “engage” with fake news sources were conservatives, older, and highly interested in political news. A 2016 survey by news and entertainment site BuzzFeed found that fake news fools American adults about 75% of the time [26].

Vosoughi et al. [32] found by analyzing 126,000 stories tweeted by 3 million people more than 4.5 million times that false stories diffused significantly farther, faster, deeper, and more broadly than the truth in all categories of information, but particularly so for political stories. Significantly more false cascades than true cascades exceeded a depth of 10. The top 1% of fake news cascades reached to between 1000 and 100,000 people, compared to true news that rarely reached more than 1000 people. They suggest that fake news is more novel, and hence people are more likely to share it.

Allcott and Gentzkow [1] showed that (1) pro-Trump fake news was shared on Facebook three times more often compared to pro-Clinton fake news and (2) 41.8% of web traffic to fake news sites came from social media compared to 10.1% for regular news sites. They found that 27% of people visited a fake news source a few weeks before the 2016 US presidential election, and visits to fake news sources were only 2.6% of total visits to reliable news sites. They conducted a post-2016 election survey and found that, on average, an adult received 1.14 fake news stories per person and 8% of the respondents believed them. Further analysis showed that Republicans were more credulous of fake news compared to Democrats. Among the demographic attributes, they show that the ability to discern fake news from true news weakly improves with education and age.

Bovet and Makse [6] analyzed 171 million tweets sent by 11 million users in the 5-month period preceding the 2016 US presidential election, among which 30.7 million tweets, from 2.2 million users, contained a URL to news outlets.

They found that 25% of these tweets spread either fake or highly biased news. The tweeting rate for fake news tweets was four times higher than that of normal news tweets. Furthermore, the top news spreaders for traditional news tweets were mostly known journalists or leaders, and those for fake news tweets were unknown or deleted accounts. Both of these suggest a role of bots. Users spreading fake and extremely biased news were smaller in number but were more active and also connected (through retweets) to more users on average than users in the traditional news networks. Among users, 64% and 8% were Clinton and Trump supporters, respectively, although Trump supporters were, on average, 1.5 times more active than Clinton supporters. Through causal analysis of tweet volume time series, the authors found that the dynamics of fake news spreaders was mostly governed by Trump supporters.

One key question is: did fake news *decisively* influence the 2016 US election? While there are some extreme positions [22], the broad consensus seems to be “No” [34], although, in our opinion, more work is needed in devising a general methodology for reliably answering such questions.

5 Other Social Processes

Fake news often indirectly promotes a particular political viewpoint or agenda, by promoting conspiracy theories, pseudo/anti-scientific narratives, and anti-media, anti-globalization, or anti-migration viewpoints. Conspiracy theories [8] usually claim that rich and powerful people or organizations clandestinely organize key events in order to protect their power. Examples are as follows: Boston Marathon Bombings were perpetrated by U.S. Navy Seals; the 2012 shootings at the Sandy Hook school were staged to motivate gun control legislation; and Orlando shooting was a hoax. Just like Sandy Hook, Boston Bombing, and San Bernardino. Keep believing Rothschild Zionist news companies. Conspiracy theories offer an interesting vehicle to promote political agenda, as believers in them may be more likely to also believe in other unverifiable information. Starbird [29] performed a detailed analysis of fake news stories about mass shootings circulating on Twitter and showed that Twitter users who engaged with conspiracy theories liberally used fake news to support the theories.

With hundreds of millions of users in India alone, WhatsApp and Facebook have become important channels for information sharing, and, unfortunately, for disinformation campaigns, often appealing to people’s prejudices and biases and leading to mob violence. Some lynchings took place in India because of disinformation about the presence of child abductors in an area [19]. Similarly, there were some incidents of lynching of Muslims in India, due to rumors about their consumption of beef or about them taking cows to the abattoir for slaughter [21]. Some disinformation campaigns attempt to boost cultural, nationalist, or religious supremacist positions;

for example, the chief minister of a state in India claimed that the Internet was invented by ancient Indians (Hindus) thousands of years ago [27].

Crisis and disaster situations often bring out disinformation tendencies. A number of fake images emerged during Hurricane Sandy [13]. The Ebola epidemic has generated many conspiracy theories, which were not just harmless scaremongering but led to real consequences such as social resistance, suspicion of authorities, noncompliance, and aggression and generally made outbreak prevention and control difficult [31]. The ongoing coronavirus pandemic has given rise to many disinformation campaigns (at least in India), some with interesting intersections with politics. For instance, a fake news claimed that Prime Minister Modi was selected to lead an international task force against the coronavirus [10]. Fake news can sometimes have disastrous economic consequences. A tweet falsely claiming that injury to President Obama in an explosion eroded \$130 billion from the stock markets [32]. The use of a fake WMD dossier was instrumental in the 2003 US invasion of Iraq. A routine military exercise (Jade Helm 15) was misinterpreted as the beginning of a civil war in the USA.

6 Conclusions

In this chapter, we summarized the literature about how social processes (elections and vaccinations, among others) are affected by all kinds of disinformation, including fake news. Disinformation is here to stay and is flourishing due to the deep reach and high speeds of social media channels. The key question is, of course, what can be done to contain the production and dissemination of fake news and the damage they inflict on society. While statistical and AI techniques for detection of fake news will undoubtedly improve over time, more theoretical work is needed for mathematical (e.g., game-theoretical) modeling of fake news as a social phenomenon. Predictive models about what kinds of fake news campaigns will emerge, say, for the next election or the next pandemic, are clearly lacking. At the very least, we need techniques that can “pick up” and group signals from very recent social media posts in real time and predict whether one of these would become a fake news campaign. Effective automated intervention techniques for countering disinformation campaigns are yet to be developed. Clearly, much more work needs to be done to detect and control disinformation campaigns on social media channels. Sociologists, journalists, politicians, and social media platforms must come together with technologists and work toward an overhaul of the news industry [14]. To conclude, computational and AI technologies cannot form the final solution to what is essentially a social malady.

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