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# Like, Comment, and Share: Distortion of Information on Facebook

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LIKE, COMMENT, AND SHARE:  
DISTORTION OF INFORMATION ON FACEBOOK

Sung Hong  
Finance  
May, 2017

Faculty advisor: Dr. Ellen Moore

Essay completed in partial fulfillment of the requirements for graduation with Global Honors, University of Washington, Tacoma

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Approved:

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Executive Director, Global Honors

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Date

“Massive digital misinformation is becoming pervasive in online social media to the extent that it has been listed by the World Economic Forum as one of the main threats to our society.” (Vicario, 2016, p. 554).

The connectedness of internet and social media today allows us to share our activities, news, knowledge, beliefs or anything else within seconds to our own social network and rest of the world. But at the same time, this ability has created unintended consequences that promote or influence creation and dissemination of misinformation. Social media users all around the globe use Facebook to stay connected with each other, and it is a dominant source of news: “over 63% of users acquire their news from social media” (Schmidt, 2017, p.3035). Facebook reported over 1.86 Billion monthly active users at the end of 2016, which was over 17% growth from previous year, according to its 2016 earnings report (Annual report, 2017). This figure is estimated to continue its increasing trend as technologies of wireless connectivity continue to expand and become more affordable and accessible, reaching even the most remote, or undeveloped communities around the globe. Social media’s major influence on its users is clear, and thus it is more important than ever to carefully consider the use of social media sites, such as Facebook, as a tool to communicate key scientific news to the people worldwide. A certain percentage of Facebook readers in America and around the world are being misinformed and disconnected from the scientific community and often fall into a trap of conspiracy theories and false information. Some of the blame can be placed on the current structure and design of Facebook and other social media online; lack of infrastructure or methods that allow debunking or fact checking of news and stories.

To maximize benefits of Facebook's communication capabilities while reducing its adverse effects, one question must be answered: how does Facebook distort science news? My research explores how social media is used as a medium for distorted scientific news. By completing a literature review and examining case studies on Facebook, this research: 1) identifies sources and provocation of inaccurate news, 2) explores how user interaction within social media promotes dissemination of distorted information, and 3) identifies global impacts of spreading distorted scientific information. By reviewing the previous studies and completing a meta-analysis on social media, I conclude that there are three main forces that must be understood to answer the research question: social media-driven reality, types and motivation for creation of questionable information, and user interaction with social media.

Several types of motivation promote creation of fake or altered news that is shared online. The confirmation bias and consumption patterns of news on Facebook create and reinforce polarization. The adverse effects of social media polarization and distortion of data by Facebook were apparent in both case studies analyzed during this research. By reviewing factual and fictional or misleading news articles on the Fukushima nuclear disaster and retracing pathways of diffusion by social media sites such as Facebook, the sources and motivation for fake news, the effects of polarization, echo chamber effect and consumption patterns of news can be identified in a real world example to support findings from the literature review.

### **Method of analysis**

Research methods of this research paper include literature reviews and two case

studies. Literature on closely related topics were reviewed for clear understanding of how Facebook is used as a medium for distorted or falsified scientific news. Topics of review were Facebook and its history, sources of questionable content, user behavior and consumption patterns of information on social media, and the polarization effect of social media. The understanding of different causes of distortion and diffusion of information was applied to analyze two case studies found on Facebook websites. Two scientific news articles both based on the Fukushima nuclear disaster in Japan that later were proven to be false and misleading were identified. The social media activities of identified articles were quantified by using online social media analytical tool buzzsumo.com and manually searching shared articles. Two random samples of shared posts on the articles were analyzed for user “likes” and “comments” to be compared with the findings of the literature review. Both case studies demonstrated how false scientific information was disseminated by Facebook, first by examining the origin and motivation of the news, then by retracing patterns of consumption by users of Facebook.

### **Interpretive framework**

In *Political-economic framework*, McChesney (2008) discusses two areas of which effected the journalism as we see it today: the rise of professional journalism and the commercial attack on professional journalism. These ideas and observations are the foundation to understanding how the online social media, such as Facebook, is used as a medium for distorted scientific news.

According to McChesney (2008), scholars have identified three fundamental

## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

flaws or biases of today's professional journalism that tend to distort or alter its news and reporting: 1) professional journalists regard anything done by official sources as a basis for news in an attempt to remove controversy (p. 31), 2) they tend to avoid contextualization (p. 33), and 3) they smuggle in values conducive to the commercial aims of the owners and advertisers (p. 34). These flaws of media in capitalistic society work against professional journalism and what is being reported.

Three flaws outlined by McChesney have been derived by the commercialization and forces of capitalism over time; the drive to the media firms to increase overall revenue while cutting costs to stay competitive. Firms face incentives to become larger by growth or merger to capture the advantages of economy of scale, resulting in fewer sources for the consumers. "The effects of this budget-cutting mania on journalism arguably have been entirely negative" (p. 41). The fundamental capitalistic structure in context of media has "...fostered corruption, as newspapers turned to sensationalism and outright lying to generate sales" (p. 27)

The same problems of media identified from the *Political-economic framework* can be observed in the social media platform. Internet may have compounded the issues of journalism and sources of misinformation by its ease of sharing of information and added competition.

### **Global significance**

As one of the key technologies of modern globalization, the internet has changed the methods and ability to communicate, collaborate, and stay connected. Some statistics suggest that by end of 2016, over 46% of the world, or roughly 3.4 billion

## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

people, will have access to internet at home (ICT Facts and Figures, 2016). 1.8 billion people, or over half of people with internet access, are active member of Facebook and utilize the website for social networking and communication (Facebook Q4 2016 Earnings, year, 5). With a diverse range of ethnicity, geographic location and socioeconomic status of users online and on Facebook, creation and distortion of news is a problem not only in the US, but around the world. The evidence of misinformation becoming a global problem was apparent in the recent US and French presidential elections.

After the US election in November of 2016, Facebook and other social media were blamed for spreading fake news that potentially influenced voters all over America. The controversy in the US was a catalyst that ultimately led to the actions by Facebook in the presidential election of France in April of 2017: "Facebook targeted 30,000 fake accounts, partnered with newsrooms to debunk false claims and ran full-page ads in French newspapers with a guide for spotting fake news" (Fiegerman, 2017). The preventive measures, even though not completely a voluntary act of the social media companies, proved effective in reducing the number fake news that circulated during the French election. Analysis from NewsWhip suggested that about 20 out of the 200, or 10% of top stories about the two French presidential candidates found on Facebook two months prior to the election were fake, compared to over 33% of news found on Facebook during the US presidential election (Fiegerman, 2017). Other countries are following and are taking additional steps to prevent the spread of fake news during election times that could influence the public in negative ways. Germany, for example, is not relying on its current efforts of social media alone, and is looking to place



responsibility by attempting to approve a bill that would allow “fines as much as 50 million euros (\$53 million) if [social media] fail to give users the option to complain about hate speech and fake news or refuse to remove illegal content” (Nicola, 2017, para. 1).

Another indication of misinformation by Facebook, which is becoming a global problem, is that fact-checking teams, groups that look to debunk misinformation found online, are becoming more popular and growing in numbers, globally. Stencel (2017) of Duke University reports that there are 114 dedicated fact-checking teams, located in 47 countries in 2017, a dramatic increase from 44 teams in 2014 (para. 4). While a sizable portion of the fact-checkers tracked by the Duke Reporters Lab are organizations that primarily check accuracies of politics and public figures, many others exist that check and de-bunk distorted and misleading presentation of scientific information found online.

### **History of Facebook**

The history of social media can be traced back as early as the 1997, “when Bruce and Susan Abelson founded “Open Diary”, an early social networking site that brought together online diary writers into one community” (Kaplan, 2010, p. 60). The idea was to create a digital place where people can meet, share, collaborate and communicate. Continuing innovation and advancements of networking technology, such as high speed internet, made more complex networking sites such as Myspace in 2003, followed by Facebook in 2004 possible. Mark Zuckerberg, founder of Facebook, originally developed the website while studying psychology at Harvard University. When it was first launched in February of 2004, even with its restrictions of membership to students of the university, the social networking site quickly gained popularity and

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enrollment. By 2005, any US universities and high school students could join the network. A year later in 2006, the restriction was further relaxed to include anyone with a registered email address (Phillips, 2007). The membership remains free today, with advertisements being its main source of income. Facebook has a global presence with users all over the world. Facebook reported in end of 2016 that there are 396 million daily users in Asia, 262 million in Europe, and 180 million in the US and Canada. The figures are much higher when accounting for monthly users: 673 million monthly users in Asia, 349 million monthly users in Europe, and 231 million monthly users in the US and Canada. Facebook's vast number of users allows the company to generate staggering amounts of revenue quarterly and annually; \$8.8 billion in the fourth quarter of 2016, and 27.6 Billion in year 2016 (Quarterly Earnings, 2017, p. 8).

### **How information is created, changed and disseminated**

Facebook is one of the largest, if not the largest social media website today. Many studies have been completed in attempt to discover and estimate the data consumption patterns of Facebook and other social networking sites.

**Social Algorithms** determine what we see online by data collected on our social network and interaction within. Lazer (2015) claims in the article "*The rise of the social algorithm*" that social algorithms such as the programs that customize what we see on social sites, such as Facebook or search engines, like Google, are often quite helpful. However, the nature of the programs that brings only what we want to see, while ignoring the conflicting point of view can be unhealthy and is "...fostering polarization

and undermining the construction of a vision of the common good” (p. 1091).

**Disinformation** is defined by the Merriam Webster dictionary as “false information deliberately and often covertly spread in order to influence public opinion or obscure the truth”. The roots of this word are traced back to the 1960’s, based upon a Russian word, Dezinformatsiya (Taylor, 2017). Disinformation was used as a tactical strategy by both Russia and United states, relying on newspapers and word of mouth as a medium of disinformation.

**Types and motivation of questionable content** need to be fully explored and understood to find causes of creation, alteration and diffusion of fake and misleading news online. In some cases, profit for individuals may be a driving factor in generation and communication of fake news. According to Kirby (2016) from BBC, teenagers of a city in Macedonia were a source of fake news during the U.S. presidential election and were purely driven by profits. One of the teenagers interviewed claimed that his stories usually originated from right-wing American sites, and “After copying and pasting various articles, he packaged them under a catchy new headline, paid Facebook to share it with a target US audience hungry for Trump news and then when those Americans clicked on his stories and began to like and share them, he began earning revenue from advertising on the site” (Kirby, 2016, para. 7). The web activity generated from posting of fake news allowed some of the teenagers of Macedonia to earn over thousands of euros per day.

Various sources of scientific misinformation exist in online space, and each is

influenced and motivated by varied factors. FirstDraftNews is a nonprofit organization that has partnered with internet giants to provide guidance on how to find and verify content sourced from social media. Wardle (2017), leading strategist and researcher at FirstDraftNews, expands upon the idea of disinformation, and suggests that there are seven distinct types of any questionable content found on social media online: Satire or Parody, Misleading Content, Imposter Content, Fabricated Content, False Connection, False Context, and Manipulated Content (Exhibit 1). At the lower end of spectrum of severity and consequences, authors of Satire, false connection, and misleading content do not intentionally cause harm by communication; however, as you gradually move up the spectrum, Imposter content, manipulated content and Fabricated content are designed to do harm by falsifying and manipulating content and imagery.

Wardle also identifies eight different motivators of questionable content on social media: Poor journalism, Parody, to provoke, Passion, Partisanship, Profit, Political Influence and Propaganda (Exhibit 1). Any questionable content found online may be motivated by one or more of the eight motivators. Propaganda, and political influences are among the top motivators to influence types of questionable content (Wardle, 2017).

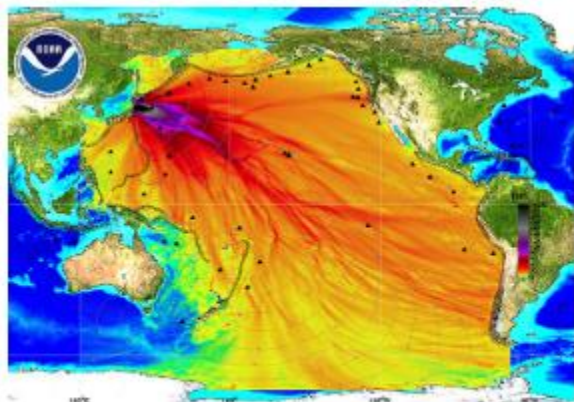
### **Case study: Fukushima disaster and the media disaster that followed**

**History** The Fukushima nuclear disaster, which occurred immediately following the devastating earthquake on March of 2011, has been noted as one of the most significant nuclear events in recent history, and only the second ever incident in history to be given the level 7 classification of the International Nuclear Event Scale. The Tohoku earthquake, which registered 9 on the moment magnitude scale, ripped through

the cities of Japan and triggered tsunami waves that later proved fatal to the Fukushima Nuclear Power Plant. According to the Fukushima Nuclear accident analysis report, the tsunami waves, approximately 17m (55.7ft) tall, arrived at the power plant about 50 minutes after the quake (2012 p. 3). The waves overcame the protective barriers and flooded the plant's basement, where its crucial backup generators were located, and interrupted the power sources for the reactor cooling pumps, monitoring and communication equipment (p. 19). The reactors began to fail without adequate cooling available to lower the temperatures of the reactor cores. The overheating of the cores produced hydrogen gas and led to the explosion of units 1, 3 and 4 on March 12, 14 and 15<sup>th</sup> (p. 21, 28, 30). The hydrogen explosions from units caused radioactive materials to be released into the air and surrounding areas (p. 36).

The events that led up to the failure of Fukushima nuclear plant in 2011 were truly significant and disastrous. Even years after the original incident, various "disasters" of media and miscommunication followed that fueled the fears of people around the world and created controversies. Some of the inaccurate information was shared by social media sites such as Facebook.

#### **Case study one** *"Fukushima Radiation Has Contaminated the Entire Pacific*



*Ocean – And It's Going to Get Worse"* was published on countercurrentnews.com on October of 2016. As the title states, the article claims that leakage of radioactive material from the Fukushima nuclear plant is

**Figure 1**

contaminating the Pacific Ocean, and is accompanied by a graphic (figure 1) that shows a clear pattern of distribution or diffusion with origin of Japan. When looking at the news article, readers would have little reason not to believe such information, and wouldn't think the possibility of fake graphics to support the story; in fact, the graphic isn't fake. However, the graphic depicting supposedly the spread of radioactive materials throughout the Pacific Ocean represents a separate set of data. Snopes.com, a well-known website that validates and fact checks popular stories and rumors online, published the origin of the graph that was used in the article by [countercurrentnews.com](http://countercurrentnews.com). According to Mikkelson (2017), a fact-checker at [snopes.com](http://snopes.com), the graphic that was used as early as 2013 was from a data set that was collected by National Oceanic and Atmospheric Administration (NOAA) showing the wave height of the tsunami waves that followed the earthquake event in 2011, not the leakage and spread of radioactive material as claimed in some sources. In addition to clarify the origin of the graphic used, [snopes.com](http://snopes.com) contradicts and debunks many of false claims from the news article. The radioactive material, which did leak into the ocean from the reactors of the nuclear power plant, posed little to no threat to the Pacific Ocean due to the amount of dilution that occurs when mixed into a great body of water, and Mikkelson stated "American officials have stated that the diluting effects of the vast Pacific Ocean expanse would likely neutralize any deleterious effects of the radioactive seepage by the time it reached US shores" (Mikkelson, 2017, para. 7). Additional sources confirm this fact. Study led by Neville (2014), titled "*Trace Levels of Fukushima Disaster Radionuclides in East Pacific Albacore*" found "The highest total radiocesium in any sample was approximately 1180 mBq/kg, 0.1% of the U.S. Food and

## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

Drug Administration level of concern for radiocesium” (p. 4741)

According to buzzsumo.com, the article in question has been shared more than 196,500 times by different users and communities of social media. Majority of the content was shared through Facebook, over 196,000 shares. Even as popular as the article is, it contains many information that is simple false.

Manual search of Facebook completed for this research resulted in same conclusion. Two random posts sharing the article were chosen, and user interaction, likes and comments were reviewed and studied. Post one was shared by Facebook group “True Activist”, and was Liked 5,900 times, 456 comments and shared 20,000 times, indicated by the Facebook website (Exhibit 2.a). Much of the popular comments of the posts were users making claims without any support or events. One comment of the original post was identified that attempted to debunk the article. Comment clarified the misuse of the map in the article and included the link of information in the comment.

“Quote: “this is not a map of Fukushima Radiation spreading across the Pacific. this is a map of the estimated maximum wave heights of the Japanese Tohoku Tsunami by modelers at NOAA. In fact, tsunamis don't even transport particles horizontally in the deep ocean. So, there is no way a Tsunami could even spread radiation (except maybe locally at scales of several miles as the wave breaks onshore). Dear VC reporter, I regret to inform you this cover image could be the poster child for the importance of journalistic fact-checking for years to come.” (Exhibit 2.b)

However, another poorly written, non-supported post was replied (23 vs 22) or liked (193 vs 123) more times (Exhibit 2.b). Top comment (Comment with most likes)

stated

“I could run this place better.... Any precocious lil’KID could for christsakes...”.

Case study 1 demonstrated the results of literatures reviewed for this research. Different users that agreed or disagreed with the content showed different level of activity, and that level of confirmation (likes and comments) did not correlate to the accuracy or context of the comments, as claimed by the literatures reviewed for this research. The confirmation of the posts from users were likely affected by polarized groups, individual’s confirmation bias and the echo chamber effect.

**Case study two:** Another example of distorted, misinformation of Fukushima nuclear news is much more recent. On February of 2017, online news source YourNewsWire.com posted an article titled “Japan Declare Crisis as Fukushima reactor begins falling into the ocean” (Adl-Tabatabai, 2017). The story claimed that Japan had declared crisis for reasons that was recently discovered. First, up to 530 Sieverts per hour of radiation was detected inside of the Reactor 2, quoting the Tokyo Electric Power Company. It is suggested that as low as 8 Sieverts of radiation is considered fatal. Second, the story makes claim structure has been compromised. “A hole of no less than one square meter in size has also been discovered beneath the reactor’s pressure vessel, TEPCO said. According to researchers, the apparent opening in the metal grating of one of three reactors that had melted down in 2011, is believed to be have been caused by melted nuclear fuel that fell through the vessel” (Adl-Tabatabai, 2017). The contents of this story may be true, however, the story on YourNewsWire.com has been exaggerated and misleading. According to Snopes.com, one of the online fact checking communities, “No credible news reports have stated that a Fukushima reactor



## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

is about to fall into the ocean, nor has any Japanese government agency announced a state of emergency” (Palma, 2017). Checking other credible sources, such as Japan Times, of the similar story reveals that there have been high measurements of the radiation in the reactor 2, but has no mention of Japan declaring crisis due to the possibilities of the radiation falling to the ocean (Highest radiation, 2017). Beser from National Geographic addressed the similar topic in the article “*After alarmingly high radiation levels detected, what are the facts in Fukushima?*”. The measured levels of radiation were so high not because they are rising but because it was measured for the first time, as TEPCO’s investigation efforts continue to create and begin the cleanup process (Beser, 2017).

One sample post reviewed for the case study was posted on online by the Facebook community named The People’s Voice. The article posted on February 3, 2017 was Liked 1,300 times, received 120 comments and shared 5.1k times (Exhibit 3.a). The top comment with the most likes of 112 doesn’t speak of the actual news item or the facts.

“This is delayed... also... for everyone pointing fingers. An earthquake over magnitude 9 hit. That will destroy everything. Though they knew that they would all die, not a SINGLE person fled that scene....”

“Bitch all you want, but don't blame Japan for this. The US has numerous leaking reactors which no one speaks about. The ocean is in serious trouble, but so is the land which sustains you. Time to shift your attention to solutions and other affected areas... or... Stop pointing that finger, and put it back in your nose.” (Exhibit 3.b)

This sample post of case study did not include any comments attempting to debunk or correct the misinformation found online.

Second sample reviewed was posted from Facebook community “Citizens Action

Network” on February 5, 2017. The post that shared the same fake scientific news was Liked 333 times, received 29 comments and shared 819 times. Similarly, the review of the top comments revealed that the comments with the most confirmation were missing any factual or supporting information of the news item. In addition, comments attempting to debunk or correct the misinformation were not found within the 29 comments of the post.

## **Discussion**

**Flaws of journalism** discussed by McChesney (2008) highlight the problems and tendencies of today’s professional journalism and media. The three flaws of journalism discussed earlier in this paper were observed in both case studies completed for this research. First, users of social media believed and shared news that originated from what appeared to be an official source. In both case studies, altered news was shared by a social media community that was well established with a considerable number of followers, who may already have accepted the source as credible.

Second, behavior and comments observed in the case study showed social media users avoided contextualization. The most comments of the shared news were not directly related to, or in the same context, as the story itself. Instead, the social media users shared more generalized opinions, criticisms and beliefs, to avoid full commitment to the story’s context.

Lastly, due to the social network’s mechanism for higher visibility to community and content more relevant to each individual user’s interest, it allowed and promoted the underlying and preexisting values of the user or the author. Both case studies showed

that people quickly accepted the negative notions and effects of the disaster, which then aided in diffusion of altered news on the Fukushima disaster.

These flaws of social media, observed in both case studies, become a medium for distorted news and provide incentives for creation and diffusion of fake or altered news. The increased accessibility and sources of news through social media compounds the problem of commercialization of journalism.

**User interaction with Facebook** results in polarization of site's users and communities. All three studies on Facebook reviewed during the research of this paper, two published by PNAS, and one published by Elsevier, independently observe the polarization effect on public opinions and news. According to a recent study, “~63% of users acquire their news from social media, and are subjected to the same popularity dynamics as other forms of content” (Schmidt, 2017, p. 3035), which means internet users around the globe are affected directly by what Facebook brings to our computer, tablet and mobile devices. The algorithm driven contents are fed to the users, whether based on historical interest, topics, related friends and community groups or other factors. Before we apply our own bias, the social media, such as Facebook, could provide an altered and skewed view of reality.

The bias content created by social media is consumed by users in a polarized cluster of users and communities. The content is much more likely to be accepted as reality because they are being shared by a member of users established social network, presumably included in your social network for having similar interests and beliefs. Furthermore, our own motivation to seek for information that confirms our own beliefs, a

## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

psychological phenomenon known as confirmation bias, drives to reinforce previous knowledge and dismiss contradicting information. This infinite loop of search for reinforcement and dismissal of additional or contradicting information continues to create and distance the polarized communities of Facebook. The cause of the problem partially stems from the origin of the benefits of the social network, which is the fundamental reason that we interact in the web, in search of contents of our own interest, similarity, familiarity, or to reinforce what we know as true. Doing so, we create our own circle, or bubble of information, or an echo chamber, that surrounds us with the bias information, which at times, continues to pull us away from what is the truth or factual. In other words, social homogeneity is the primary driver of content diffusion, which results in polarized clusters, multiplied by the echo chamber effect (Vicario, 2016).

The result of polarization effect in scientific communication is a creation of a gap between the scientific and the misinformed community. Each of the polarized communities continue to support its own claims and beliefs, and further pushes the communities apart. In addition to the confirmation bias, different study found that Facebook users tend to depend on relatively small sources for news and information. More importantly that “more active user is, the more the user tends to focus on a small number of news sources” (Schmidt, 2017, p.3038). The most active users, or the author of majority of posts, comments and shares generally have the least diverse sources of information and develop bias, and at times false thoughts and information. The people that arguably should say the least, could end up taking up majority of content on yours or my Facebook page.

## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

The second half of the story of misinformation and distortion of information on Facebook comes from the lifetime of information shared online. A study has found that when comparing news and conspiracy news, the pattern of diffusion in function of time is very different. Analysis shows that both scientific and conspiracy news assimilated, reaching its peak level of diffusion, very quickly. However, when analyzed as function of size of diffusion, the conspiracy news continued to diffuse within communities and users of Facebook as time passed, where scientific news did not; the rate at which scientific news was shared decreased substantially as time passed (Vicario, 2016).

In addition to the receipt of bias information from the polarized effect and the asymmetrical lifetime of news content, the way users on social media deal with massive amounts of information adds to the problem of communication. With limitless amount of information, statistics and opinions available with very little effort, users tend to ignore information that contradicts or disagrees with them on beliefs and bias. The way we share information on Facebook and social media, by sharing or shared by friends within same polarized group, only supports the current knowledge and belief whether information is true or false. Vicario (2016), author of the study "*The spreading of misinformation online*" concludes that "Users tend to aggregate in communities of interest, which causes reinforcement and fosters confirmation bias, segregation and polarization." (p.558). Once the news or information is accepted by the user and adopted, right or wrong, they are often difficult to and are rarely corrected or changed (Vicario, 2016).

Last study reviewed for this research paper, "*Science vs Conspiracy: Collective Narratives in the Age of Misinformation*" analyzed the relationship and interaction

## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

between the two polarized communities of Scientific news and content of social media. First, the study analyzed interaction of Facebook users and the two type of news groups. The interactions with the contents were likes, comment and shares of its news. Statistical analysis shows that Facebook users were much more likely to like and share posts of conspiracy news, compared to the Scientific news (Bessi, 2015).

The study found that interaction of each community and the two different types of news, factual and fictional, are drastically different, adding to the polarization and echo chamber effect. The users that were categorized as conspiracy news users were much more likely to interact with news of their own category, while unlikely to interact with news of the opposite category. Out of 790,899 conspiracy news users, 642,229 comments were made to their own category while only 5,954 comments were made on the opposite side. Interestingly, the scientific news consumers behaved differently. Scientific news users were more likely to interact with both sides of the groups, out of 255,225 users, 126,454 users commented on their own category while 13,603 on the opposite (Bessi, 2015, p.7). The results show that polarized users are much more likely to interact within user's own communities, and users categorized in scientific news are found to be more active elsewhere (Bessi, 2015)

All these factors, confirmation bias, polarization, echo chamber effect, lifetime of news content, and interaction patterns of users play a pivotal role on how information is consumed by users on Facebook and social media worldwide.

**Current efforts** are ongoing to prevent or minimize the impact of social media being used as a medium for fake news, or distort information by user interaction.

Growing number of populations in America and other countries are pressuring Facebook to allow verification of information and debunking of fake news found online, as seen during the US and French presidential election. While the motive behind the verification system may be political in nature, such system could prevent spread of false information of scientific or academic in nature as well. Facebook plans to outsource the fact checking process to an assigned group, partnering up with Snopes, Politifact, ABC news and FactCheck.org (Mullin, 2017). The members this small group will gain access to posts of Facebook posts that were flagged by users for accuracy and credibility of the information. The group then can flag and dispute information found in Facebook posts with explanation as to why and supporting information. In addition to implementing third party organizations to fact check its user contents, Facebook will be “taking steps to disrupt the business model for spammers that pass themselves off as genuine news organizations” by identifying sites that post false information and shutting them down (Mullin, 2017, para.3)

While some control of content may prove to be helpful in the future for social media and its users, the limitations introduced to the social media sites may disrupt or even change the nature of social media as we know it today.

**Future goal** is to create a cohesive, trusted community of journalists, fact checkers educators and scientific communicators that can self-enforce and manage the online information. The responsibility to change and tackle the current problem of fake news or misinformation must be taken on by everyone involved, not just social media.

## **Conclusion**

All social media sites online, including Facebook, will continue to influence how we communicate, socialize and view the world in the future. The global social network will result in a world that is more closely connected than ever before. The methods of usage and governance of content of social media will play a critical role in future communication of scientific news. For global users to use social media more effectively, higher level of education is needed on distortion and creation of bias that occurs through social media.

**Sources** of false information need to be addressed and discredited to users of social media, with use of technology and human resources. Companies in the industry of social media and big data should be held accountable to develop computer driven algorithms to detect questionable information found online. The algorithm could work as the first line of defense in monitoring and selecting data to be reviewed further. Implementation and management of database containing known sources of fake news will take resources to adapt and put in place, however, is important first step. Such database should include a user-driven ranking system, where reviews can be collected to rank authenticity and credibility of the source on the database. Fact checking organizations around the globe should be funded and put in place to police not only the database of sources but the information found online. Consequences, monetary, legal, or other means need to be put in place for sources of fake news or misinformation online.



**Users** must become aware of media online to combat the distortion effects through social media. More comprehensive and robust education of online and social media interaction and consequences is needed. A strong partnership between social media and educational institutions will need to form and continue and will result in more conclusive and comprehensive understanding of how social media is used as a vehicle for information, and how it is distorted. In addition to further studies, the partnership with educational institutions can better spread the basic knowledge of social media platform and its findings of studies, and enforce education in science and critical thinking skills which are important in addressing the problems of misinformation.

**Real journalism** and fact and evidence based communication should be prioritized and encouraged. Policies and regulations put in place will help along with higher level of investments to promote real journalism. Once started with injection of investment, viewers that are already more educated on information online and social media who can think critically will be likely to be engaged to fact and evidence based journalism. By natural attrition and competition, questionable contents will disappear over time. Science based communication of key topics need to be informative while entertaining and engaging. The paradigm of boring, technical communications of science must be changed to bring real journalism back to the forefront.

### **Areas for further study**

Additional studies in key areas are needed to fully understand the complex nature of behaviors, drivers and consumption patterns of users on social media sites.

The psychological motivation and effects were not discussed or covered in the theoretical framework of this study, such as fear and anger, powerful emotions, should be researched and incorporated into the future study for better comprehension and theories of behaviors on social media sites.

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## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

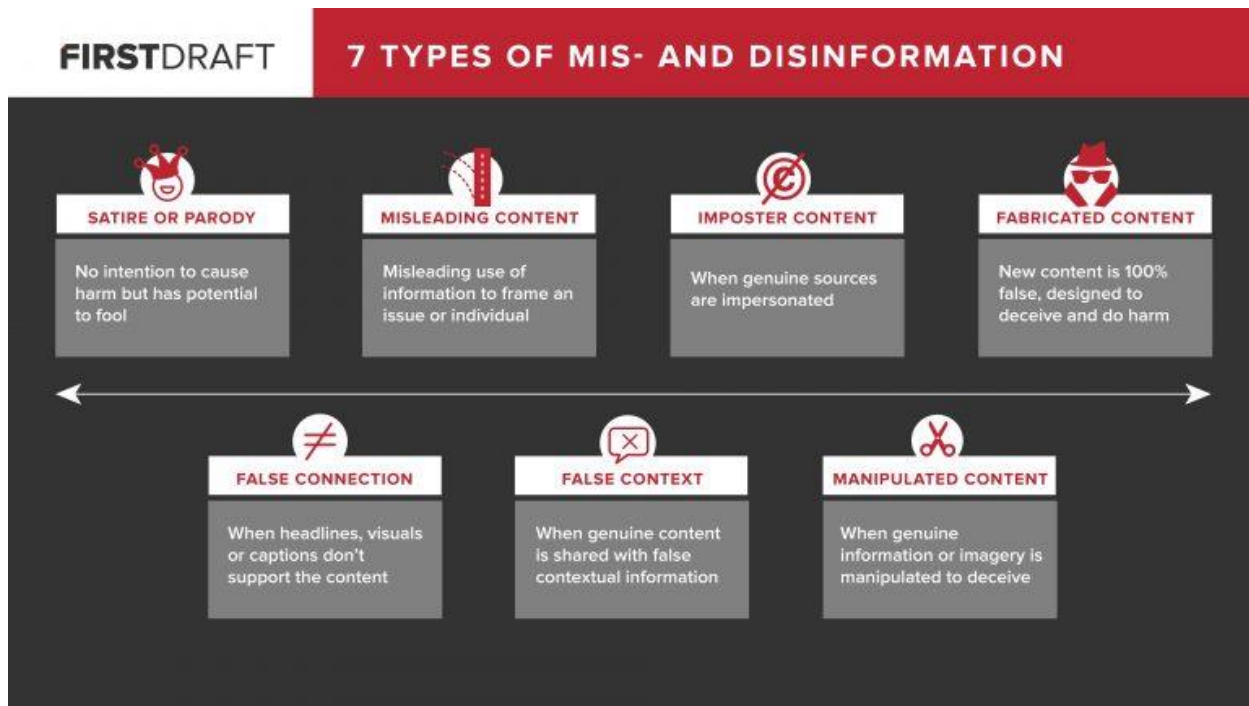
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<https://doi:10.1073/pnas.1517441113>

Exhibit 1.



**FIRSTDRAFT MISINFORMATION MATRIX**

	SATIRE OR PARODY	FALSE CONNECTION	MISLEADING CONTENT	FALSE CONTEXT	IMPOSTER CONTENT	MANIPULATED CONTENT	FABRICATED CONTENT
POOR JOURNALISM		✓	✓	✓			
TO PARODY	✓				✓		✓
TO PROVOKE OR TO 'PUNK'					✓	✓	✓
PASSION				✓			
PARTISANSHIP			✓	✓			
PROFIT		✓			✓		✓
POLITICAL INFLUENCE			✓	✓		✓	✓
PROPAGANDA			✓	✓	✓	✓	✓



Exhibit 2.a

**True Activist** September 30, 2016 Like Page

The nuclear disaster has contaminated the world's largest ocean in only five years and it's still leaking 300 tons of radiation every day.

**Fukushima Radiation Has Contaminated The Entire Pacific Ocean – And It's Going To Get Worse**

The nuclear disaster has contaminated the world's largest ocean in only five years and it's still leaking 300 tons of radiation every day.

TRUEACTIVIST.COM

5.9K 456 Comments 20K Shares

Like Comment Share

Exhibit 2.b

**Sophie Pack** I could run this place better.... Any precocious lil' KID could for christakes.... anyone with some humility, some morals, some real priorities (the environment, people's rights, animal rights, anti-corruption aka private interest lobbyists ruling the trade zones). Cut out the bad stuff, advocate and empower peace and peace initiatives, then instigate creative solutions of which I have ZILLIONS. Come ON children.

Like · Reply · 193 · September 30, 2016 at 6:06pm

23 Replies

**Felicity Moeckel-Hughes** Quote: "This is not a map of Fukushima Radiation spreading across the Pacific. This is a map of the estimated maximum wave heights of the Japanese Tohoku Tsunami by modelers at NOAA. In fact, tsunamis don't even transport particles horizontally in the deep ocean. So there is no way a Tsunami could even spread radiation (except maybe locally at scales of several miles as the wave breaks onshore). Dear VC reporter, I regret to inform you this cover image could be the poster child for the importance of journalistic fact-checking for years to come." [www.deepseanews.com](http://www.deepseanews.com). True facts about Ocean Radiation and the Fukushima Disaster.

**All the news on the Earth's largest environment.**

Delivery of ocean science as it occurs through the...

DEEPSEANEWS.COM

Like · Reply · 123 · September 30, 2016 at 11:39pm

22 Replies

## LIKE COMMENT AND SHARE: DISTORTION OF INFORMATION ON FACEBOOK

## Exhibit 3.a

**TPV The People's Voice** ✓  
February 3 · 🌐 Like Page

Scientists at the Fukushima Daiichi nuclear plant in Japan have declared a state of emergency as one of the reactors is on the verge of falling into the ocean.



**Japan Declare Crisis As Fukushima Reactor Falls Into Ocean**


Scientists at the Fukushima Daiichi nuclear plant in Japan have declared a state of emergency as one of the reactors is on the verge of falling into the ocean.

YOURNEWswire.COM | BY SEAN ADL-TABATABAI

👍 🤔 😱 1.3K 120 Comments 5.1K Shares

👍 Like 💬 Comment ➦ Share Top Comments

## Exhibit 3.b

 **Michael Nunez** This is delayed... also... for everyone pointing fingers.

An earthquake over magnitude 9 hit. That will destroy everything. Though they knew that they would all die, not a SINGLE person fled that scene. They have been working tirelessly on the problem. Anyone who had gone to help, accepted a death sentence. Two whole cities have been abandoned, so they are not just sitting idly by as everything closest to them decays, including the ocean. They are the most heavily impacted by this. They are trying to save their children, as the older generations closest to the affected area accept their fate, and try and make a difference... or it is simply too late in many cases.

Where are all of those good Christian people, asking for prayers to help deliver these people and places from a disaster which nature caused?

You going to send your people to fix it, as they are trying to do? You sending funds to those scientists and workers?

Bitch all you want, but don't blame Japan for this. The US has numerous leaking reactors which no one speaks about. The ocean is in serious trouble, but so is the land which sustains you.

Time to shift your attention to solutions and other affected areas... or... Stop pointing that finger, and put it back in your nose.

Like · Reply · 🌐 112 · February 3 at 1:23pm