Fake News Flags, Cognitive Dissonance, and the Believability of Social Media Posts

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Short Paper

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Abstract

Despite the increasing relevance of how to counter fake news on social media, there are only a few studies on the merit of fake news flags. Therefore, the main goal of this research is to investigate how fake news flags and the reputation of sources affect believability and information elaboration of news content shared online. Based on the data of an online pre-study with 118 participants, we present preliminary results and how we intend to test our research model in more detail by conducting an experimental eye-tracking study. Our initial findings suggest that fake news flags have a measurable impact on the believability of news, but only partially manage to counteract the established reputation of a trusted information source. Such results serve a broader research agenda to develop systems and user interfaces that are more effective for communicating fact-checking results and debunking fake news.

Keywords: Fake News Flags, Believability, Social Networks, Cognitive Dissonance

Introduction

Humans are continually looking for new information to expand their knowledge and keep up-to-date with the current state of affairs in their environment. Information can help to reduce uncertainty and facilitate decision-making, but can also lead to confusion and misunderstandings, in particular where contradictory sources of evidence exist. The way information is being shared has changed over the years as a result of Internet access and global high-speed connectivity. However, the question of whether the information and its sources are credible remains a hot topic that is not easy to defuse and has a high impact on the individual decision-making processes and far-reaching societal consequences. Over the years, the Internet has become the largest source of information. The easy access and the ability to aggregate information from different providers made the Internet more popular than any other type of media, including traditional news broadcasters such as newspapers, radio, and television. Moreover, social media platforms work with radically different distribution patterns than other news media. These platforms enable all users to share information in real-time, for example, reporting on current or upcoming events (Zubiaga et al. 2018). Compared to traditional news media, social media content generally does not run through a thorough filtering process, such as fact-checking or editorial judgment (Allcott and Gentzkow 2017).

Consequently, low-quality content and false information are distributed on many social media platforms. The lack of mechanisms supporting verification and information quality control tends to provoke the spread of rumors and false information (Zubiaga et al. 2018). Rumors can also be described as unverified information originating from one or more sources spreading across a network over time (Vosoughi 2015). Contrary to rumors, fake news is defined as "news articles that are intentionally and verifiable false and could mislead readers" (Allcott and Gentzkow 2017, p. 213) and as "fabricated information that mimics news media content in form but not in organizational process or intent" (Lazer et al. 2018, p. 1094). Nowadays, 68% of people report that they come across fake news at least once a week (European Commission 2018). This awareness fuels the need for developing reliable frameworks that could aid to judge the believability of the information shared online. To combat fake news, many approaches to fact-checking as well as rumor detection and verification were proposed. These approaches to monitoring news media also require a certain degree of automation to be able to meet the volume and velocity of the real-time digital news media streams. Automated systems are able to detect fake news and rumors and monitor their propagation using supervised machine learning models, which are trained to evaluate the combinations of features extracted from the information content itself, the information source and the information propagation patterns (Zhou and Zafarani 2018). However, the question remains about whether the resulting news quality ratings and fake news flags are sufficient to influence the perception of the believability of such news content. We substantiate the need for analyzing the factors influencing the perception of believability regarding news media content more thoroughly, including its origin. Believability is highly relevant because it is an important factor that influences reading and sharing behavior (Kim et al. 2019) and thus contributes to the dissemination or reduction of fake news.

When using social media, users rely on their intuitive judgments, since they primarily seek entertainment and interpersonal connections via social media and are therefore in a "hedonistic mindset" (Moravec et al. 2018a). Gabielkov et al. (2016, p. 185) report, based on the analysis of a Twitter dataset of 2.8 million posts, that "59% of the shared URLs are never clicked [on]", according to which users put little cognitive effort into assessing the truthfulness of messages. When flagging fake news, it is essential to generate a sufficiently strong cognitive dissonance to encourage readers to critically assess news content (Moravec et al. 2018b). Few studies investigated the effect of news quality ratings and fake news flags on believability. An exception is a study by Kim and Dennis (2018), who evaluated the effect of the source reliability ranking on the believability of news posts shared on social media networks. Overall, lower source ratings lead to lower believability of social media posts. Another study by Moravec et al. (2018a) went a step further and measured the effect of training users on the meaning of fake news flags attached to the social media post. Their results suggest that both design and user training have an impact on users recognizing fake news in social media. While studies on fake news flags often used unknown sources (e.g., Kim et al. 2019; Moravec et al. 2018a) or either blackened or cut the source (Ross et al. 2018), in reality, news sources and fake news flags always appear together. Other research streams have investigated how social media as a channel (e.g. Twitter) change the believability of traditional news sources (e.g. The New York Times) when using an official social media account compared to a regular website (e.g., Schmierbach and Oeldorf-Hirsch 2012). Our experiments continue these lines of works by analyzing the combined impact sources and fake news flags have on the perception of news content shared on social networks. Contrary to previous research, we evaluate a specific type of fake news flag, which indicates believability of the news post as a whole, and not its source as in Moravec et al. (2018a) in combination with real sources. Furthermore, we are specifically interested in evaluating the effect of a fake news flag, which is semantically associated with lying and low believability; a Pinocchio pictogram as proposed by the Washington Post (Kessler 2019). We adopt the Pinocchio fake news flag in our experiments to communicate the low believability of news content and evaluate the impact on the reader's perception of believability. To the best of our knowledge, there are no previous studies that investigated the effects of using this type of graphical fake news flag. In summary, this paper deals with three main research questions: whether Pinocchio fake news flags are able to influence 1) the believability of a social media post, 2) the time invested in the decision about the believability of the information, and 3) whether this effect is influenced by the source's reputation. In this paper, we present preliminary survey results, which we conducted to address these questions and describe a follow-up eye-tracking study, in which we intend to investigate them in more detail.

Theoretical Background and Hypotheses

Several scholars attempted to formalize a consistent definition for believability and to systematically determine the factors that may have an impact on its perception (Kim and Brown 2015). Believability (or credibility) refers to the degree of belief that may be attributed to a chunk of information (a message) or its source. Believability is highly relevant for user interactions with social media posts. Wathen and Burkell (2002) distinguish five factors influencing believability: characteristics of the source (e.g., sources with high or low reputation), characteristics of the receiver (e.g., prior knowledge), the message itself, the medium where it is released and the context of message reception (e.g., distraction). Kim and Brown (2015) refer to similar factors but put a specific emphasis on the relevance of the information source and the channel that propagates this information. In our research, we are interested in the effect of the source and the fake news flag. We utilize the design proposed by the authors of the Washington Post, who use Pinocchio pictograms as a veracity rating to annotate their articles that analyze and fact-check claims publicly made by famous US politicians (Kessler 2019). The rating provides a scale from one to four, which reflects the author's opinion of the statement's truthfulness. Such an approach highlights the non-binary nature of the true-false assignment and the complexity, which lies in combining or omitting certain facts. Compared to other fake news flags, which were previously empirically evaluated in other research studies, such as the star rating (Kim et al. 2019) or colored source reliability scales (red to green) (Kim and Dennis 2018), Pinocchio fake news flags represent a negative scale; the visual indicator stands directly for lying and fake news, and exhibits a high semantic transparency. Generally, semantic transparency refers to the extent to which users intuitively associate the symbol's meaning (the semantic concept it represents) with its visual appearance (Moody 2009). Pictograms visually resemble the real-world concepts they reference and are often easily associated with them. The Unicode Full Emoji List v12.0 also lists emojis with long noses as "lying faces." Thus, a semantic association between a Pinocchio pictogram and low believability is very likely, and a Pinocchio fake news flag should reinforce the natural skepticism towards the claims presented in a social media post. Consequently, we hypothesize:

H1a: Users are less likely to believe social media posts with a Pinocchio fake news flag than posts without any fake news flag.

Next, we turn to the source as one of the factors affecting news believability. The concept of trust towards news publishers received a surge of attention from the social science community since the 1990s (Kohring and Matthes 2007). Following Kim et al. (2019) we employ reputation theory (Eisenegger and Imhof 2008), which defines reputation as "the recognition of trustworthiness", as a framework that helps us to explain the impact of the news source reputation on the reader's perception of the believability of a social media post. We focus on the functional reputation dimension, which is more objective and inter-subjective than the dimensions of social reputation (which involves, e.g., ethics) or expressive reputation (e.g., art, attractiveness). According to Eisenegger and Imhof (2008), institutions that demonstrate technical competence and achieve performance goals have a high functional reputation. In the following, we refer to functional reputation when describing sources with a high reputation. Source reputation should be directly related to the believability of social media posts. Hence, we hypothesize:

H1b: Users are more likely to believe social media posts from a source with a higher reputation.

We draw on the cognitive dissonance theory (Festinger 1962) to hypothesize on the interaction effects of source reputation and the consideration of fake news flags. Cognitive dissonance occurs in a situation where an individual faces conflicting attitudes, beliefs, or behaviors (Cooper 2007). According to the theory of cognitive dissonance, individuals strive to restore their internal consistency when confronted with conflicting information. We argue that if a social media post presents conflicting information, readers tend to dissolve the dissonance by changing their attitudes and beliefs about 1) the validity of a Pinocchio fake news flag or 2) the source. If a source has a low reputation, a Pinocchio fake news flag will reinforce the distrust in a social media post, and no cognitive dissonance occurs. However, if users have high trust in the news source, because of its high reputation, cognitive dissonance will occur. We hypothesize that the effect from a fake news flag will be less pronounced for sources with high reputation. Hence, we intend to test the following interaction effect:

H1c: The negative association between fake news flags and believability of a social media post will be less pronounced for sources with a higher reputation.

Another factor that may influence the believability of a social media post is the readers' prior awareness of the news content itself. In this respect, the illusory truth effect (Pennycook et al. 2018), also called validity effect by Boehm (1994), refers to a higher believability of information to which one has been exposed repeatedly. The illusory truth effect has been assessed in the context of fake news only recently (Pennycook et al. 2018), and experiments have demonstrated that the mere exposure of a headline leads to a higher believability in the subsequent tests. Individuals tend to believe specific information if they were previously exposed to it. Thus, it is likely that participants believe in fake news if the content sounds familiar to them. Therefore, we hypothesize:

H1d: Users with prior awareness of the news content are more likely to believe a social media post than users who never heard about it before.

Next, we want to zone in on the elaboration of social media posts. We draw on cognitive dual processing theories (Samson and Voyer 2012) in combination with the theory of cognitive dissonance (Festinger 1962) as a theoretical framework to ground the following hypotheses. The elaboration likelihood model (Petty and Wegener 1999) is a prominent dual processing model. The central point of the this model is the elaboration continuum: readers of an online content either process domain-relevant information with much cognitive effort at the high end of the continuum (the "central" route) by carefully considering the arguments, or with less cognitive effort at the low end by relying on the extrinsic, peripheral cues. Variables as the source of a social media post or a fake news flag may not only influence users and change their attitude by serving as an argument or a cue but also determine the extent of the information elaboration (Petty and Wegener 1999). In the decision domain, a similar distinction was made between dual processing in the form of System 1 and System 2 thinking: the first processing type is intuitive, autonomous and fast, while the second processing type is analytic, reflective and slow (Evans and Stanovich 2013). Moravec et al. (2018b) argued that social media users tend to rely on the intuitive and fast System 1 thinking because they are in a "hedonistic" mindset. However, we expect that fake news flags shift users from System 1 to System 2, when they evoke cognitive dissonance. As System 2 requires greater cognitive activity, we take response time as an indicator for a higher cognitive elaboration and expect that an effective activation of System 2 by a fake news flag to think critically about a message, will increase the time to answer the questions on a social media post. In the neuroscience, Colosio et al. (2017, p. 5076) "calculated individual reaction times (RTs) in each condition to relate them to the levels of cognitive conflict." They also assumed that "a longer RT is associated with a higher level of conflict." The combination of a believable social media post and a fake news flag that indicates the opposite can lead to cognitive dissonance. Therefore, we expect users to spend more time dissolving the emerged cognitive dissonance, as response time tends to correlate with response conflict (Izuma et al. 2010). This expectation is also in line with Moravec et al. (2018c), who have reported that cognitive dissonance created by reading a social media post flagged as false that participants wanted to believe in, resulted in users spending more time to evaluate believability. Hence, we raise the following hypothesis:

H2a: Users will spend more time when deciding on the believability of a social media post if a fake news flag is present.

Users also rely on heuristics such as an association between a source with high reputation and believable content. Against this background, there are two possible consequences of the cognitive dissonance evoked by a fake news flag on a post from a source with a high reputation: "System 1 either ignores the discomfort or invokes System 2 to resolve it" (Moravec et al. 2018a, p. 5), which processes the conflicting information and tries to come to a well-considered decision. We assume that System 1 can quickly decide that a social media post from a high reputation source is believable, while it is less believable from a low reputation source. Thus, source reputation per se is not supposed to affect the time to decide on the believability of a social media post. We expect a longer response time only in cases of cognitive dissonance. In the case the post is from a source with low reputation, we can assume that the fake news flag evokes no cognitive dissonance, and the decision is therefore made more quickly. However, when a fake news flag leads to cognitive dissonance, we expect a longer response time as an indicator for a higher cognitive elaboration. Consequently, we posit:

H2b: Users will spend more time when deciding on the believability of a social media post if a fake news flag is present on a post from a source with a higher reputation.

We summarize our hypotheses in the research model shown in Figure 1.

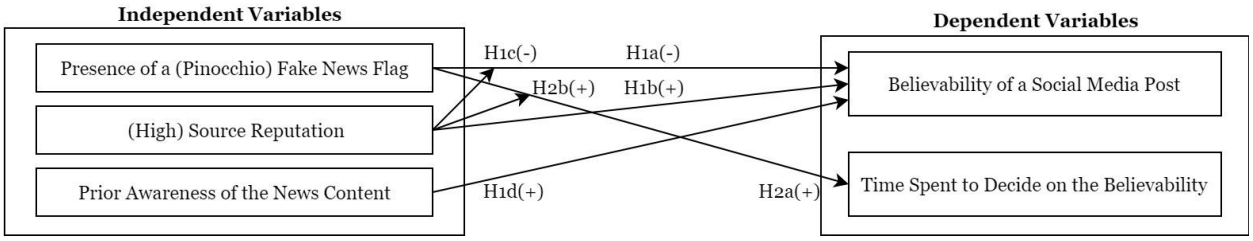

Figure 1. Research Model

Pre-Study

To assess our hypotheses in a pre-study, we used an experimental design with a between-subject factor (presence of a Pinocchio fake news flag) and a within-subject factor (source) which was counterbalanced. The pre-study used eight different mock-ups, similar to posts shared on Facebook. The design context was chosen based on practical relevance and ease of generalization, as Facebook is the most widespread social network site with 2.3 billion monthly active users, 1.5 billion of whom use this platform each day (Facebook 2019). Figure 2 is a case in point for the test material we used.

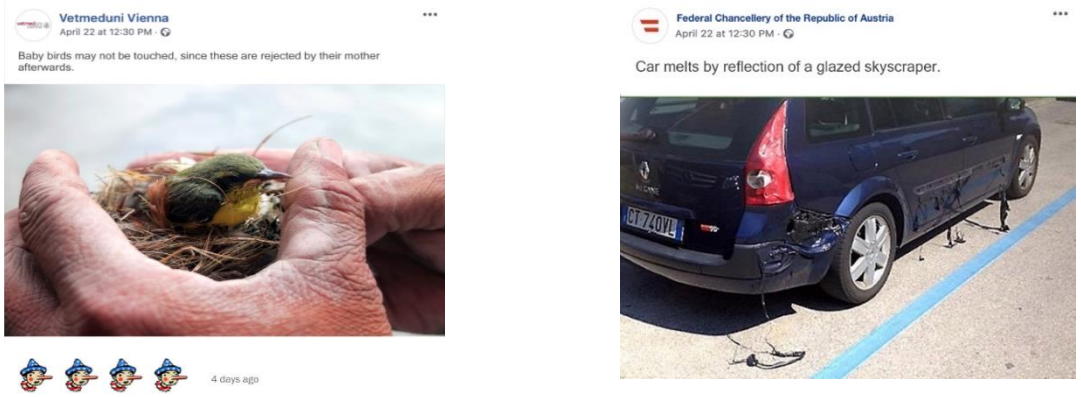

Figure 2. Examples of the Experimental Material With/Without a Fake News Flag

We draw on the reputation theory (Eisenegger and Imhof 2008) to manipulate source reputation and use three sources with a high reputation from different domains: a governmental organization (the Federal Chancellery of the Republic of Austria), domain experts (e.g., local universities; the selection depended on the specific cases) and one of the well-known local daily newspaper ("Standard"). As a source with an assumed low reputation, we chose a popular and free local daily newspaper ("Heute"). Similar to Kim and Dennis (Forthcoming), we relied on an external trustworthiness rating (Brandner and Schwabl 2017) to identify real and existing news sources with high and low reputation. According to Brandner and Schwabl (2017), the online presentation of the chosen newspaper with high reputation was rated on the first place of 17 local newspapers, while the chosen newspaper with low reputation was rated the last place by a sample of over 800 participants. We controlled whether our categorization of reputation of the sources was also valid for our sample in a trustworthiness rating in the questionnaire. which ensured that our initial categorization of reputation was correct (domain experts: Mean=4.18, SD=0.62; daily newspaper: Mean=3.91, SD=0.80; governmental organization: Mean=3.76, SD=0.89; free daily newspaper: Mean=2.70, SD=0.75). The mock-up Facebook posts were combined with the four different sources (three with high reputation and one with low reputation). Each participant received eight posts (two posts from each source), and we counterbalanced posts with sources in four different experimental groups. Further, we used Pinocchio pictograms as fake news flags by attaching one or four Pinocchios to a Facebook post. As there was no difference between one and four Pinocchios in our results, we decided to conduct our preliminary analysis with the binary variable "presence of a Pinocchio fake news flag." Prior to rating the believability of Facebook posts, the survey participants received explicit instructions on the meaning of the Pinocchio fake news flags. To produce test cases, we looked for news content that is less likely to trigger subjective judgments among the study participants. Half of the eight claims were true; the other half was false. We measured believability

on a 4-point Likert scale (from very unbelievable to very believable), and we asked participants whether they would share the Facebook post and whether they have ever read anything about this subject before to measure awareness. (However, collected data about the sharing intention could not be used, because participants only rarely selected this option. This behavior could have several reasons, e.g., because participants never share something on social media or because the topic was of no interest to them.) Response time was measured for reading each case and answering these three questions.

Preliminary Results and Interpretation

We collected data from a convenience sample of 118 participants (65% females, 35% males; aged from 19 to 35) with an online questionnaire. All participants had at least a high school diploma, and 41 (35%) had completed a bachelor's degree. To analyze the effects on believability and response time we used multilevel mixed models in SPSS (with case and participant as random intercepts). As independent variables, we used the presence of a Pinocchio fake news flag, the source (sources with high reputation: domain expert, federal chancellery, high quality newspaper; source with low reputation: low quality newspaper) and prior awareness according to our hypotheses and additionally tested for interaction effects. Table 1 provides more detailed results (with the low-quality newspaper [source with low reputation] as a reference value).

	Dependent Variables	
	Believability	**Time Spent**
Independent Variables	Coefficients	Coefficients
Presence of a Pinocchio Fake News Flag	-0.15	-0.57
Prior Awareness (of the News Content)	0.55***	-
Presence of a Pinocchio Fake News Flag * Prior Awareness	0.10	-
Domain Expert (Source with High Reputation)	0.69***	-0.98
Federal Chancellery (Source with High Reputation)	0.47***	0.08
High Quality Newspaper (Source with High Reputation)	0.45***	-2.11
Domain Expert (Source with High Reputation)* Presence of a Pinocchio Fake News Flag	-0.18	2.62
Federal Chancellery (Source with High Reputation)* Presence of a Pinocchio Fake News Flag	-0.19	3.24
High Quality Newspaper (Source with High Reputation)* Presence of a Pinocchio Fake News Flag	0.17	3.06

Table 1. Results for Believability and Time Taken. Note: Number of Subjects=118. Number of Observations=944. ***p < 0.001, **p < 0.01, *p < 0.05

Our analysis showed that participants correctly classified only 37% out of 944 observations. This result supports the results of the prior studies, e.g., Moravec et al. (2018c) reported lower believability for true headlines in their study.

An overall test of fixed effects showed that the presence of a Pinocchio fake news flag ($F=2.67$, $p=0.10$) only tended to affect the dependent variable believability. The source ($F=26.61$, $p<0.001$), the interaction effect of the presence of a fake news flag and the source ($F=2.86$, $p=0.04$) and the prior awareness ($F=100.07$, $p<0.001$) were significant influence factors for the believability, but the interaction effect of the presence of a Pinocchio fake news flag and prior awareness was not ($F=2.27$, $p=0.31$). The presence of a Pinocchio fake news flag lowered the believability of a post (EMM=2.72, Std. Error=0.12 versus EMM=2.84, Std. Error=0.12; weak support for H1a).

Concerning the information source, overall, facts stemming from different domain experts were trusted most, followed by the high-quality daily newspaper, the governmental organization, and the free low-quality newspaper with low reputation was trusted least (support for H1b). Figure 3 shows that the presence of a Pinocchio fake news flag lowered the believability of posts from all sources, except high-quality newspapers (support for H1c). A detailed look at how effective the presence of a Pinocchio fake news flag was for

different information sources revealed that a stronger effect was observed for the governmental organization and domain experts than newspapers. In the context of the high-quality daily newspaper, the results indicate that participants ignored the presence of a Pinocchio fake news flag added to the posts. This might be caused by a "backfire effect" (Nyhan and Reifler 2010), which means that conflicting information does not lead to a questioning of one's views, but even stronger support for the original opinion.

Furthermore, participants rated the believability of a post higher when they had higher prior awareness of the fact (EMM=3.10, Std. Error=0.12 versus EMM=2.46, Std. Error=0.12; support for H1d), thus have heard about the fact before.

Regarding the dependent variable time spent, neither the presence of a Pinocchio fake news flag (no support for H2a) nor the source was a relevant influence factor; the interaction effect of Pinocchio rating and the source was also not significant according to an overall test of fixed effects. Although the effect was not significant, the participants spent more time on average when they judged a case with a Pinocchio fake news flag (EMM=21.84, Std. Error=2.30) than without a Pinocchio fake news flag (EMM=20.17, Std. Error=2.28). Figure 3 suggests that Pinocchio fake news flags did not lead to a prolonged time spent for the low-quality newspaper (source with low reputation) – probably because it was not trusted anyway, and therefore cognitive dissonance was less likely to occur – but only for the other sources with higher reputation. (Although the interaction effect was not significant, it tended to be significant when using a dichotomous variable source with low/high reputation (F=3.55, p=0.06)).

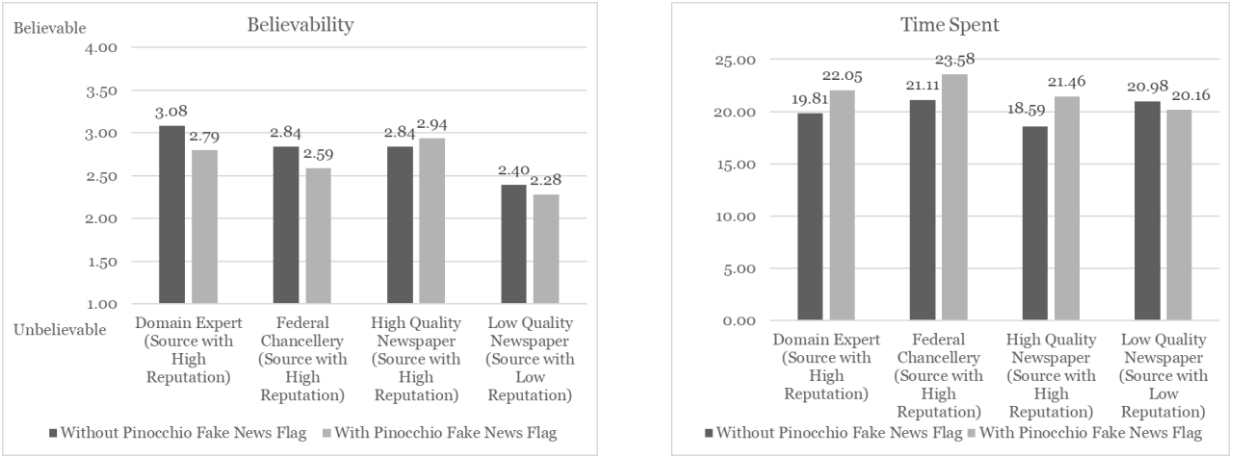

Figure 3. The Effect of Pinocchio Fake News Flags and Source (with High/Low Reputation) on Believability (Left) and on Time Spent (Right)

Planned Main Study

In the main study, we plan to carry out an experimental eye-tracking study to test our hypotheses. We will use a Tobii Spectrum eye-tracking device to control the visual attention for the Pinocchio fake news flag (to assure that it was noticed, which is a pre-requisite for effectiveness of any warning message (Conzola and Wogalter 2001)) and to measure the attention focus of participants on the source and other elements of social media posts. The lab setting will also make it possible to measure the response time more accurately and avoid potential interruptions. Based on the insights gained from the pre-study, we intend to use the presence of a Pinocchio fake news flag as a within-subject factor in the main study and add a control group without a specific publisher (posting without a logo and a neutral name, e.g., "Facebook user"). Another goal of our research is to generalize our findings for different types of fake news flags, which is why we want to compare three different fake news flags with each other, with the Pinocchio fake news flag being our baseline. We will use an exclamation mark sign as another fake news flag, similar to the flag Facebook used (Facebook 2016), and a stop sign, both utilized by Moravec et al. (2018a) as well. Furthermore, we want to identify more sources with a low reputation as we only included one in the pre-study.

Since we used a convenience sample in the preliminary study, in the main study, it would be necessary also to include participants under 19 and over 35 as well as different educational groups to ensure greater representativeness for the total population using social media. We further intend to include individual control

variables as cognitive styles (see, e.g., Haug and Gewald 2018), social desirability and adherence to social norms.

To mitigate the low intention of interacting with the posts (i.e., sharing) in the pre-study, we intend to choose topics in the main study, which are locally likely to spread as fake news. In Germany, social media users are more likely to notice fake news on topics such as refugees and immigration, US presidential elections, politics, crime, and violence (Bitkom 2017). One further limitation of our pre-study was that believability was measured on a single rating scale; in the main study, we, therefore, will measure believability with three 7-point items as proposed by Kim and Dennis (2018).

Conclusion

There is an ongoing debate about the need to regulate the quality of news in order to prevent fake news occurring on social media. It is crucial to develop powerful mechanisms to ensure effective communication and a healthy environment for constructive discourse. Our planned study seeks to adopt a critical stance towards existing fake news flags and their potential to influence the believability of social media posts. Fake news flags should encourage users to engage more critically with the information they receive and share through social networks. A central mechanism by which fake news flags function is cognitive dissonance. In this context, our research aims to provide an empirical contribution to a deeper understanding of cognitive dissonance in the detection of fake news. First results of our pre-study indicate that the reputation of news sources interacts with the effect of fake news flags. In other words, fake news should be exposed by credible sources; therefore, the presented fake news flags should also be generated by credible sources, such as news publishers with an established reputation.

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