Creation, dissemination and mitigation: toward a disinformation behavior framework and model

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Abstract
Purpose – This paper seeks to disambiguate the phenomenon by clarifying terms, highlighting current efforts, including the importance of critical thought and awareness, and a test for genuine serendipity.
Design/methodology/approach – The authors review the literature, primarily from a library and information science perspective, and arrive at a theoretical framework and model.
Findings – The authors find various initiatives to fight fake news. Building upon Karlova and Fisher’s (2013) model as well as research on critical thinking and serendipity, the primary contribution of the paper is a disinformation behavior framework and model. The model includes both the problem of disinformation from a creator and user perspective, as well as the solutions to fight it.
Research limitations/implications – The framework will guide practitioners and researchers in library and information science and beyond, as well as other stakeholders in both understanding the phenomenon, and leading the fight against it.
Originality/value – The spreading of false information has become an alarming phenomenon in the last few years, leading to the popularity of terms such as misinformation, disinformation, infodemic and fake news. While information professionals have been called upon to lead the fight against fake news, in the lack of a comprehensive understanding of the phenomenon, current efforts have been isolated and inadequate. Most models of information behavior deal with information, and not misinformation or disinformation per se.
Keywords Misinformation, Disinformation, Fake news, Information behavior, Disinformation behavior, Confirmation bias
Paper type Research paper

Introduction
In the last few years, we have heard the terms fake news, disinformation, misinformation, etc. repeatedly. Disinformation or fake news has generated massive debate, in particular, after the 2016 US elections, when there was a huge spread of disinformation on social media platforms. Similar patterns were witnessed in other countries around the world in different contexts. In the current crisis brought about the COVID-19 pandemic around the world, the word “infodemic” became an alarming phenomenon (see, e.g. Zarocostas, 2020; Xie et al., 2020), during which misinformation and disinformation content about Coronavirus, its ways of spreading, varieties of home remedies and treatment, became commonplace which came in the way of sensitizing the public with correct information to contain the disease. The pandemic propagated a multitude of falsehoods even as truth has increasingly become a matter of life and death (Pennycook et al., 2020).

The field of library and information science (LIS) has been at the forefront in engaging with the discourse on fake news, misinformation and disinformation. According to the Association of College and Research Libraries (2016), fake news is one of the top trends in

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academic libraries. However, current efforts are often seen as inadequate (Sullivan, 2018). In this paper, we seek to answer the three research questions:

- **RQ1.** How do we understand the fake news and disinformation phenomenon?
- **RQ2.** What is its relationship with LIS? and
- **RQ3.** How can information professionals fight it?

### Methodology

To answer the three research questions, we adopt a two-pronged approach – the first based on literature review, and the second on the development of a theoretical model. In our first prong: To understand what is fake news and disinformation (RQ1), we discuss the phenomenon and review the literature to disambiguate the terms. We also conduct a literature review to discuss the relationship of LIS with the disinformation phenomenon (RQ2). Finally, as part of our findings, we discuss current efforts that are being used to fight fake news (RQ3), and how these are isolated and inadequate.

Grant and Booth (2009) provide a typology of reviews and provide 14 types of reviews ranging from critical review, literature review, systematic review, scoping review, etc. Based on their typology, what we carry out in this study is a “literature review,” which is an examination of recent and current literature. “The literature review method seeks to identify what has been accomplished previously, allowing for consolidation, for building on previous work, for summation, for avoiding duplication, and for identifying omissions or gaps” (Grant and Booth, 2009, p. 97). In their review of scholarship on the fake news and misinformation phenomenon published between 2008 and 2017, Ha et al. (2021) found that a wide variety of journals from various disciplines publishing on the topic shows that it has captured interest from the scholarly community in general. Our aim in our review is to synthesize current and representative studies to answer the different parts of our research question. We limited our review to 30 years from 1992 to 2021. Google Scholar was used as the primary means to find the articles. We also used the Scopus database to find the articles, filtering articles relevant to LIS. For our searches, we used the keywords, “disinformation,” “misinformation,” “fake news,” “information behavior models,” “disinformation behavior” and their combinations. We read the title and the abstract of the articles that were retrieved. For seminal articles discussing disinformation, all the articles citing that particular article were also consulted. From the close to 200 articles that were consulted and reviewed, about one in three were found to be relevant to this paper. In total, 65 relevant research articles and publications were selected to be cited in the paper.

In our second prong, we build upon Karlova and Fisher’s (2013) work that we adopt as a theoretical lens in our study. We are also guided by prior work on critical thinking and serendipity. Based on these, as well as the literature reviewed as part of the first prong, we propose a disinformation behavior framework and a simplified causal model for understanding the fake news phenomenon and the ways to fight it. As there are not enough existing information behavior theories or models on disinformation and fake news, we do not contrast or aggregate other prior theories of this phenomenon. However, we do discuss related information behavior theories and models and focus on completing and adding to one particular theory, Karlova and Fisher (2013) that we use as our lens. In building our proposed framework, we started with Karlova and Fisher and incorporated terms from the literature on disinformation and fake news, the literature on information behavior and context (see Agarwal, 2018), and on critical thinking and serendipity. This helped us arrive at a framework that both explains the disinformation and fake news phenomenon (RQ1) as well as ways to fight it (RQ3), thus answering two of our research questions. The framework is then simplified and presented as a causal research model (following Agarwal, 2018 – Designing Research Studies Incorporating Context, pp. 109–113).
In the sections that follow, we discuss the literature related to the phenomenon and terminology (RQ1), review the literature related to LIS (RQ2), and arrive at the findings of our study – which discuss current efforts to fight fake news (RQ3) and propose a theoretical framework (RQ1 and RQ3). We then discuss the findings and conclude the study.

Literature review

Disinformation and fake news – the phenomenon and terminology

Fake news is a phenomenon that emerges whenever a new technology innovation gains popularity. For example, during the Second World War, new global communication broadcast technologies released an overwhelming amount of information, and there was significant demand for radios, newspapers and magazines (Soll, 2016). The Nazi Party in German used radio and broadcast journalism to spread their ideas. At that time, the party took advantage of the massive volume of information to spread fake news about the killing of Jews (Soll, 2016). Hence, fake news became widespread and was used for political advantage. According to Soll, “fake news is not a new phenomenon. It has been around since news became a concept 500 years ago with the invention of print – a lot longer, in fact, than verified, ‘objective’ news, which emerged in force a little more than a century ago” (p. 1). One of the main differences now is that people are treating “fake news” as a significant threat. According to a Pew Research Center study, 50% of Americans rate “fake news” as a more substantial problem than racism, climate change or violent crimes (Mitchell et al., 2019). Another distinguishing characteristic is that fake news has become a business with financial gains (Kiwi, 2018).

There are different typologies for false information that include lies, ignorance, disinformation, misinformation, paltering, doxing and fake news (Froehlich, 2020). Misinformation is considered “uncertain, vague, or ambiguous information, or not entirely accurate (not necessarily intentionally so), or true enough depending on the context” (Cooke, 2017, p. 213). In other typologies, false information can be seen as one of six types. According to Steinberg (2017), misinformation types include clickbait, propaganda, satire or parody, sloppy journalism, misleading headings, and biased or slanted news.

When you add purpose or intention to any of these types of misinformation, they can be weaponized into disinformation, and when applied to the context of news (a particular category of information, though a powerful one for false information), called fake news. While the definition of fake news is still open, it can be useful for LIS professionals to see fake news as disinformation (and distinct from misinformation, which is a broader category). Disinformation is information that can be partially true and partially false and is purposefully used by individuals or governments to mislead or to deceive others (Fallis, 2015). Fallis clarifies that disinformation is misleading information that has the function of misleading (Fallis, 2014) or non-accidentally misleading information (Fallis, 2015). “Most forms of disinformation, such as lies and propaganda, are misleading because the source intends the information to be misleading. But other forms of disinformation, such as conspiracy theories and fake alarm calls, are misleading simply because the source systematically benefits from their being misleading” (Fallis, 2015, p. 413).

While disinformation is intentionally false and used to deceive, misinformation is false but could be unintentional. According to Buschman (2019), disinformation, or decontextualized misinformation made to deceive and manipulate the public audience, is at the core of fake news. Soe (2019) characterizes information as intentional non-misleadingness, misinformation as unintended misleadingness, and disinformation as intentional misleadingness. Baines and Elliott (2020) come up with similar distinctions in these terms in the context of the COVID-19 pandemic. The flowchart in Figure 1 demonstrates the distinction between misinformation and disinformation. Fake news is a more colloquial term
for disinformation, especially when applied to the context of “news.” Gelfert (2018) defines fake news as “the deliberate presentation of (typically) false or misleading claims as news, where the claims are misleading by design” (p. 108). Fallis and Matthiesen (2019) argue that fake news is best understood as counterfeit news. “A story is genuine news if and only if it has gone through the standard modern journalistic process involving professionally trained reporters, fact-checkers, and editors. And a story is counterfeit news if and only if it is not genuine news, but is presented as genuine news, with the intention and propensity to deceive” (Fallis and Matthiesen, 2019, p. 1). In this paper, we use the terms fake news and disinformation interchangeably.

Intention plays an important role in weaponizing misinformation into fake news. With this in mind, we can identify what is not fake news. Fake news is different from rumor, and errors are promptly corrected by an author or publisher. “The fake news that information professionals must train patrons to detect is not intended as satire or a practical joke. It is 100% false and designed to provoke its audience” (Watson, 2018, p. 93).

**Use of social media to spread fake news**

A challenging aspect of the fake news problem is the massive information overload associated with the widespread use of social media platforms as a source of daily information. As of 2020, the information behavior of people include drawing information from a variety of synchronous and asynchronous sources and channels (Agarwal et al., 2011; Agarwal, 2011), e.g. from friends and contacts reached face-to-face, or via phone, audio/video calls, email, or messaging apps; online information; and social media like Facebook, Twitter, Instagram and LinkedIn (Agarwal, 2018).

New consumers unable to discriminate between reliable and unreliable news sources are particularly vulnerable to fake news (Qiu et al., 2019). This happens because people’s attention is more and more limited in social networks. Rubin (2019) states that social media data is large-scale, multi-modal and largely based on the function of user-generated content, which allows for intentionally written disinformation to spread rapidly among users from different backgrounds and have different preferences, needs and purposes for sharing such information. The low cost of creating social media accounts can invite easy creation of malicious accounts, such as social bots, cyborg users and trolls that can become powerful sources and contribute to the explosion of fake news (Rubin, 2019; Erdelez et al., 2019). Silverman and Alexander (2016) and Sydell (2016) both referred to the US 2016 election concerning the role of various actors exploiting social media for the spread of fake news.

![Flowchart depicting the role of intention in disinformation or fake news](image-url)
related to the elections. Shearer and Gottfried (2017) report that two-thirds of the US adults report getting 67% of their news on social media.

Impact of fake news
Bessi and Ferrara (2016) say that “the presence of social bots in online political discussion can create three tangible issues: first, influence can be redistributed across suspicious accounts that may be operated with malicious purposes; second, the political conversation can become further polarized; third, the spreading of misinformation and unverified information can be enhanced” (para.1). A big factor in the polarization of political conversation is the phenomenon of filter bubbles (Pariser, 2011). People follow certain news sites, social media accounts and maintain a list of in-person and online contacts that “agree” with their worldview, political views, mental models and prejudices. Search engines, news aggregators and social networks are increasingly responsible for this “personalization” of content through machine-learning models (Flaxman et al., 2016; Hannak et al., 2013). The filter bubbles, thus, potentially created have “algorithms inadvertently amplifying ideological segregation by automatically recommending content an individual is likely to agree with. Moreover, individuals are more likely to share information that conforms to opinions in their local social neighborhoods” (Flaxman et al., 2016, p. 299). Filter bubbles can be understood through the story of the “frog in the pond” who meets the “frog in the sea” and inquires if the sea is as big as his pond. The frog is happy in his pond and thinks that the sea can never compare with the size of his pond. This is what happens to people in filter bubbles. Even though people in these bubbles are technologically very “connected” through social media and messaging, their sources of information are skewed to match their prejudices; a lot that we see online is designed for us to see (and for us to not easily see certain things). In such a scenario, people are very vulnerable to the goodness (or not) of those who hold power to create or influence these rules (Erdelez et al., 2019). Internet news sources and social media turn into “echo chambers” (Dubois and Blank, 2018) with limited information access, designed to reinforce people’s existing political views, and to prevent them from critical thought and analysis (Yadamsuren and Erdelez, 2016). With a vast majority of the population relatively new to technology, and not trained in any formal way to decipher the real from unreal, truth from half-truths and lies, people actually end up believing disinformation as truth (Loftus, 1992), especially when there is enough repetition (Fazio et al., 2015; Erdelez et al., 2019). People tend to believe disinformation because of their preexisting confirmation bias, which is the “tendency to search for, interpret, favor, and recall information in a way that confirms or strengthens one’s prior personal beliefs or hypotheses” (Plous, 1993, p. 233). Cognitive and confirmation biases play a major role in why disinformation is so hard to fight, as people are attached to their long-held beliefs and value system – they accept all news (true or fake) that agrees to their worldview and reject other evidence (even if true) if it is contrary to their worldview. Information segregation that happens in filter bubbles leads to further polarization, and is “a serious concern, as it has long been thought that functioning democracies depend critically on voters who are exposed to and understand a variety of political views” (Flaxman et al., 2016, p. 299; Lassen, 2005). The only way to break out of such bubbles is to check for one’s prejudices and confirmation biases (Plous, 1993), and allow room for differing points of view than what one is comfortable with.

The relationship between LIS and fake news
Since fake news and disinformation propagate, in part, due to the difficulty of recognizing information resources’ credibility and authority, LIS organizations and professionals can help educate users by leading conversations about reliable sources and critical thinking, and updating information literacy education in the light of the fake news problem (Jacobson, 2017;
LIS researchers and information professionals have traditionally been concerned with identifying and evaluating the reliability of information sources, which they address through information literacy (IL) education and research. The Association for College and Research Libraries (2016) is known for its efforts to develop IL standards and then IL frameworks concerned with helping LIS professionals in developing educational programs to improve individual's ability to locate, evaluate and use information effectively. Along with information literacy, information access becomes important as well. Saunders et al. (2018) state that access to information is and has always been a key element of everyday life and is essential to the functioning of participatory democracy. Both information literacy and information access are tested in the current information environment. The fake news phenomenon increases the loss of control, context and capacity and makes it more difficult to evaluate the credibility and authority of information resources, leading to low-quality and false information to easily spread (Cooke, 2017). The fake news issue interferes with the LIS professionals’ role in advocating for better information access (Berry, 2016). The challenges introduced by the misinformation age are “possibly the most difficult and vital challenge in library history” (Berry, 2016, para. 4).

**Information behavior and fake news**

Currently, news is downloaded and shared across many social media channels, and, along with automated bots, the spread of misinformation depends on people's information sharing patterns (Rubin, 2019). Rubin, therefore, argues that fake news is related to the scholarly field of information behaviors (IBs), in which researchers have been actively trying to understand how individuals interact with information and with technology. IB encompasses a wide range of essential human activities, including accidental encountering of, needing, creating, finding, avoiding, choosing, using and non-using information (Case and Given, 2016; Agarwal, 2018).

Historically, IB researchers have addressed issues related to the fake news problem by developing models such as Rieh’s (2002) model of the judgment of information quality and cognitive authority and Sundar’s (2008) four-affordances model for digital media credibility assessment, which attempted to understand human judgments concerning information-related activities. Robson and Robinson (2013) bring in concepts from the fields of information behavior and communication to create a cross-disciplinary model. Primarily, their model incorporates assessing, using or dismissing information based on its utility and/or credibility. Rubin (2019) indicates that notions explored in the IB literature, such as Kuhlthau’s (1993) work on the concept of uncertainty, and Yoon and Nilan’s (1999) research on the cognitive gap as an information need are instrumental ideas to apply when researching and studying fake news as well as when developing IL programs to raise users' awareness about their online habits and critical thinking skills. Although these ideas and models can be useful to address critical parts of the fake news problem, they mainly appear to discuss how users interact with information in the online environment, and to some extent, evaluate and validate information (e.g. Robson and Robinson, 2013) rather than focusing directly on disinformation and fake news. There are very few models and frameworks in information behavior, which address the fake news phenomenon directly. One such model is Karlova and Fisher’s (2013) social diffusion model of misinformation and disinformation which can aid in the understanding of the fake news phenomenon. This study is also seminal in some ways as it has been cited by several later works relating to disinformation and fake news (e.g. Kumar and Geethakumari, 2014; Torres et al., 2018; Giglietto et al., 2019; Hameleers et al., 2021). Thus, we adopt it as a theoretical lens for our study.
Theoretical lens

Discussing the issue of fake news in relation to human information behavior seems to echo Rubin’s (2019) claim that fake news can be addressed through the lens of the information behavior (IB) field. Karlova and Fisher (2013) have developed a model called the Social Diffusion (SD) model of misinformation and disinformation to understand human information behaviors that seem to contribute to the proliferation of fake news on social media platforms. Karlova and Fisher (2013) claim that individuals appear to like sharing news even when they do not believe the information to be true, which then leads to the spread of misinformation (inaccurate information) and disinformation (deceptive information) throughout social networks. Part of the problem of sharing misinformation and disinformation is also related to the ease and speed of current communication channels, such as social media, which allow users to engage in greater social interaction. Karlova and Fisher (2013) argue that misinforming and disinforming are types of information behaviors that are ignored by many IB models, which instead subscribe to a normative model of information as true, complete, accurate and current.

Based on a constructivist view, Karlova and Fisher argue that information is constructed based on human actions and influenced by human social context. This view of the nature of information appears consistent with Dervin and Nilan (1986), who consider information as something constructed by individuals. Similarly, Tuominen and Savolainen (1997) view information as a communicative construct created in a social context.

Adopting a constructivist view of information is useful when investigating the spread of misinformation and disinformation involved with the fake news problem. Karlova and Fisher (2013) state that the constructivist approach can help in addressing the social context and conversations among people, which impact their process of determining what information is and what can be informative. Karlova and Fisher, hence, argue that misinformation and disinformation are extensions of information as well as misinforming and disinforming are information behaviors that can occur in dialogues between people and can be used to construct some reality. They discuss the similarities between information, misinformation and disinformation to confirm their argument for the idea of information extension. Karlova and Fisher contend that misinformation and disinformation can all be true, complete, current and informative. However, in terms of deception, they state that only misinformation and disinformation can be deceptive. The informativeness of misinformation and disinformation largely depends on human social context and situations.

Indeed, people tend to share misinformation and deliberately engage in the spread of disinformation for social, historical and political purposes. Karlova and Fisher argue that in many cases and depending on human situation, misinformation and disinformation seem to provide different levels of informativeness; they claim that the informative nature of misinformation and disinformation appears to extend the concept of information. Hence, they propose the social diffusion (SD) model (see Figure 2) to illustrate how people create and use misinformation and disinformation as well as to precisely describe misinforming and disinforming as information behavior. Their model shows that information, misinformation and disinformation are products of social processes. It demonstrates how information, misinformation and disinformation are shaped, disseminated, judged and used.

The model can be read from top to the bottom. We added numbers to the model for ease of understanding, to correspond to the numbers in the explanation below.

(1) To develop an inclusive and context-aware model, Karlova and Fisher (2013) first placed “Milieux” at the top of the model to indicate social, political, cultural, and historical aspects (e.g. divisive political and social contexts during the 2016 US elections, and those in some other countries) that can influence the perception and use of information, misinformation, disinformation, cues to credibility and cues to
deception. Thus, leading people to perceive information as true or false, and getting them to share false information. Hence, the model considers information, misinformation and disinformation to be socially, culturally and historically mediated.

(2) The second element of the model is diffusion, which attempts to explain how misinformation and disinformation spread. First, personal and professional relationships, which can involve negative, positive and/or latent ties of varying strength, are leveraged in the process of sharing information, misinformation and disinformation. Such information diffusion can occur even when people do not believe in such information. Diffusion can be rapid or slow depending on politics, social events, relevance and value. Information, misinformation and disinformation can be shared across geographies and across social media, which speeds up the process of diffusion much easier and faster.

(3) In terms of intention to diffuse information, the model considers such inner motivations unknown. Karlova and Fisher argue that human intentionality is usually vague and changeable, so it is difficult to know the intent behind such information diffusion at any given moment. However, the dissemination of inaccurate and deceptive information may be driven by benevolent or antagonistic intentions.

(4) The model considers deception to be a complex process and cues to deception (signs to know whether a piece of information is false or deceiving) to be context-dependent.
or relationship-dependent. People can attempt to share disinformation to deceive others, but their success in the deception attempt is not guaranteed and largely depends on different sets of cues for different contexts or relationships.

(5) The model includes judgment to explain how the receiver of misinformation and disinformation can interact with such information. Deceivers use cues to credibility to achieve deception when sharing misinformation and disinformation with others e.g. mixing lies with facts. However, irrespective of diffusers’ attempts to deceive, the receivers also make judgments about information reliability by using cues to credibility and cues to deception. Much of the interpretation of misinformation and disinformation can be influenced by social, historical and cultural factors.

(6) The model includes “use” as a central element to illustrate how receivers of disinformation and misinformation decide to handle such information. During the process of using information, misinformation and disinformation, individuals can turn to their information literacy skills to assess the credibility of information sources of such news. Information literacy programs and education (or any change of context e.g. travel to a different country, or an in-depth conversation with a trustworthy person with different views than ours) can assist users in recognizing or correcting inaccurate information. However, individuals or governments can decide to share misinformation and disinformation for several reasons related to social or political contexts.

Although the model is relatively new and has not been used in empirical research, the SD model can be a promising start for addressing the fake news issue because it seeks to interpret how fake news components, which include both misinformation and disinformation, are influenced by social, historical and political contexts. Moreover, considering misinforming and disinforming as information behaviors can help librarians expand their information literacy education by addressing such behaviors in relation to users’ social and political contexts.

**The role of critical thinking and serendipity**

Along with Karlova and Fisher (2013), we use Erdelez et al. (2019) to guide our work in this paper. Erdelez et al. (2019) propose a two-pronged approach to fight disinformation and fake news in the digital age: by harnessing greater critical thinking and critical action and using the presence of true serendipity as a test case.

Critical thinking is the ability to analyze a piece of information or a particular problem and use logical or scientific reasoning to come to a conclusion and make inferences about that information (Velautham, 2017). For people to effectively think critically, they must integrate newly discovered information on some subject into their preconceived notions. Erdelez et al. (2019, p. 1) contend that it is time to move from critical thinking to critical situational awareness, and critical action, “which imply thinking critically, being aware, and converting that critical thought into action in the way we communicate and make decisions.” The process of critical thinking and inquiry is central to media literacy and news literacy efforts listed in the previous section.

Serendipity in information behavior is finding information when not looking for it, often leading to a surprise and an “ahah!” moment (Agarwal, 2015; Erdelez et al., 2019). Erdelez et al. propose that since we may be inclined to trust information that we encounter through serendipity, a test for serendipity (whether it is genuine or manipulated by software or someone) could help people in the judgment process of whether information is true or false, and therefore, to be believed or not. “Serendipity acts as a hypodermic needle that injects surprising, unexpected evidence into the echo chamber of the filter bubble” (Erdelez et al.,
They go on to describe how such a test could be conceptualized at an individual level, and a systems level (discussed further in the Discussion section).

Findings

Current efforts to fight fake news

The fake news problem has led LIS professionals to reflect on their role in advancing democracy and protecting intellectual freedoms under attack by the proliferation of fake news (Association for College and Research Libraries, 2016). Since information source evaluation and providing access to trustworthy information so people can make informed decisions has been the traditional role of librarians, they have taken on the fight against fake news as a natural imperative of their profession.

Thus, LIS researchers and professionals have engaged in the fight against fake news in several ways. Since the spread of fake news globally and particularly during the last few years, fake news has been a major topic at LIS conferences and in many publications, including Library Quarterly and Reference and User Services Quarterly, which have featured over a dozen articles discussing fake news. Moreover, information science and LIS organizations such as the Association for Information Science and Technology (ASIS&T), the American Library Association (ALA), and the International Federation of Library Associations and Institutions (IFLAs) have been active in presenting several workshops and webinars and promoting the importance of information literacy programs to address fake news. They have also developed important documentation, such as the International Federation of Library Associations and Institutions’ (2020) “How To Spot Fake News” infographic and American Library Association (2017)’s “Resolution on access to accurate information,” which encourage librarians to raise awareness and deliver accurate information to users to counter disinformation. Many libraries have also created LibGuides to fight disinformation, along with their continuing information literacy programs. Thus, information professionals have responded energetically and politically to the fake news issue (Rubin, 2019).

While acknowledging the importance of appreciating and being optimistic about the value and work of LIS professionals in fighting fake news, we must also recognize that the problem of fake news will continue to be a very complex issue due to the rapid growth of information and communication technologies as well as the influence of various personal, social and political contexts on patrons’ abilities to handle fake news. Association for College and Research Libraries (2016) has indicated that future plans should consider the complexity of fake news as well as the limitation of IL education in fighting it. Similarly, Sullivan (2018) argues that librarians cannot fight fake news because they largely rely on limited solutions, such as IL instructions and research guides that are outdated and do not fully address the problem of fake news. For example, Sullivan (2018) reports that in some IL instructions, librarians were still found to recommend evaluating websites based on sloppy or unprofessional design as an indicator of reliability which does not reflect the complexity of verifying fake news.

To fully address the complexity of the fake news phenomenon, LIS researchers and professionals can expand their influence and leverage trust by engaging in practical and research initiatives. First, the process of fighting fake news requires greater collective efforts to tackle the social, human, and technological contexts involved in the problem. Engaging professionals from the technological and psychology sectors can be useful when developing strategies for combating fake news because these sectors can provide insights into how new information technology works and how humans process information (Saunders et al., 2018).

Second, the collaboration with other fields should also be expanded to future research in LIS focusing on fake news. Sullivan (2018) states that “LIS researchers and practitioners need
to draw on and contribute to a larger body of research pertaining to misinformation, biases, and critical thinking” (p. 104). An interdisciplinary research agenda can be useful for addressing the complexity of the fake news phenomenon as well as for contributing to information professionals’ practices and IL programs.

Third, IL initiatives and training, workshops or documentation targeting fake news should always be evaluated and updated to ensure the effectiveness of the approach. Sullivan (2018) claims that it is important to rely on evaluative research to determine the success of LIS professionals in providing IL education that is effective in addressing the fake news problem. Sullivan (2018) further states that in the short term, librarians should start by revising and updating their research guides, checklists, and other tools by removing outdated recommendations that are no longer useful for addressing the current misinformation landscape, as well as including new resources about images and verifications.

Fourth, Karlova and Fisher’s (2013) SD model draws LIS professionals’ attention to the importance of considering misinforming and disinforming as types of human information behaviors. Such consideration can help empower future research and IL education to address the social, historical and political contexts involved in the process of sharing misinformation, and disinformation among people. The fight against fake news appears to largely target disinformation, which seems reasonable given the political context of the fake news issue. However, some people contribute to fake news by sharing misinformation as well. Hence, the SD model can be useful for LIS professionals who wish to address the fake news phenomenon by understanding how humans engage in sharing both misinformation and disinformation.

Lastly, LIS professionals should engage with governments and lawmakers to ensure that the development of future legislation targeting the fake news problem will not result in censorship and/or violations of individuals’ intellectual freedoms.

Apart from LIS, large social media platforms such as Facebook and Twitter have responded to the fake news phenomenon. Their response has included hiring fact-checking teams, disrupting financial incentives of the creators of fake news, ranking improvements, easier reporting of false information, creation of a new set of tools (Lapowsky, 2019), and removing trolls and fake accounts (Talbot, 2019). Apart from these efforts by social media giants, fact-checking websites exist for different countries across the world (see Global Fact-checking Websites, 2020). Organizations such as the Center for Media Literacy (medialit.org) and initiatives like the News Literacy Project (newslit.org) are educating people on fighting fake news.

**Disinformation behavior framework and model**

In the previous section, we looked at the efforts of LIS professionals, the limitations of those efforts, those by social media companies, government agencies, and other independent organizations, fact-checking websites and media literacy projects in fighting fake news. We also discussed how a two-pronged approach focusing on critical thinking and action, and designing tests for the genuineness of serendipitously encountered information could help in this effort.

We now propose a disinformation behavior framework and model on the fake news phenomenon and ways to fight it. Most models of information seeking and behavior focus on information seeking and behavior, and not on false information. While Karlova and Fisher’s (2013) model addresses this aspect, it is eight-years-old, complex and verbose, and does not take into consideration some of the current terms such as filter bubble and the role of bots, as well as ways to fight fake news. We incorporate certain elements from Karlova and Fisher’s model and other elements from other studies. Table 1 shows the sources for the elements that we incorporated in the proposed framework. As seen in the table, most of the elements that explain the disinformation and fake news phenomenon are from Karlova and Fisher.
In addition, we added the concepts of confirmation bias (Plous, 1993), filter bubble/echo chamber (Pariser, 2011; Flaxman et al., 2016), and the use of algorithms and bots (Erdelez et al., 2019). While Karlova and Fisher had put only the disinformation diffusion part under the “social, cultural, and historical milieux,” we have placed the entire phenomenon within “context,” as context affects everything (Agarwal, 2018). We do not repeat certain elements like information, misinformation, and disinformation twice in our model, as Karlova and Fisher have done. We have also simplified “creator’s and spreader’s intentions” to be listed just in one place (Karlova and Fisher had separated diffuser’s and deceiver’s intents in two places). The primary addition in our model is various ways to fight disinformation and fake news.

Figure 3 shows our proposed new framework. We also present a simplified causal model (Figure 4). The framework and model should help us understand the fake news phenomenon, include ways to fight it, and guide future researchers studying this phenomenon.

**Discussion**

In this study, we sought to answer three research questions: 

**RQ1:** How do we understand the fake news and disinformation phenomenon?  

**RQ2:** What is its relationship with LIS?  

**RQ3:** How can information professionals fight it? The first two questions were addressed using the

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**Table 1.** Sources for elements incorporated in the proposed framework.

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In our findings, we addressed the third question. The theoretical framework we proposed above seeks both to explain the phenomenon (RQ1) as well as provide ways for information professionals to fight against it (RQ3).

As per the framework, all information, including misinformation, and disinformation is produced and consumed in a mix of historical, social, psychological and personal contexts (see Agarwal, 2018, for an elaborate treatment on context in information behavior) linked to certain activity or events such as national elections in a country and COVID-19 pandemic. The fake news, thus generated, spreads over time, at least, among a segment of the population. Such a diffusion is aided by the intentions of those creating and spreading them, which can include changing long-held historical narratives or wanting to influence a certain outcome. The information creation is mediated by the use of algorithms, bots and social media to deceive, leading to disinformation and fake news. The user’s or consumer’s confirmation biases and prejudices moderate their ability to evaluate and judge the reliability and credibility of such information and sources (unless they’ve been trained in critical thinking and media literacy, which can be a very small segment of the population). Based on user judgment, they can perceive information as either genuine (information) or
false — whether unintentionally so (misinformation) or intentionally (disinformation/fake news). The user/consumer of such information might then decide to ignore it, use it or forward and spread it, depending on one’s intentions and biases, thus engaging in a variety of information behaviors. When a user decides to forward or spread false information, they contribute to the further diffusion and spread of fake news. The more a user resides within a filter bubble/echo chamber (with access to only those people and sources that conform to one’s pre-held notions), the more it inhibits their ability to evaluate information critically. Such a filter bubble can be punctured through the concerted efforts and advocacy by individuals, groups, associations and organizations working on media literacy, LIS professionals teaching information literacy, and educators in schools, colleges and universities, as well as others, training people on critical thinking and critical action (Erdelez et al., 2019), and serendipity researchers who can design tests to help people if the information that was forwarded to them, and lead to a surprise, was genuine, or presented before them to deceive them into thinking of it as a getting them surprised without any intervention (Erdelez et al., 2019).

Erdelez et al. (2019) say that at the individual level, the test could be designed to assist a person in determining if their personal experience of serendipity is a genuine one by answering questions about the nature of surprise experienced when they found information by chance, and the nature of the information they found. “Are there circumstances in previous user-system interactions that may have resulted in finding information that was encountered? Did the user voluntarily request information encountered at some earlier point, but forgot about it? How unusual is the source where information was encountered? Is the information source networked or a physical one?” (Erdelez et al., 2019, p. 2). At the systems level, Erdelez et al. propose that the test would examine the patterns of prior online interactions of the individual and to see if that prior interaction has anything to do with the information they found now. “Are there some established algorithms that capture specific patterns in users’ online behavior (e.g. online shopping, music downloading, use of search engines, social media activity, etc.)? Do these algorithms communicate with each other and
provide an opportunity for an intersection across various online information spheres? Do these algorithms have access to confirmed, identifiable data about individuals?” (Erdelez et al., 2019, p. 2). They cite such questions as a way to determine if the information found by “chance” is actually a result of chance or interference by a system algorithm based on one’s prior online history.

In Figure 4, we simplify the framework of Figure 3 to arrive at a causal research model for disinformation behavior and ways to fight it. Such a causal model, with clearly delineated constructs and variables, and directionality of arrows would help in the design of empirical studies (see, e.g. Agarwal et al., 2011; Agarwal, 2018, Chapter 4) using surveys and other methods to further investigate the fake news phenomenon.

As per the model, context linked to social, political or historical phenomenon will give rise to a variety of information, misinformation (depending on the extent of false information) and disinformation/fake news (depending on the intentionality involved in misinformation). The intention of persons, groups or organizations creating and spreading false information will influence technology algorithms, bots and social media in moderation this relationship between context and dis/misinformation. The context also affects a user’s inherent confirmation bias, as well as the sources and channels (Agarwal, 2011; Agarwal et al., 2011) which help limit the user within a filter bubble. These user biases, enabled by sources within a bubble, will moderate the way a user judges information and whether they believe it to be true or not. Based on user judgment, the user might decide to use (mis/dis)information, disuse or ignore such information, or even decide to forward and spread this to other people (the dotted line in Figure 4, which corresponds to the information behaviors of misinforming/ disinforming in Figure 3). The user’s filter bubble and biases can be fought through critical thinking and action, which are included in educational practices such as information literacy, media literacy, as well as advocacy, as well as through sources outside of one’s filter bubble, e.g. a friend or a colleague who provides an alternate point of view. A test for genuineness of serendipity can further help toward critical thought and action in puncturing the user’s filter bubble.

Conclusion

The fake news phenomenon is a complex problem with several causes. The fight against this problem is big, and cannot be won by isolated efforts. Addressing such a problem requires a collective approach capable of tackling the political, social, technological and human aspects of the fake news issue. LIS professionals can contribute to the fight against fake news by educating users and raising awareness, and by studying the information behavior aspects of fake news. All LIS professionals in the US and across the world must join hands, and train students and professionals in critical thinking, to become advocates in this fight against fake news. Universities must make fighting disinformation an important learning outcome of their programs.

In this paper, we have sought to disambiguate various terms, and have provided a comprehensive account of the state of the field – at least from a LIS perspective. Our proposed disinformation behavior framework can help researchers, as well as information professionals, understand the fake news phenomenon, as well as the ways to fight it. The causal research model can help in the design of research studies to empirically investigate the phenomenon of fake news. The framework and the model expand upon Karlova and Fisher’s (2013) model by incorporating confirmation bias, filter bubble and use of algorithms and bots, as ways to explain the fake news phenomenon. The proposed framework and model fill the gap in prior theories and models in information and information science that have mostly focused on information seeking, and lately, some other forms of information behavior such as information finding, sharing and avoidance, but have largely left out misinforming and
disinforming behavior that is related to the fake news phenomenon in the development of its models. By incorporating ways to fight fake news as part of the model, we help bridge theory with practice, and make the model useful to not just researchers but to practitioners, policymakers and the lay public as well.

Despite our efforts to take a comprehensive view on the fake news issue, the paper has its limitations. First, we have looked at the fake news issue from a LIS perspective. We do not claim that the framework will provide complete coverage of the fake news and disinformation process as seen from all thematic and scientific fields. There are other ways to look at the phenomenon. For example, Froehlich (2020) offers ten lessons for the age of disinformation. The problem of false information affects various fields and areas and can be seen from a communications perspective, from a technological perspective, etc. Those would offer more insights. Second, our framework and model are focused on understanding and explain the disinformation and fake news phenomenon and ways to fight it. The model does not include the impact of fake news and the harm it causes to individuals, institutions, societies, and countries. That is outside the scope of this study. Last, but not least, we may seem naive in our assumption that LIS can help to fight fake news in the ways we suggest in our framework. We have to understand that just having a framework or model is not the same as fighting fake news. There is a massive algorithmic multi-headed hydra out there in terms of the fake news phenomenon. Our attempts are more to not accept defeat and give people across the world a fighting chance, even if small and long-drawn, to withstand the phenomenon. LIS professionals and all thinking people from other fields need to train people, and especially school children, on critical thinking and critical action, and on media and news literacy. Concerted advocacy and action can go a long way in fighting this large and difficult phenomenon. In our future work, we aim to (1) investigate the literature on empirical studies on fake news outside of LIS; (2) look at fake news specific to particular events, e.g. the “infodemic” during the coronavirus situation; and (3) the impact of fake news in specific regions of the world. We also invite other researchers to evaluate and empirically test our proposed framework and model in the design of their research studies on disinformation and fake news, and in evaluating how these work in different populations and contexts where the fake news phenomenon plays out.

References


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Naresh Kumar Agarwal is Associate Professor and Director of the Information Science and Technology Concentration at the School of Library and Information Science at Simmons University, Boston, Massachusetts, USA. Naresh’s research area is information behavior and knowledge management. His first book Exploring Context in Information Behavior: Seeker, Situation, Surroundings, and Shared Identities was published by Morgan and Claypool in 2018. His second book You Know the Glory, Not the Story: 25 Journeys towards Ikigai (South Asian version: “Engineering to Ikigai: 25 Journeys towards Purpose”) is coming out in 2021. He has been a keynote/invited speaker at workshops and conferences in different countries, including in the United States, Canada, Japan, France, India, Pakistan, Bangladesh
and South Africa. Naresh has held various leadership positions at the Association for Information Science and Technology (ASIS&T). He has been a member of its Board of Directors, co-chaired its Annual Meeting in 2017, and was awarded the ASIS&T James M. Cretsos Leadership Award in 2012. He is currently the President-elect of ASIS&T. In 2018, he started http://www.projectonenessworld.com to gather human stories through interviews. You can learn more about him at http://web.simmons.edu/~agarwal. Naresh Kumar Agarwal is the corresponding author and can be contacted at: agarwal@simmons.edu

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