

Fake News and Social Endorsement Cues: Do the Number of Likes,
Shares and Comments Influence Engagement with Inaccurate News
Articles?

Damla Ozdalga

Faculty Advisor: David Rand

Co-Advisor: Gordon Pennycook

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Abstract

In recent years, news consumption has systematically shifted from print to online platforms. With this shift, social media websites like Facebook have gained prominence as sources for news articles. As inaccurate news (*fake news*) has proliferated, the ability to judge the credibility of online information has become crucial, since misinformation can have detrimental effects on political processes. Our studies investigate how social endorsement cues, in the form of likes, shares, and comments, are used by social media news consumers to determine article credibility. In three online experiments, subjects were presented with news headlines and brief descriptions of articles in a format similar to what is seen on Facebook. The number of likes, shares and comments on each article was systematically varied, and the articles were balanced in terms of their political valence. Against expectations of an endorsement heuristic, the high number of likes did not lead to a significantly greater willingness to share or perceived accuracy for either fake (fabricated) or real (accurate) news articles. Additionally, there was no differential impact of the strength of social endorsement cues on willingness to share fake as opposed to real news items. Interestingly, no effect was found in the between-subject format while only a marginally significant effect was observed in the within-subject design, suggesting that social endorsement is not a robust signal of credibility of news posts on Facebook. Together, results suggest that social media users may be employing other methods such as analytical thinking as opposed to heuristics when assessing articles online. To the extent that heuristics are used, they do not appear to be based on social information.

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1. Introduction

Increased use of the internet has permanently shifted the way information is accessed. Recent data from the Pew Research Center show that the gap in news consumption through online versus offline sources like television has narrowed significantly, from 19% to 7% in just a year (Bialik & Matsa, 2017). One important issue related to online platforms is information overload (O'Reilly, 1980), in which users encounter more information than they can evaluate systematically. In situations like these, people have been shown to use heuristics, which are mental shortcuts used to form judgments and make decisions, to determine what information to pay attention to (Tversky & Kahneman, 1974). Heuristics are particularly valuable in determining the credibility of information, since people are motivated to select accurate information as efficiently as possible. Some attributes of information which can serve as heuristics in determining credibility are source (Iyengar & Hahn, 2009; Dou et. al., 2012), ideological content of information (Johnson & Kaye, 2010), website characteristics (Fogg et. al., 2003) and social endorsement cues (Sakamoto, 2010; Salganik, Dodds & Watts, 2006).

While these heuristics can sometimes lead to more efficient information processing, they can also lead to faulty decision-making regarding the accuracy of news headlines. Even though fake news has recently evolved in meaning due to its use by politicians to refer to news sources that do not support their position, this paper will use it to refer to news articles with deliberately misleading and inaccurate facts. If an online news consumer mistakenly believes a *fake news* article, they may share this piece of information with others, thereby perpetuating the falsehood. The resulting spread of misinformation can lead to a variety of suboptimal societal outcomes such as political manipulation and rejection of beneficial policy proposals (Flynn, Nyhan & Reifler, 2017) as well as loss in companies' stock values (Rapoza, 2017). Although other attributes such as valence and novelty also contribute to the decision to share a piece of information, credibility is a particularly prominent one

(Castillo, Mendoza & Poblete, 2011; Fragale & Heath, 2004). On top of this, use of social media has made it much easier to share news with one's peers. Research shows that most social media users may only pay attention to the informationally limited version of news articles on platforms like Facebook (Schäfer, Sülflow & Müller, 2017) and do not engage in fact-checking (DiFonzo, 2010); as a consequence, better understanding how credibility is determined in this context becomes paramount.

Social endorsement cues, which can be defined as an aggregate representation of the support of others, are salient components of online information and have been shown to influence credibility judgments (Sakamoto, 2010; Bond et. al., 2017; Salganik, Dodds, & Watts, 2006). Social influence theories suggest that people may use these cues in two situations: to make decisions in cases where ambiguity exists (*informational social influence*) and to make decisions that conform to social norms (*normative social influence*). While there is research to suggest that both can be motives to use social endorsement cues as a heuristic when evaluating information, there is also some evidence that social cues are not persuasive enough for people to change their attitudes on a given topic (Stephan, Caroline & Krämer, 2015). Since there is mixed evidence regarding how social information is incorporated into judgments made online, it is valuable to investigate its effects. Although there is evidence that social endorsement positively impacts credibility judgments, which is correlated with sharing behavior, there is much less information available on whether these cues have a direct effect on sharing decisions. Given the detrimental impact misinformation can have in a society, it is valuable to address this gap in literature by clarifying the scope of social endorsement effects and determining whether strong social endorsement cues lead to a higher mean willingness to share fake or real news articles.

Before describing the set of studies aiming to answer this question, I will provide an overview of how news consumption has shifted due to the move from print to online media, and

proceed to outline the common methods used in determining the accuracy of a piece of information. After this background, I will review the current research on the characteristics and impact of fake news, and discuss how social endorsement cues have served as an important heuristic to assess the credibility of news in online platforms.

1.1. Consumption of News in the Digital Age

The ease of producing knowledge online has lowered the barriers of entry into the news industry by decreasing the cost of producing and distributing articles, which, in turn, contributes to the drastic proliferation of information (Flaxman, Goel & Rao, 2016). Complementing this increase in information, there has also been a shift in the platforms used to consume news, as online sources gained prominence over television and print media. For their part, traditional news outlets have responded to this shift in media consumption preferences by creating online platforms in order to reach more individuals (Messing & Westwood, 2014).

People increasingly consume political news through social networking sites all around the world (Gottfried and Shearer, 2016; Hölig and Hasebrink, 2016). News consumption trends reflect the increased importance of online platforms: 28% of traffic to news sources come from dedicated websites or smart phone apps while 18% come from social media platforms. However, the gap between the usage of these two sources closes when it comes to the biggest stories of the year—48% of U.S. adults said that they received news regarding the 2016 presidential election from a news site or app, while 44% said that they acquired their news from a social networking site (Lu & Holcomb, 2016). Overall, a recent Pew survey (in Allcott & Gentzkow, 2017) finds that 62% of adults in the U.S. get some of their news from social media, with only 18% getting their news from social media “often,” 26% getting it “sometimes” and 18% getting it “hardly ever.” Facebook is the most cited social media source of news: just under half of Americans (45%) report getting their news on Facebook. It is important to note that many social media users get news from a variety of other

sources. For example, Facebook news users are likely to also get news from dedicated websites and apps or local TV (Gottfried & Shearer, 2017b). This shift to social media represents another fundamental change in consumption strategies where people can select news stories itself, as opposed to selecting a news source they come to trust. Since Facebook has become a dominant way in which individuals access news, organizations have become more active in spreading news posts via Facebook in addition to their own websites (Kümpel, Karnowski & Keyling, 2015). Interestingly, only 37% of adults using the internet trust the information they get from social media “some” or “a lot,” while this figure is 72% for national news organizations and 85% for local news organizations (Bialik & Matsa, 2017) [see *Figure 1*].

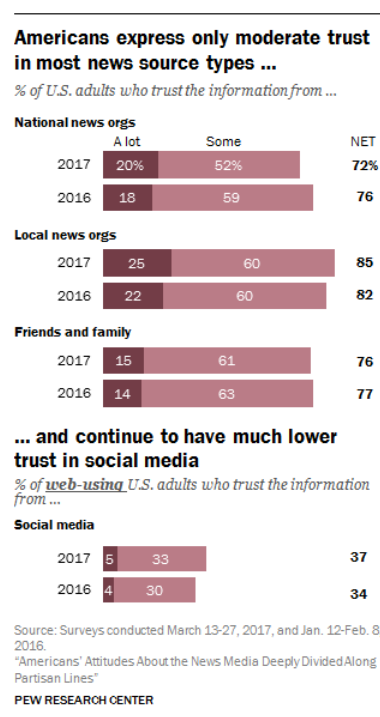


Figure 1. *Americans express only moderate trust in most news source types*

Despite trusting social media less, one of the reasons why consumers prefer online mediums for news delivery is that they can be highly selective about what kind of news content to consume (Althaus & Tewksbury, 2002). Indeed, research has shown that participants reading the online versus print format of the same news source attend to pieces of information and modify their agendas

differently (Althaus & Tewksbury, 2002). Additionally, some researchers have explored various ways in which people change their news consumption when reading articles online; notably, they found that readers filter content based on perceived ideological congruence (Iyengar & Hahn, 2009) or discard news consumption altogether in order to avoid politics (Prior, 2007). This was not surprising, since Americans have become increasingly polarized along partisan lines and have been ascribing political positions to media sources (Messing & Westwood, 2014).

Some suggest that the fragmented nature of internet inadvertently limits the diversity of information available. Experiments show that participants prefer news articles from sources that align with their own political views (Iyengar & Hahn, 2009; Flaxman, Goel & Rao, 2016), but there is mixed evidence regarding whether the consumption of news through online versus print sources leads to an *echo chamber* effect, whereby people are *only* exposed to articles that conform to their pre-existing beliefs (Althaus & Tewksbury, 2002; Messing & Westwood, 2014). Schmidt et. al. (2017) found that selective exposure plays a pivotal role in shaping the consumption of Facebook posts from news outlets such that users tend to confine their activity to a limited set of news pages, despite the wide availability of heterogeneous narratives. This finding lends credibility to the concern over social media forming homogenous clusters, as past studies have shown that selective exposure is the primary driver of content diffusion (Del Vicario, et al. 2016).

On the other hand, others have suggested that characteristics of social media have actually led to a greater exposure to diverse ideas (Pentina & Tarafdar, 2014). Most people with a Facebook account maintain both weak and strong relationships online and disagree with their network on political issues significantly more than they think (Goel, Mason & Watts, 2010). Brundidge (2010) found that social media sites also lower social boundaries and allow for contact between users who have opposing political views. Messing and Westwood (2014) found that social recommendation of Facebook-format articles had a significantly bigger impact on news selection than partisan source

labels do: participants preferred to read the articles that had the most social endorsement, as opposed to the ones that aligned with their political ideology. Interestingly, Republicans were more likely to utilize strong social endorsement cues when selecting articles than Democrats, which may be driven by the stronger degree of conformity found in Republicans versus Democrats. Since there is mixed evidence regarding social media's contribution to sustaining echo chambers, it is worthwhile to explore how social endorsement cues may impact consumption and sharing of politically discordant articles.

1.2. Methods to Determine Credibility of Online Information

Credibility refers to the extent to which a receiver considers information to be believable (Eisend, 2006). People employ various strategies to judge the credibility of a piece of information they encounter, considering factors like believability, accuracy, fairness, depth, trustworthiness, bias, completeness and reliability of the message and source (Johnson & Kaye, 2014). In traditional print media, the assumption related to credibility is that the editorial staff serves a “gatekeeper” role to ensure all information provided is accurate, and comes from sources with expert credentials (Allcott & Gentzkow, 2017). Although there exist tabloids that focus on gossip and prefer sensationalism over ensuring accuracy, most traditional newspapers take their responsibility to provide fact-checked information very seriously in order to maintain their reputation and the trust of their readers. However, the switch to online information dissemination shifted the gatekeeper role from news producers to news consumers (Johnson & Kaye, 2014). Thus, a common criticism of non-traditional web-based news sources is that it does not reach sufficient levels of factual substantiation or analysis. Furthermore, websites do not always have traditional indicators of expertise such as author identity or established reputation.

The circumstance encountered online, where a large amount of news arrives in too many different formats, can lead to *information overload* as well as a corresponding sub-optimal information

processing and decreased accuracy in determining credibility (O'Reilly, 1980). Strategies used to deal with information overload either focus on reducing the amount of information processed or increasing the effectiveness of processing (Pentina & Tarafdar, 2014). Reducing the information can include pruning and filtering information that is deemed unimportant or that creates dissonance with existing information; conversely, increasing the effectiveness of processing usually includes the use of heuristics (Pennington & Tuttle, 2007). Due to the limits on our cognition, people rely on heuristics to find an ideal balance between cognitive effort and efficient outcomes (Messing & Westwood, 2014; Tversky & Kahneman, 1974). Results from online experiments indicate that people routinely use cognitive heuristics to evaluate the credibility of information and sources, rather than systematically process information, in order to minimize cognitive effort (Metzger, Flanagin & Medders, 2010; Sundar, 2008).

There are two major categories of heuristics that may be used to determine credibility, as well as personal characteristics that come into play. The first category includes heuristics used when making credibility judgments regarding print media that would also apply to judgments made online. These would be based on source (Iyengar & Hahn, 2009) and the ideological valence of content in relation to the individual (Messing & Westwood, 2014; Chung, Nam & Stefanone, 2012). The second category includes heuristics that are relevant *only* in an online setting, such as website presentation and social endorsement cues. There is also some evidence for personal differences in critical reasoning (Pennycook & Rand, 2017), trust (Teun & Jan Maarteen, 2012), risk taking (Rafalak, Abramczuk & Wierzbicki, 2014), and experience with online platforms (Johnson & Kaye 2014) that impact credibility judgments.

Source information has been consistently presented as a common heuristic used to determine credibility, serving as a proxy of trustworthiness and expertise (Sundar, 2008; Dou et. al., 2012). It is important to note that other experiments found source recognition to be worse when the

same news is accessed through social media (52%) than when it is accessed through a news website (78%) (Bialik & Matsa, 2017). This suggests that source may not always be a cue evaluated by users, and implies that other types of heuristics specific to the online platform may be utilized more frequently.

A second important heuristic that influences credibility judgments comes from *motivated reasoning*. This is defined as a cognitive characteristic in which people “seek out information that reinforces their preferences (i.e., confirmation bias) and counter-argue information that contradicts their preferences (i.e., disconfirmation bias)” (Flynn, Nyhan & Reifler, 2017). Many experiments have shown that credibility of information is enhanced if it converges with the reader’s worldview rather than challenge it (Johnson & Kaye, 2010) or comes from other users that share their values and interests (Metzger, Flanagin & Medders, 2010), especially when people are searching for information about politics or current events. The elaboration likelihood model (ELM) developed by Petty and Cacioppo (1986) explains how motivated reasoning can be a hindrance to correctly determining credibility. When a piece of information is discordant with one’s beliefs, information seekers will pay more attention to information quality cues and perform more rigorous evaluation compared to cases when information is concordant and motivation is lower. Nevertheless, Pennycook and Rand (2017) show that motivated reasoning is mediated by analytical thinking, and in fact people are better at determining the accuracy of news that is consistent with their political ideology than those that are not.

The other category of heuristics, such as website presentation and social endorsement cues, is specific to the online platform. While technological characteristics like interactivity, hyper-textuality and multi-mediality were not found to be significant factors for credibility (Chung, Nam & Stefanone, 2012), Fogg et. al. (2003) found that consumers' predominant consideration was *site presentation*, which is comprised of the visual design elements of websites. Subsequent research has

revealed the strength of social endorsement cues as another robust rule of thumb. Individuals were found to rely on credibility assessment of others and harness collective intelligence to help evaluate information they encounter online (Sakamoto, 2010; Salganik, Dodds & Watts, 2006). The group-based information can either come through recommendations from others in an individual's network or through aggregated reviews and ratings (Metzger, Flannagin & Medders, 2010). For example, Garrett (2011) found that political news articles recommended over email by family or friends were more likely to be believed and shared with others than articles encountered on major news websites. The role of social endorsement cues will be explored in more detail in Section 1.4, but it is likely connected to the *bandwagon heuristic* (Sundar, 2008) where individuals believe that if many other people think something is correct, then it must be so. This effect can even overpower an individual's own first-hand information or impression about the information they encounter.

An important mediator of credibility judgments is the degree of familiarity an individual has with the internet. Some studies show that while social media sites are judged to be less credible overall due to a lack of *depth of content*, those who are more experienced in using online platforms for political information judge the internet as highly credible (Johnson & Kaye, 2004; 2014) and have learned which sources provide reliable news. Studies have also found that in online review communities like Yelp, a reviewer's profile elements such as number of friends and number of reviews impact the credibility given to the reviewer by Yelp users. However, these cues are only impactful when users are familiar with the platform, despite the website's intuitive nature, suggesting that there may be a learning curve to use these cues. The learning component is understandable from a social information processing theory perspective, which claims that people will adapt to employ available cues in the absence of nonverbal cues they can use (Walther, 1992).

Previous research has shown that many factors such as source, motivated reasoning, website characteristics, social cues, internet experience as well as some personal characteristics can influence

credibility judgments of news encountered online. Of all of these factors that contribute to credibility judgments, social endorsement cues have emerged as a particularly interesting feature that inform people's opinions. These types of cues are prevalent in social media, which is increasingly becoming an important platform for news consumption. Although these findings are helpful for understanding how people think about news on social media, there is a need for quantitative studies measuring the impact of social endorsement cues on accuracy judgments and decisions to share an article with one's network.

1.3. Current Research on Fake News

There is an expressed worry that the proliferation of internet news sources increases the threat of political manipulation through hearsay and falsehoods, leading the U.S. into a period of unparalleled rumoring (Garrett, 2011). In fact, the World Economic Forum recently identified the rapid spread of misinformation online among the top ten perils to society (World Economic Forum, 2014). Misperception is particularly dangerous for the stability of a democracy—past instances show that misinformation regarding political facts have had a negative impact on policy efforts. For example, confusion regarding “death panels” delayed Medicare coverage of voluntary end-of-life consultations with doctors, since misperception led to the provision being removed from the Affordable Care Act (Flynn, Nyhan & Reifler, 2017). Incorrect rumors also impact the stock market and people's investment outlooks, as evidenced by a false tweet claiming that Obama was injured in an explosion leading to a stock sell-off that resulted in the loss of \$130 billion in market capitalizations (Rapoza, 2017). If citizens make decisions based on false information and can't recognize or evaluate unverified information critically, the legitimacy of political and economic systems will be threatened.

Fake news websites exacerbate misinformation by deliberately publishing misleading, deceptive, or incorrect information and asserting it to be accurate news in order to gain a political or

economic advantage (Garrett, 2011; Allcott & Gentzkow, 2017). Social media plays a crucial role in the dissemination of news, and by virtue of its format, has made it much easier to rapidly spread inaccurate facts to many people (Starbird et. al., 2014; Howard et. al., 2018). Indeed, fake news sites often rely on social media to attract web traffic and drive engagement, which is apparent from a recent study indicating that 40% of fake news is consumed through social media while only 10% of real news is consumed through the same platforms (Allcott, & Gentzkow, 2017).

Perhaps more concerning is the fact that fake news tends to focus on political content. Many Americans (64%) believe fabricated news stories lead to confusion about basic facts regarding current issues and events, and a third of U.S. adults (32%) say they often see made-up political news online (Bialik & Matsa, 2017). A study conducted by Howard et. al. (2017) found that in Michigan, social media users shared a much higher proportion of sensationalist and politically-motivated fake news than they shared professionally researched political information. In addition to this, other research shows that the most popular fake news stories with political content were shared significantly more on Facebook than the most popular real political news stories, and the most discussed fake news stories tended to be pro-Republican (favoring Donald Trump over Hillary Clinton) (Silverman 2016). In fact, of the known fake news articles shared in the three months before the elections, the ones favoring Trump (N = 115) were shared 30 million times while the ones favoring Clinton (N = 41) were shared only 7.6 million times (Allcott, & Gentzkow, 2017). Swing states also had a higher proportion of fake news disseminated through Twitter compared to the national average, based on data analyzed from the first ten days of November 2016 (Howard et. al. 2018). Together, these findings signal a political motivation to manipulate social media users' understanding of public issues and demonstrate the substantial impact misinformation can have. In fact, some commentators have suggested that the influence of fake news played a significant role in Donald Trump's election (Read 2016; Dewey 2016).

Two of the most concerning factors about fake news is its reach and the impact of repetition. Valence and credibility have also been found to be particularly important factors in how information spreads (e.g., Castillo, Mendoza, & Poblete, 2011; Fragale & Heath, 2004; Ha & Ahn, 2011; Heath, 1996). For example, when a rumor comes from a credible source, people are more likely to believe that rumor (Blake, McFaul, & Porter, 1974), which in turn can increase the sharing of the rumor (DiFonzo & Bordia, 2007; Li & Sakamoto, 2013). Similarly, experiments show that fake news spreads due to the novel, surprising and high-valence nature of its content—characteristics which have also been shown to influence sharing decisions (Kümpel, Karnowski & Keyling, 2015; Vosoughi, Roy & Aral, 2018). Interestingly, the impact of valence on sharing was higher for fake news containing political information as opposed to those covering other content such as science, natural disasters or financial information (Vosoughi, Roy & Aral, 2018). On the other hand, Pennycook and Rand (2017) found that people are generally less willing to share fake news than real news when making a case-by-case decision, despite the differences in valence and novelty, which other researchers found to be crucial for the faster dissemination of fake news articles relative to real ones.

Additionally, even a single exposure to a fake news article can make people more likely to believe that article in subsequent exposures (Pennycook, Cannon & Rand, 2018). This prior-exposure effect persists even when the articles in question have a label saying they are contested by fact checkers, or when they are discordant with the reader's political ideology. Coupled with the fact that fake news tends to spread faster and farther (Vosoughi, Roy & Aral, 2018), the impact of repetition on credibility judgments becomes a significant problem, and implies that low level cognitive processes and heuristics may be present in the evaluation of fake news (Pennycook, Cannon & Rand, 2018).

It could be argued that the threat of fake news is not substantial because people can fact-check information online—verifying articles using websites such as Politifact.com or Snopes.com. However, research finds that most people do not engage in fact-checking, especially for articles that have ambiguous accuracy and that are identity-consistent with the reader (DiFonzo, 2010; Flanagin & Metzger, 2007). This is because misperceptions regarding political facts could be rooted in directionally motivated reasoning (Flynn, Nyhan & Reifler, 2017) where people evaluate discrepant information more critically than consistent ones. Bakshy, Messing, and Adamic (2015) found that only 18-20% of a person's social network is comprised of friends and family who hold the opposite ideology. Furthermore, people were more likely to share and read articles that are consistent with their own political ideology, supporting the echo chamber theory. Indeed, Schmidt et. al. (2017) developed a model of preferential attachment to specific sources that could predict the community structure created between users and news channels by analyzing interaction of 376 million users with news outlets on Facebook. Presenting this as evidence for selective exposure, they suggest that a driver of misinformation is user polarization on certain topics as opposed to a lack of fact-checking, which is consistent with research on the diffusion of conspiracy theories (Del Vicario, 2016).

A significant body of research has investigated what characteristics pre-dispose people to be able to distinguish fake from real news. Allcott and Gentzkow (2017) found that education, age, and total media consumption are strongly associated with more accurate beliefs about whether headlines are true or false. Respectively, Democrats and Republicans were 17.2% and 14.7% more likely to believe ideologically aligned news headlines, including both real and fake ones. This effect was far stronger in people with ideologically segregated social media networks (Allcott & Gentzkow, 2017). Additionally, people with a propensity to think analytically (as measured by higher CRT scores) are better at discerning fake from real news (Pennycook & Rand, 2017), regardless of the article's alignment with their political ideology. In fact, when an article was concordant with one's political

ideology, participants were *better* at distinguishing fake from real news. Trump supporters were also less able to discern fake from real news compared to Clinton supporters.

There has also been a proliferation of popular news articles providing tips on distinguishing fake from real news and aiming to educate users on determining credibility of information (Davis, 2016). Research that aims to use machine learning to detect fake news articles has proliferated (Conroy, Rubin & Chen, 2015), and some entrepreneurs have created a Google Chrome browser plug-in that would help users distinguish fake news (King, 2017). Given the increased attention on this topic, the results of this study may inform further actions taken to help people improve their discernment of what is real news and what is not.

1.4. Role of Social Endorsement Cues in Social Media News

It is important to first establish the common perceptions around *why* people provide social cues. An interview-based study found that people use the *Like* button for three main reasons: (1) to acknowledge the gratifications obtained with the use of Facebook, (2) to share information about oneself with others, and (3) as a tool for impression management (Ozanne et. al., 2017). They found that 54% of posts from public pages were liked with the intention to share information with one's network, suggesting that the number of likes can serve as one of the underlying ways in which people communicate what information is worth taking note of (Ozanne et. al., 2017).

As previously stated, finding credible information has become more challenging in the age of social media due to information overload and the large number of available sources. Since readers have limited time and attention to decide what to read, heuristics have become important in determining what to focus on amongst the many options. The increased consumption of news through social media highlights the importance of social endorsement cues to determine what news is worth reading (Messing & Westwood, 2014), demonstrated by many news sources providing aggregate popularity ratings (O'Reilly, 2007) and highlighting the most popular news articles on their

homepage. For example, Facebook counts the number of likes given by its users to indicate combined liking of a photo, story, community page, and so on. News organizations have sought to facilitate the dissemination of content by adding social networking functionality to websites, encouraging users to “like” or “tweet” a story (Hermida et al., 2012). Collective opinion is also present in Twitter, through the ability to retweet or favorite tweets; likewise, many websites like Yelp or Amazon provide a star rating system to reflect the aggregate evaluation of users. Given the abundance of social endorsement cues online, research in the past decade has tried to situate the impact of these cues within existing social frameworks.

It is well-established that individuals are influenced by the actions and opinions of people around them and respond to social pressures such as persuasion, peer pressure, and conformity. Theories of social influence focus on the questions of why and under which conditions individuals’ behavior can be influenced by those around them (Kümpel, Karnowski & Keyling, 2015). Many studies have replicated the finding that people tend to think of others as having information that they themselves do not have, and often follow the behavior of others to eliminate ambiguity and establish subjective validity (Cialdini & Goldstein, 2004; Deutsch & Gerard, 1995; Flanagin & Metzger 2013). According to Latané’s social impact theory (1981), the strength, immediacy, and number of people determine the degree of social impact. Thus, if an opinion is endorsed by an influencing group that meets the criteria of having many members, being close to the individual, and being valued by the individual, this opinion will have a stronger social impact. From the perspective of social media, this suggests that people will pay attention to the collective opinion signaled by large numbers of people in their network.

Since people tend to engage in similar activities as their peers, social influence is believed to play a critical role in recognizing, adapting, and sharing news content. Because of this, theories of social influence are often used to understand the impact of constructs like homophily—where

individuals tend to associate with those similar to themselves—on news sharing behavior (Kümpel, Karnowski & Keyling, 2015). Research on social impact has identified *informational social influence* and *normative social influence* as two common models under which people follow the majority opinion. Informational social influence takes place when people follow the opinion of others due to their desire to respond correctly under uncertainty (Sherif, 1935; Edwards et. al., 2013). On the other hand, normative social influence is present when people follow others' opinion due to their desire to follow established norms and be liked by others (Asch, 1955). With this framework around social impact theories in mind, experiments have explored how social information influences online behaviors in particular. Overall, studies suggest that both models of social influence can be present in different online contexts.

Research into the phenomena of *wisdom of the crowds* discovered that individuals who have little prior knowledge were more sensitive to using social information (i.e., the collective opinion of others) when making an estimation. Individuals with higher prior knowledge, however, were more sensitive to social information only if the difference between the collective opinion and their personal estimation was high (Jayles et. al., 2017). Likewise, another study found that the popularity of different songs, unless considered objectively good or bad by a majority, varied depending on whether or not people knew the number of downloads it had (Salganik, Dodds & Watts, 2006). Taken together, these results lend support to the informational social influence theory.

On the other hand, further studies have found that social cues are used ubiquitously and serve as a heuristic regardless of concordance or ambiguity, providing support for the normative theory of social influence (Lünich, Rössler & Hautzer, 2012). In a social media environment, people liked the same story more when it had many supporters than when it only had a few, and they switched their support when the experimenter inverted the number of supporters (Sakamoto, 2010). Li and Sakamoto (2014) found that showing participants a score for the collective likelihood of

sharing a statement positively influences participants' own sharing intention for that statement. Moreover, this effect was present for health-related statements that were pre-tested as true as well as those that were debatable or false. This is a particularly convincing piece of information because it demonstrates that people consider others' collective opinion and sharing patterns in both debatable *and* definitive cases, suggesting that social cues may be used robustly in cases beyond ambiguous ones. In summary, social cues can be used as a heuristic to inform credibility judgments and sharing behavior but there is mixed evidence in terms of its impact, which can vary depending on what informational or normative context is present.

There has also been some evidence that suggests social endorsement cues may not be a robust heuristic in convincing people to change an opinion. An experiment by Stephan, Caroline and Krämer (2015) explored how comments and number of likes on a Facebook news post impacts readers' attitudes. The researchers found that negative comments had a significant persuasive impact, while positive comments had none. Against the prediction of a bandwagon effect, the number of likes did not have a persuasive impact on the readers. An important component of this study, however, was that readers exclusively looked at articles from reputable news sources. The second notable difference between that experiment and the ones presented in this paper is methodological: Stephan, Caroline and Krämer (2015) showed participants a blurb, followed by full articles, as opposed to solely exposing participants to the distinctive format found online. News posts on Facebook have a unique structure which has been dubbed *snack news*—a restricted format that displays a headline, picture, source, teaser of the news story, and social endorsement cues such as likes and shares (Schäfer, Sülflow & Müller, 2017). Even though some argue that the *snack form* is usually a starting point before an in-depth news consumption aimed at gaining knowledge, Meijer and Kormelink (2014) suggest that people may try to get a basic overview of the day's events by

scanning headlines, without reading the full news stories behind posts. The existence of this type of news consumption is supported by empirical evidence (Lin et. al., 2005; Hermida et. al., 2012).

It is likely that heuristics play an important role in people's cognition of online news, considering that there is a prior-exposure effect associated with fake news articles (Pennycook, Cannon & Rand, 2018). The tendency of people to be satisfied with the *snack* version of articles instead of reading the full length version increases the possibility that social information may serve as a heuristic to judge the credibility of an article, since it is one of the few pieces of information present in this format. However, findings by Pennycook and Rand (2017) show that patterns of accuracy judgments for fake news articles that are either politically concordant or discordant support the hypothesis that participants use analytical reasoning, as opposed to heuristics. Their research suggests that a motivated reasoning account of online news consumption may not be fitting when it comes to discerning the accuracy of fake news. Additionally, it is less clear what role motivated reasoning plays in sharing decisions in particular—based on the salience of social information in this context, there may be an interaction between the endorsement cues and article concordance. Given the mixed evidence regarding the impact of social information, the set of experiments described in the next section hopes to shed light onto the debate on whether people use a social heuristics-based strategy to process *snack news* on Facebook (either in a *normative* or *informational* fashion), or if they instead use a systematic method.

In addition to accuracy judgments, better understanding the dissemination of news articles is particularly interesting since studies mentioned in Section 1.3 show that inaccurate news articles tend to be shared more widely. As mentioned before, valence and arousal associated with an article, as well as how interesting it is, impacts the likelihood of being shared. Other experiments find that desire to propagate information is a primary driver of online sharing behavior (Kümpel, Karnowski & Keyling, 2015). Some researchers have used the *diffusion of innovations* theory to explore the

influence of different factors that operate on the individual, network and news attribute levels (Long, Chei, & Dion, 2014) on news sharing. Of these factors, self-perception of opinion leadership, perceived tie strength in online networks, and preferences for online news had a significant impact on users' intentions to share news on social media. However, opinion seeking, homophily, and perceived news credibility did not have a significant impact (Long, Chei, & Dion, 2014). This surprising result can be attributed to the methodology of the study: news credibility was measured by asking subjects their general judgments of news on social media, as opposed to collecting evaluations for specific news articles. Thus, we give credence to the experimental studies mentioned in the previous section which found credibility to be a factor that influences sharing decisions (Sakamoto, 2010; Salganik, Dodds, & Watts, 2006; Sundar, 2008; Metzger, Flannagin & Medders, 2010).

2. The Current Experiments

Although social endorsement cues can serve as a valuable source in instances where the user lacks information, it is important to remember the distinction between the popular opinion and correct information. The spread of inaccurate facts can lead to political polarization, which is to the detriment of individuals in a society. Relatedly, social endorsement cues appear to play a role in credibility judgments and past experiments show that accuracy judgments and sharing preferences are strongly correlated (Li & Sakamoto, 2014). However, less research has looked into whether there is a direct role of social information on people's sharing decisions. Thus, our study aims to explore the strength of this effect, if any, for online news articles shared on Facebook. Examining people's sharing behavior is important because it influences the spread of information and, ultimately, the overall quality of information on social media. If strong social endorsement cues contribute to the dissemination of fake news (which are not credible but have high-valence elements), we will need to critically evaluate the value of these signals and identify methods to shift user attention to other features of online news articles. If these cues are not salient factors that contribute to the spread,

then we come a step closer to identifying what *other* features of these articles may be influencing people's sharing decisions.

The theoretical social influence frameworks that were highlighted in the previous section imply two potential hypotheses that can guide our examination of the extent to which social endorsement cues have an impact. Although there could be a number of factors that influence sharing decisions, we believe that these main hypotheses present a theoretically sound structure to inform our analysis of social cues.

Hypothesis 1: Regardless of the ambiguity or political concordance, participants will attend to the social endorsement cue and use it as a heuristic to decide which articles to share [*normative social influence*].

Hypothesis 2: When there is ambiguity regarding the accuracy of an article, such as in the case of fake news articles, participants will be more likely to use social endorsement cues [*informational social influence*].

It's worth noting that there may be no significant impact of social endorsement cues, perhaps because participants tend to use other heuristics or analytical thinking when evaluating credibility and determining their willingness to share articles. In addition to these possibilities, our secondary analysis will explore whether there is a differential impact of social endorsement cues on people who have different political ideologies. We would also like to explore if there is an interaction between social endorsement cues and political concordance, on participants' willingness to share. There is mixed evidence in literature regarding the effect of political concordance of articles: some researchers find that subjects employ analytical thinking to discern the credibility of politically concordant information (Pennycook & Rand, 2017) while others suggest that concordant information is evaluated less critically and shared more widely (Johnson & Kaye, 2010; Allcott & Gentzkow, 2017; Flynn, Nyhan & Reifler, 2017; Bakshy, Messing, & Adamic, 2015). Both cases

suggest that there would be a significant effect of political concordance on accuracy judgments, but due to different kinds of information processing mechanisms (analytical v. heuristic). It is less clear in which direction, if any, social endorsement cues may impact the predicted effect of concordance. Thus, if there is a main effect of social information, another interesting result would be to examine if social cues interact with concordance.

In the first study, we presented participants with both fake and real news articles and asked for their willingness to share each article, presenting each condition with articles that had only one strength of social endorsement cues, either weak or strong, which will be defined in the Methods section. In the second study, we presented participants the same articles and kept the same social endorsement cue conditions, but asked for their judgments of accuracy instead. In the third study, we presented participants with both fake and real news articles and asked for their willingness to share each article, but used a within-subject design where each participant was exposed to a set of articles that had varied strengths of social endorsement cues.

2.1. Study 1 – News Sharing, Between Subject

2.1.1. Methods

2.1.1.1. Participants

A total of 610 participants were recruited from Amazon's Mechanical Turk platform and responded to our survey online. Of these, 25 participants did not have a Facebook account and thus did not proceed with the survey. After the participants who indicated that they would not be willing to share political content on Facebook ($N = 275$) were removed, we had a total of 310 participants left with complete responses. Regarding the demographic characteristics of our remaining subjects, 182 were female (59%) and 128 were male (41%). Of all the participants, 259 (86%) had an education level between high school graduate and a Bachelor's Degree. The mean age of participants was 35 [range: 19—73].

When asked about their party affiliations, 132 (43%) indicated that they identify as a Democrat, while 70 (23%) identified as a Republican and 96 (31%) identified as Independent. The remaining 12 people (4%) either gave other answers or refused to answer. Given a forced choice between Hilary Clinton and Donald Trump, 189 (61%) indicated that they would prefer Hilary Clinton as President of the U.S. and 120 (39%) indicated that they would prefer Donald Trump, while one person did not answer. Given a forced choice between the Democratic and Republican parties, 194 preferred the Democratic party (63%) and 115 preferred the Republican party (37%), while one person did not answer. Self-reported data indicated that 214 participants (69%) use Facebook “daily,” while 81 (26%) use it one to six times a week. We also asked participants how much they trust various sources of information. In line with past research, the following proportions of people indicated that they trust the sources “a moderate amount,” “a lot” or “a great deal”: friends and family (88%), local news (86%), national news (62%), and social media (21%). Each subject received \$0.60 for completing the survey.

2.1.1.2. Materials and Procedure

We presented participants with twenty-four news articles where twelve news headlines were factually accurate (*real news*) and twelve were entirely untrue (*fake news*). The fake news headlines were selected from Snopes.com, a third-party website that fact-checks news stories. The real headlines were contemporary stories from mainstream news outlets (see the Appendix for examples of fake and real headlines used). Moreover, both fake and real news items were balanced politically, with half being Pro-Democrat and half Pro-Republican (based on a pretest). All of the articles were also pre-tested to ensure that there were no confounds related to article content and characteristics that would influence our results (see Pennycook & Rand, 2017b for details; same articles were used). The headlines were presented in an identical format to that of Facebook posts (i.e., a headline with an associated photograph above it and a byline and source below it; see Appendix for examples).

Following Pennycook and Rand's past experimental paradigms, we also focused on judgements about news *headlines*, as opposed to full articles, because much of the public's engagement with news on social media involves only reading story headlines (Gabiello, Ramachandran, & Chaintreau, 2016).

First, subjects were asked if they have a Facebook account—since our study explores the effects of social information present in news items shared on social media, subjects that indicated they do not have a Facebook account ($N = 25$) did not continue with the survey. Subjects were divided up into the following 3 between-subject conditions: (1) weak strength condition where they only saw articles with less than 20 likes, shares and comments, (2) control condition where they saw no social endorsement cues, and (3) strong strength condition where they only saw articles with more than 1,000 likes, 500 shares and 500 comments. These numerical values were determined to be a common co-occurrence of likes, shares and comments for news articles on Facebook, and the specific numbers were chosen based on observations from Facebook pages of traditional news sources (e.g., NYTimes, Fox, USA Today, MSNBC) for articles with high and low popularity. The values in the weak strength condition were accompanied by a thumbs up icon for *Like*, while the strong strength condition was accompanied by a combination of icons for *Like*, *Love* and *Wow* since most articles with more than a thousand likes include three icons, and the aforementioned ones have a lower emotional salience than the other options presented on Facebook (i.e., *HaHa*, *Sad* and *Angry*). These stimuli were created using Adobe Photoshop. Each fake and real news article was counterbalanced such that there was a weak strength, control, and strong strength version of each article photoshopped. Thus, the same articles were shown in each condition, presented in a randomized order for each participant.

After seeing each article, participants were asked the following question: “If you were to see the above article on Facebook, how likely would you be to share it?”. They responded on the

following scale: 1 (extremely unlikely), 2 (moderately unlikely), 3 (slightly unlikely), 4 (slightly likely), 5 (moderately likely), 6 (extremely likely).

Participants also completed seven items from two different versions of the Cognitive Reflection Test (CRT), which was included as an exploratory variable. First, they received a reworded version of the original Frederick (2005) CRT (via Shenhav, Rand & Greene, 2012). Second, we administered the 4-item non-numeric CRT from Thomson and Oppenheimer (2016). The two versions were significantly correlated, $r(309) = .43$ ($p < 0.01$).

Participants also completed the fear of negative evaluation (FNE) scale, which evaluates the feelings of apprehension about others' evaluations, distress over these negative evaluations, and the expectation that others will evaluate one negatively (Watson & Friend, 1969). This scale is closely related to social anxiety in that it captures the sense of dread associated with being evaluated unfavorably in social situations. The social information conveyed in news articles may have a differential impact on participants who care more about what others think of them, which is a tendency that would be captured by the FNE scale and makes this a relevant exploratory variable to include.

The last section of the survey included demographic questions. These included age, sex, education, proficiency in English, stance on God, political party (Democratic, Republican, Independent, other), political ideology with respect to economic and social issues, and three questions about the 2016 election. In the first questions, participants were asked to indicate who they voted for, given the following options: Hillary Clinton, Donald Trump, Other Candidate (such as Jill Stein or Gary Johnson), I did not vote for reasons outside my control, I did not vote but I could have, and I did not vote out of protest. Participants were then asked "If you absolutely had to choose between only Clinton and Trump, who would you prefer to be the next President of the

United States?”. They were also asked “If you absolutely had to choose between only the Democratic and Republican party, which would do you prefer?”

Participants were asked about their attitudes towards the role of media and how much they trust the information that comes from different sources such as national news organizations, local news organizations, friends and family, and social networking sites. They also indicated how much they and their friends care about sharing accurate news articles on Facebook. The CRT, FNE, demographic and media related information were collected as exploratory variables and were not included in the preregistration for these set of experiments. Therefore, the analysis will not be focusing on these factors, but their role can be explored in future work.

2.1.2. Results

The planned analysis on the collected data was preregistered before the experiment was run, which can be found in the Appendix. Accordingly, we ran a mixed design ANOVA with mean willingness to share for both fake and real news items as repeated measures, and the condition (weak strength, control, and strong strength) as a between subject factor. In line with past findings (Pennycook & Rand, 2017), we found a main effect of type of news item ($F(1, 307) = 31.037$, $MSE = 14.616$, $p < .001$) such that participants were significantly less willing to share fake news articles ($M = 2.39$, $SD = 1.16$) than real ones ($M = 2.70$, $SDS = 1.06$). However, there was no main effect of condition ($F(2, 307) = 0.773$, $MSE = 1.543$, $p = 0.462$) and no significant interaction between condition and news type ($F(2, 307) = 1.408$, $MSE = 0.663$, $p = 0.246$). For each condition, the mean willingness to share fake and real news items and standard deviations can be found in Table 1.

We also ran a larger ANOVA as a secondary analysis, with the following factors: social endorsement cue condition (weak strength, control, and strong strength), news item type (fake, real), news item valence (Pro-Democrat, Pro-Republican) and political ideology of the participant (Democrat, Republican). The mean willingness to share for each type of news can be found in

Figure 2. There was no significant main effect of condition, $F(2, 303) = 0.740$, $MSE = 2.923$, $p = 0.478$, but there was a significant main effect of participant's political ideology, $F(1, 303) = 4.639$, $MSE = 18.330$, $p = 0.032$ such that Republicans ($M = 2.69$, $SD = 1.0$) were more willing to share news articles than Democrats ($M = 2.45$, $SD = 0.99$) and there was a significant main effect of type of news, $F(1, 303) = 26.948$, $MSE = 25.150$, $p < 0.001$. We also found a significant interaction of condition with valence ($F(2, 303) = 3.052$, $MSE = 2.931$, $p = 0.049$), such that there was a larger impact of social endorsement cues for Pro-Democrat news. Follow-up tests revealed that this effect was driven by lower sharing of Pro-Democrat news in the control condition ($M = 2.49$, $SD = 1.20$) relative to the strong strength ($M = 2.87$, $SD = 1.16$) condition, $t(203) = 2.342$, $p = 0.020$. Additionally, all other interactions that included condition were nonsignificant (see the Appendix for a table of the results).

Condition	Type	Mean	Standard Deviation
<i>Weak</i>	Fake News	2.40	1.17
	Real News	2.68	1.07
<i>Control</i>	Fake News	2.24	1.17
	Real News	2.67	1.05
<i>Strong</i>	Fake News	2.53	1.14
	Real News	2.74	1.06

Table 1. Overall mean willingness to share the indicated type of news item in each condition and standard deviations from Study 1. Willingness to share is measured on a scale from 1 to 6.

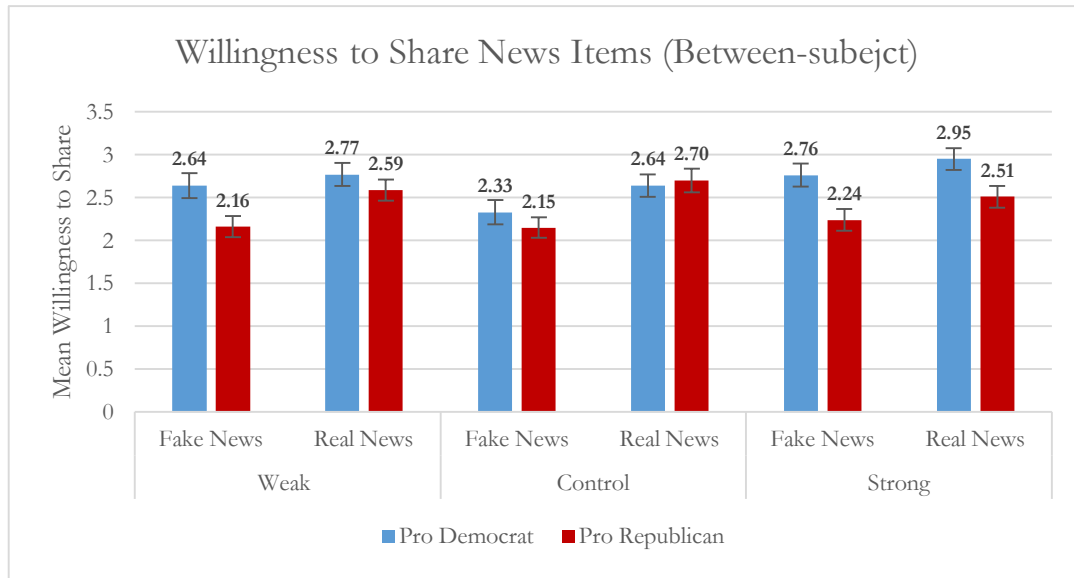


Figure 2. *Mean willingness to share the indicated type of news item in each condition from Study 1. Willingness to share is measured on a scale from 1 to 6.*

2.1.3. Discussion

Overall, these initial results suggest that there is neither a differential effect of social information on participants' willingness to share fake versus real news items (predicted by the informational social influence theory) nor a more general impact of social endorsement cues (predicted by the normative social influence theory). Additionally, although not central to this experiment's main question, the significant effects found regarding news type and political ideology were in line with past findings (Pennycook & Rand, 2017; Allcott & Gentzkow, 2017). The potential effects we found regarding social endorsement cues were unexpected, however, due to the low sample size, we don't have sufficient power to have confidence in the pattern of results regarding the observed interaction between condition and valence.

Since there was no main effect of condition, the results suggest that social information may not significantly impact willingness to share news articles. However, it is possible that willingness to share does not reflect people's judgments regarding the accuracy of news article fully. At this point,

it is difficult to draw a conclusive answer from these findings, as social cues could still be influencing credibility judgments while other factors drive attitudes towards sharing political content, such as currency, valence or desire to signal information about oneself. On the other hand, past experiments demonstrate that there is a direct impact of social cues on credibility judgments (Li & Sakamoto 2014; Pentina & Tarafdar 2014); thus, it would be interesting to explore if this effect is present in the context of our studies. In Study 2, we address this possibility by directly looking at whether accuracy judgments themselves differ across conditions with varying strengths of social endorsement cues.

2.2. Study 2 – Accuracy Judgments, Between Subject

2.2.1. Methods

2.2.1.1. Participants

A total of 629 participants were recruited from Amazon's Mechanical Turk platform and responded to our survey online. Of these, 32 participants did not have a Facebook account and thus did not proceed with the survey. Regarding the demographic characteristics of our remaining subjects ($N = 597$), 373 were female (63%) and 219 were male (37%), while five did not answer. Of all the participants, 509 (85%) had an education level between high school graduate and a Bachelor's Degree. The mean age of participants was 35 [range: 18—73].

When asked about their party affiliations, 229 (38%) indicated that they identify as a Democrat, while 132 (22%) identified as a Republican and 203 identified as Independent (34%). The remaining 33 (5%) gave other answers. Given a forced choice between Hilary Clinton and Donald Trump, 372 (62%) indicated that they would prefer Hilary Clinton as President of the U.S. and 224 (38%) indicated that they would prefer Donald Trump, while one person did not answer. Given a forced choice between the Democratic and Republican parties, 365 preferred the Democratic (61%) party and 231 preferred the Republican party (39%), while one person did not answer. Self-reported

data indicated that 382 participants (64%) use Facebook “daily,” while 136 (23%) use it one to six times a week. Each subject received \$0.60 for completing the survey.

2.2.1.2. Materials and Procedure

We presented participants with the twenty-four news articles used in Study 1, where twelve news headlines were factually accurate (*real news*) and twelve were entirely untrue (*fake news*). Items were balanced politically, with half being Pro-Democrat and half being Pro-Republican. After being asked if they have a Facebook account and excluding those that did not ($N = 32$), participants were randomly assigned to 3 conditions: (1) weak strength condition where they only saw articles with less than 20 likes, shares and comments, (2) control condition where they saw no social endorsement cues, and (3) strong strength condition where they only saw articles with more than 1,000 likes, 500 shares and 500 comments. The counterbalancing was identical to Study 1, such that there was a weak strength, control and strong strength version of each article. Each condition saw either the weak, control or strong version of the articles and the order was randomized for every participant.

After seeing each article, participants were asked the following question regarding accuracy: “To the best of your knowledge, how accurate is the claim in the above headline?”. They responded on the following scale: 1 (not at all accurate), 2 (not very accurate), 3 (somewhat accurate), 4 (very accurate). The order of the news items was randomized for each participant.

Participants completed the CRT and FNE tasks that were included in Study 1. They also ended the survey by answering the demographic, media and accuracy related questions that were included in Study 1. Both sets of information were collected for exploratory purposes.

2.2.2. Results

We preregistered our primary analyses, which can be found in the Appendix. We ran a mixed design ANOVA with accuracy judgment for both fake and real news items as repeated measures, and the condition (weak strength, control, and strong strength) as a between-subject factor. For each

condition, the mean judgments of accuracy for fake and real news items and standard deviations can be found in Table 2. Contrary to our hypothesis, we found no main effect of condition on judgments of accuracy of the two types of news items ($F(2, 594) = 0.022$, $MSE = 0.004$, $p = 0.979$). Similar to Study 1, there was a main effect of the type of news, $F(1, 594) = 2881.67$, $MSE = 521.495$, $p < 0.001$, but no significant interaction between news type and condition, $F(2, 594) = 0.908$, $MSE = 0.164$, $p = 0.404$.

We also ran the secondary analysis that had been preregistered with the following factors: social endorsement cue condition (weak strength, control, and strong strength), news item type (fake, real), news item valence (Pro-Democrat, Pro-Republican) and political ideology of the participant (Democrat, Republican). The mean judgments of accuracy for each news type can be found in Figure 3. There was a significant difference between the accuracy judgments for Pro-Democrat ($M = 2.18$, $SD = 0.85$) versus Pro-Republican ($M = 2.25$, $SD = 0.84$) news items ($F(1, 590) = 50.240$, $MSE = 9.490$, $p < 0.001$) as well as a significant difference between the accuracy judgments for fake ($M = 1.56$, $SD = 0.42$) versus real ($M = 2.86$, $SD = 0.43$) news items ($F(1, 590) = 2722.986$, $MSE = 956.925$, $p < 0.001$). However, there was no significant effect of condition on judgments of accuracy ($F(2, 590) = 0.082$, $MSE = 0.029$, $p = 0.922$) and neither did we find a significant interaction effect between condition and type of news item ($F(2, 590) = 1.278$, $MSE = 0.449$, $p = 0.279$) nor between condition and valence of news item ($F(2, 590) = 0.070$, $MSE = 0.013$, $p = 0.933$). The three-way interactions that include social endorsement cues were also nonsignificant (detailed results can be found in the Appendix). These results mirror our findings from Study 1 such that there was no significant effect of social information on participants' judgments of accuracy of fake versus real news items, nor was there a significant interaction effect that includes social endorsement cues.

Condition	Type	Mean	Standard Deviation
<i>Weak</i>	Fake News	1.58	0.44
	Real News	2.86	0.42
<i>Control</i>	Fake News	1.54	0.42
	Real News	2.88	0.42
<i>Strong</i>	Fake News	1.54	0.41
	Real News	2.89	0.44

Table 2. Mean judgments of accuracy for each type of news item and standard deviations from Study 2. Accuracy is measured on a scale from 1 to 4.

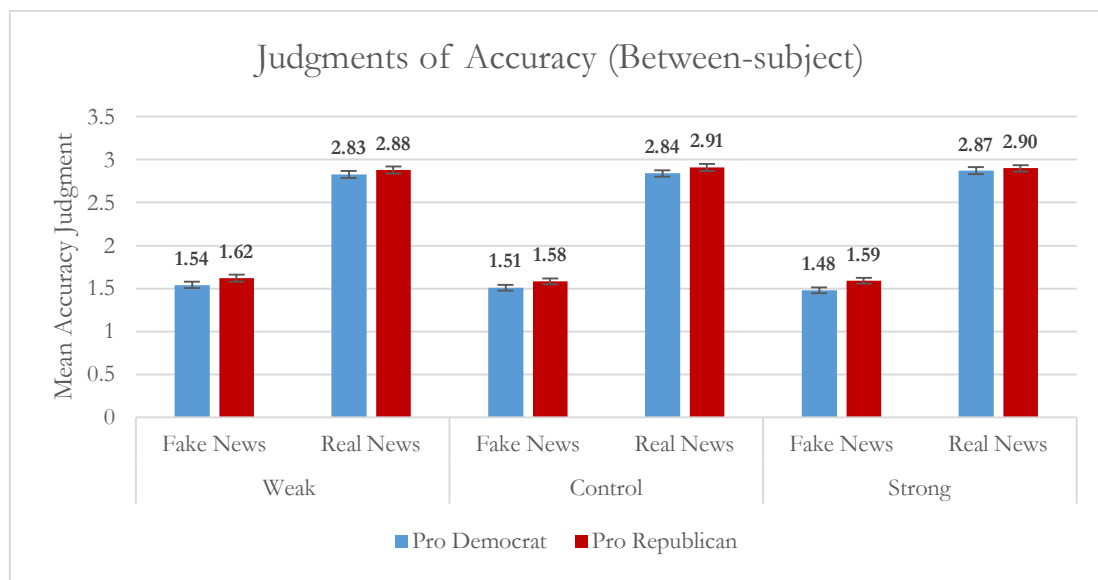


Figure 3. Mean judgments of accuracy for each type of news item from Study 2. Accuracy judgments are measured on a scale from 1 to 4.

2.2.3. Discussion

Both these experiments show that social endorsement cues are not robust enough to have an impact on people's perceptions of accuracy or willingness to share news on social media. Our findings were similar to those of the previous study in terms of significant differences between judgments for fake versus real news and a lack of significant difference related to condition. Neither

was there any interaction between the social endorsement cue condition and other factors in our analysis, such as valence, type of news or political ideology of participant.

The above results do not mean that social information has no effect per se, as there could still be an impact when different strengths of social endorsement cues are presented side by side. Due to this possibility, our third experiment was designed to explore whether social information has any impact on willingness to share in a within-subject context. Namely, do people use social endorsement cues as a heuristic when they are presented both weak and strong social information side by side? Our main prediction would remain consistent—that subjects would be more willing to share a news article with ten thousand likes compared to five likes and that this effect could be amplified for fake news items. This set-up will also allow for the control of individual differences, since we would be comparing how an individual's willingness to share articles differs across condition (weak v. strong) and type (fake v. real). This is an especially interesting way to study the impact of social endorsement cues because it is an ecologically valid methodology as it mimics the exact way articles are presented on Facebook. Additionally, while there were significant effects in Study 2 related to factors other than condition (mentioned in the Appendix), these will not be discussed because our experimental focus is on the role of social endorsement cues.

2.3. Study 3 – News Sharing, Within Subject

2.3.1. Methods

2.3.1.1. Participants

A total of 308 participants were recruited from Amazon's Mechanical Turk platform and responded to our survey online. Of these, 2 participants did not have a Facebook account and thus did not proceed with the survey. After the participants who indicated that they would not be willing to share political content on Facebook ($N = 130$) were removed, we had a total of 176 participants left with complete responses. Regarding the demographic characteristics of our remaining subjects,

105 were female (60%) and 69 were male (40%), while two did not answer. Of all the participants, 142 (80.7%) had an education level between high school graduate and a Bachelor's Degree. The mean age of participants was 33 [range: 19-72].

When asked about their party affiliations, 88 (50.0%) indicated that they identify as a Democrat, while 34 (19.3%) identified as a Republican and 47 identified as Independent (26.7%). The remaining 7 (3.9%) gave other answers. When given a forced choice, 117 indicated they would vote for Hillary Clinton (66.5%) as President of the U.S., while 59 indicated they would vote for Donald Trump (33.5%). Given a forced choice between the Democratic and Republican parties, 120 (68.1%) preferred the Democratic party, while 56 (31.9%) preferred the Republican party. Self-reported data indicated that 64.2% of participants use Facebook "daily" while 14.7% use it "2-6 times a week." Slightly differently than Study 1, the following proportions of people indicated that they trust the following sources "a moderate amount," "a lot" or "a great deal": local news (71.6%), national news (70.5%), friends and family (65.3%), and social media (35.8%). Each subject received \$0.60 for completing the survey.

2.3.1.2. Materials and Procedure

We presented participants with the same twenty-four news articles from Study 1 and 2, where items were balanced by type (fake, real) and political valence (Pro-Democrat, Pro-Republican). After being asked if they have a Facebook account, those who indicated that they do not have an account ($N = 2$) were excluded. Participants were assigned to the same within-subject condition where they saw six articles with weak social endorsement cues (less than 20 likes, shares and comments) and six articles with strong social endorsement cues (more than 1,000 likes, 500 shares and 500 comments). The articles were counterbalanced such that each item had a weak and a strong version presented an equal number of times across participants.

After seeing each article, participants were asked the following question: “If you were to see the above article on Facebook, how likely would you be to share it?”. They responded on the following scale: 1 (extremely unlikely), 2 (moderately unlikely), 3 (slightly unlikely), 4 (slightly likely), 5 (moderately likely), 6 (extremely likely). The order of the news items was randomized for each participant.

Participants completed the CRT and FNE tasks that were included in the previous studies. They also ended the survey by answering the demographic, media and accuracy related questions that were included in Study 1 and 2. Both sets of information were collected for exploratory purposes.

2.3.2. Results

We preregistered our planned analyses, which can be found in the Appendix. For our primary analysis, we ran a mixed design ANOVA with willingness to share for both fake and real news items that were concordant or discordant as repeated measures, and the condition (weak strength, strong strength) as a between-subject factor. For each condition, the mean willingness to share fake and real news items and standard deviations can be found in Table 3. Similar to the last two studies discussed, there was a significant main effect of type ($F(1, 175) = 13.251$, $MSE = 24.659$, $p < 0.001$). In addition, there was also a main effect of concordance ($F(1, 175) = 91.285$, $MSE = 166.146$, $p < 0.001$), as well as a significant main effect of social endorsement cues on willingness to share, $F(1, 175) = 5.518$, $MSE = 3.252$, $p = 0.020$. However, there was neither an interaction between news type and social endorsement cues, $F(1, 175) = 0.923$, $MSE = 0.544$, $p = 0.338$, nor one between concordance and social endorsement cues, $F(1, 175) = 0.077$, $MSE = 0.035$, $p = 0.782$.

We also ran a mixed design ANOVA with willingness to share different type of items (fake, real) that had different levels of social endorsement (weak strength, strong strength) and different valence (concordant, discordant) and political ideology of the participant (Democrat, Republican).

The mean willingness to share fake and real news items that are concordant or discordant can be found in Figure 4. Contrary to our expectations, the main effect of social endorsement cues on willingness to share news items was no longer significant when the political ideology of participant was added to the analysis ($F(1, 174) = 3.464$, $MSE = 2.044$, $p = 0.064$). Additionally, we did not find an interaction between the type of news item and the level of social endorsement ($F(1, 174) = 0.880$, $MSE = 0.522$, $p = 0.349$). We also did not find a significant interaction between the concordance of article and the level of social endorsement, $F(1, 174) = 0.088$, $MSE = 0.040$, $p = 0.767$ or between the political ideology of participant and the level of social endorsement, $F(1, 174) = 0.803$, $MSE = 0.474$, $p = 0.371$. There were some significant two and three way interactions that did not include social endorsement cues, which can be found in the Appendix, along with the nonsignificant interactions that included social endorsement cues.

Condition	Type	Mean	Standard Deviation
<i>Weak</i>	Fake News	2.43	1.27
	Real News	2.73	1.09
<i>Strong</i>	Fake News	2.56	1.27
	Real News	2.79	1.14

Table 3. Overall mean willingness to share fake or real news items and standard deviations from Study 3.

Willingness to share is measured on a scale from 1 to 6.

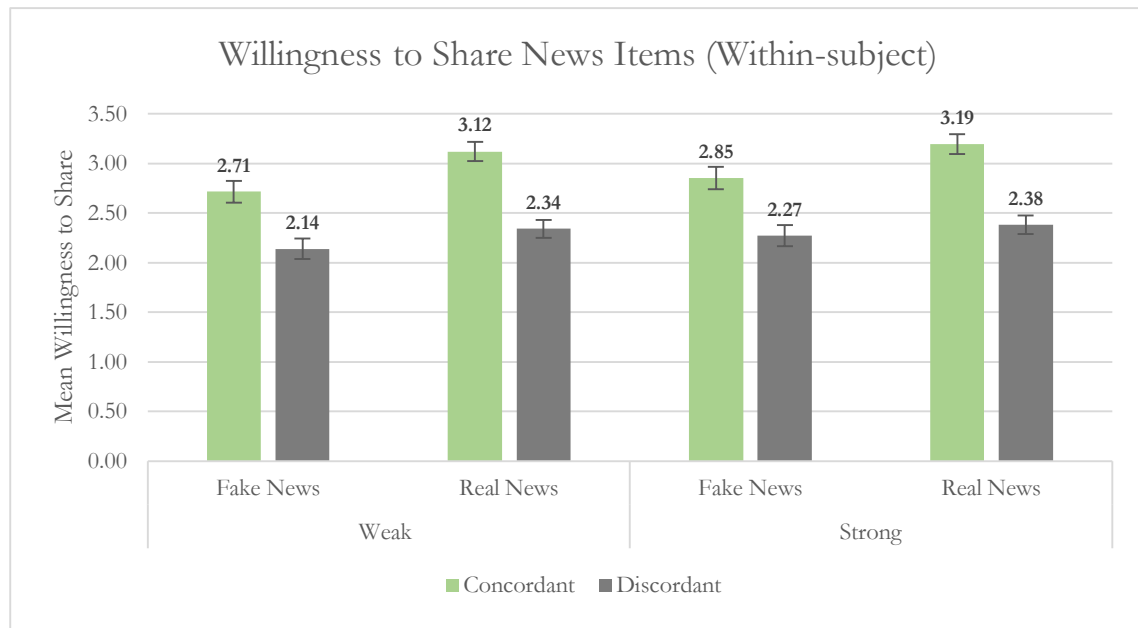


Figure 4. Overall mean willingness to share different types of news items with different social cue strengths, from Study 3. Willingness to share is measured on a scale from 1 to 6.

2.3.3. Discussion

Participants were slightly more likely to share news articles with strong social endorsement cues compared to weak ones; however, this effect was only borderline significant when we accounted for the political ideology of participants. Since our study had sufficient power, we can conclude that these results reinforce findings from Study 1 and 2 such that the impact of social endorsement cues on willingness to share is small. Even in a more sensitive setting where participants are exposed to varying strengths of social endorsement cues side by side, the impact of social information was marginal compared to the strength of other significant main effects such as those for type and concordance. In other words, other characteristics of news articles such as accuracy (i.e., being fake or real) and concordance with the participant's political ideology had a significantly larger impact on willingness to share than social cues did. Our findings are in line with the motivated reasoning account in which people were more willing to share politically concordant articles than discordant ones. However, Pennycook and Rand (2017) suggests that this effect is *not*

driven by a motivated reasoning heuristic, where analytical thinking is used to justify prior beliefs and protect political identity. Rather, their findings show that analytical thinking mediates the concordance effect and supports the override of ideology-consistent priors, as opposed to exacerbating them. They suggest that the main effect of concordance is instead driven by differing prior beliefs about what is possible. Thus, it is likely that the role of motivated reasoning is not similar to that of a heuristic in this case.

While our experiment did not directly explore the role of analytical thinking or which explanation for motivated reasoning is true, our experiments do suggest that the interpretation favoring analytical over heuristic-based processing may be the most accurate one. This is because social endorsement cues, which are a type of heuristic that has been shown to be highly robust in other settings, did not significantly influence people's willingness to share. Additionally, the lack of an interaction between social cues and news type further suggests that it is unlikely for these cues to be used as a strong heuristic when making credibility judgments about ambiguous stimuli like fake news, which was hypothesized based on the informational social influence theory.

2.4. General discussion

All three studies suggest that there does *not* appear to be a robust impact of social endorsement cues on people's perceptions of accuracy, while there is only a borderline significant impact on people's willingness to share news on social media in a within-subject context. This implies that our first and second hypotheses regarding the use of social cues as a heuristic is not supported by these experiments. Specifically, there was no evidence that participants use social endorsement cues as a heuristic to decide which articles to share regardless of their own preferences [Hypothesis 1] nor do they use social information as a cue in cases where there is ambiguity regarding the accuracy of an article [Hypothesis 2]. On the contrary, it seems that the effect of social

endorsement cues is of marginal significance, and social information does not influence people's judgments of accuracy or willingness to share significantly.

Previous literature examining motivated reasoning presents mixed evidence regarding the direction of the influence social cues could have: Messing and Westwood (2014) had found that social endorsement cues have a more significant influence on people's news consumption than concordance of the source, while other researchers suggest that concordance is one of the most significant factors that influence news sharing behavior and can lead to the formation of echo chambers (Bakshy, Messing & Adamic, 2015; Schmidt et. al., 2017). In this regard, our results are in line with the latter finding that political concordance is a much more significant predictor than social cues. Our findings differ from those of Messing and Westwood perhaps because they were interested in news-seeking as opposed to news-sharing behavior, such that the social cues impacted which articles were chosen by the participant for *consumption* as opposed to being chosen to be *shared*. This difference is noteworthy because sharing decisions may be influenced by a different set of factors.

Our findings are in line with work by Stephan, Caroline and Krämer (2015), who found that social information did not have a significant impact on persuasiveness of news articles. In their experiment, they looked at how the following two factors influence the reader's own sentiments on the topic of the news article: (1) different number of likes, and (2) comments conveying a positive or negative opinion about the news article's topic. Their results indicate that while the number of likes is not sufficient in *changing* the persuasiveness of the article, negative comments are able to diminish it. One of the reasons used to explain the absence of a *bandwagon effect* is the lack of negative social information conveyed by likes, since negative comments were found to be more persuasive than positive ones. This may be one of the reasons why our studies also did not find a significant effect, but it is also likely that the *lack* of social endorsement could be perceived as a negative feedback if

people have sufficient experience interacting with social media and interpreting these types of cues. Although it is hard to analyze null results regarding the use of heuristics, it is worth exploring if there is indeed a more systematic evaluation of information involved when people come across news articles in the “snack” format found on social media. Experimental methods such as those employed here are particularly useful because they allow researchers to be very selective about which characteristics to vary and assess. Considering Pennycook and Rand’s (2017) explanation that the source of the political concordance effect is analytical thinking, our results imply that people may be employing systematic methods as opposed to heuristics when determining credibility of news articles on social media. One way to explore if this assertion is accurate could be to examine if *other* heuristics are used when evaluating news articles on social media, and more specifically determine if these are used instead of a systematic processing of information where people use their own judgments and knowledge about the world to determine credibility.

Another interesting implication of our results is related to the role of trust: past studies suggest that trust in a source of information is an important factor when determining credibility (Teun & Jan Maarten, 2012). If this is accurate, the lower levels of trust in social media as an information source (Bialik & Matsa, 2017) could mean that people are, in general, more skeptical of the information they encounter on social media. In a setting like this, social endorsement cues can signal to users that an article is credible. However, despite this possibility, it appears that social endorsement cues do not have a significant influence on people’s judgments. This could simply be because trust is not an important characteristic online (despite being an important factor in credibility and persuasion in other settings) or that people use other cues besides social ones to determine trustworthiness of information in social media.

In terms of the secondary analyses ran in each study, it appears that there is only a slightly significant difference in willingness to share news between people with different political ideologies,

such that Republicans were more willing to share news than Democrats. Although the impact of political ideology was not significant for accuracy judgments, it appears that there is some difference between news sharing habits of Republicans and Democrats. Since the social endorsement cue conditions did not interact with participants' political ideology, our studies suggest that there is no differential impact of social information on people who have different political ideologies. This is an interesting finding because past studies show that social cues are more influential for Republicans compared to Democrats (Messing & Westwood, 2014).

In the future, it would be ideal to assess people's sharing behavior on the actual platforms used for sharing news, perhaps by running an experiment directly on Facebook where articles are presented to users and their sharing choices are evaluated. While behavioral experiments such as ours examine these issues better than observational studies on social media platforms, the aforementioned type of information collection would address the research question more precisely than our study design is able to. Additionally, future experiments could also look at how the proportion of fake news articles having strong social endorsement cues impact people's judgments relative to weaker ones. In other words, there could be a differential impact if someone encounters fake articles that have strong social cues 80% of the time and those that have weak social cues only 20% of the time, as opposed to the inverse. This is an important question because we know that fake news articles are likely to spread faster and be shared by significantly more people relative to true news articles (Vosoughi, Roy & Aral, 2018), which changes the "norms" people become accustomed to utilizing when assessing the accuracy of these types of news compared to real ones.

2.4.1. Limitations

There are several limitations to highlight in our study design. Although past work has shown that Amazon Mechanical Turk is a reliable resource for research on political ideology (Coppock, 2016; Mullinix, Leeper, Druckman, & Freese, 2015), the samples in our studies were not

representative of the U.S. and our results regarding political ideology should be interpreted with this in mind.

In terms of our materials, we intentionally presented *snack* news instead of full length articles in order to simulate the way articles are encountered online. However, providing a functionality where subjects are able to click on the link to access the full article would be an interesting design for a future study, as researchers could assess the role of social cues for information filtering and selection. Additionally, future studies may prefer to look at the impact of other social cues such as the content of comments, which could be a type of negative feedback. Looking at how comments come into play or presenting other types of icons that are present on Facebook (such as the “*Sad*” or “*Angry*” options) could be helpful in understanding if the valence of social endorsement cues plays a role. Another difference between our study and the way news is encountered in a social media environment is that we presented participants exclusively with news articles and no other interspersed content. We also presented an equal number of concordant and discordant articles, while this may not necessarily be the case on social media platforms like Facebook due to the echo chamber effect. Moreover, even though we used a range of fake and real articles in our studies, they may not be representative of the type of news media encountered online.

Though this is not a limitation of our study design, there is also the possibility that other factors that were found to inform people’s sharing decisions, such as self-perception of opinion leadership and perceived ties to online networks (Long, Chei, & Dion, 2014), are more salient than social cues in informing people’s behavior. Future studies should assess how these factors come into play in online decision-making. Additionally, our study design was not able to assess the importance of social cues when endorsement is provided by specific people in one’s network. Since it is true that people tend to trust their friends and family to provide information that is as credible as those found

through national news (Bialik & Matsa, 2017), information endorsement by one's network could lend an article credibility, more so than aggregate support from strangers would be able to.

One last factor to consider is whether social endorsement cues perhaps play a bigger role in filtering information as opposed to informing credibility judgments. If this is the case social information may play a role in what information is attended, regardless of credibility. If users decide what articles to read based on the strength of social endorsement cues, that could reinforce an echo-chamber effect such that popular articles are preferentially read. Since our studies were not designed to test this hypothesis, a different experiment could present a series of articles to participants to explore which are read for a longer period of time or which are recalled best by subjects.

3. Conclusion

Our studies intended to explore the role of social endorsement cues on people's judgments regarding articles encountered online. This is a particularly topical area to study due to the rapidly increasing spread of misinformation through social media platforms. Against the expectations of a bandwagon heuristic, our studies highlight that social endorsement cues have a marginally significant impact on people's willingness to share news on social media, and do not significantly influence accuracy judgments. Although unexpected, this is a particularly relevant result when considered in conjunction with past findings that suggest analytical thinking may play a larger role than heuristics in online information processing. Given the debate around the dangers of social media being an echo chamber, it is slightly concerning that concordance of articles had a significantly bigger influence on people's willingness to share news on these platforms. While our studies had some limitations outlined in the previous section, these results suggest that the use of heuristics when processing online information may be minimal. Thus, future experiments should be run to address the implications discussed above. One particularly noteworthy area would be validating the role of analytical thinking, which can inform efforts to reduce the dissemination of fake news.

Author Contributions

Pennycook, Rand and Ozdalga designed the study using paradigms previously developed by Pennycook and Rand. Ozdalga conducted a literature review and created the stimuli for the studies. Pennycook and Ozdalga prepared the Qualtrics survey that was administered to subjects on mTurk. Pennycook cleaned the data and Ozdalga analyzed it with the guidance of Pennycook. Ozdalga produced an initial draft of the final paper and received feedback from Pennycook, and wrote an updated draft. Rand provided additional suggestions and Ozdalga made the necessary revisions to compose the final draft.

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5. Appendix: Survey Materials

Example real news items with weak strength of social endorsement cues:



Trump calls for a tax reform 'speed-up' in light of Hurricane Irma

U.S. President Donald Trump said on Saturday that he will ask the Republican-controlled Congress to further speed up its efforts to overhaul the U.S. tax code, citing the potential...

YAHOO.COM



7

2 Comments



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Harold Hamm: The Trump boom may just be getting started—growth could hit 4%

Congress needs to pass a meaningful tax cut to fuel the Trump economic boom, says Continental Resources CEO Harold Hamm.

CNBC.COM | BY CNBC



7

2 Comments



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Trump Lawyers Reportedly Wanted Jared Kushner To Step Down Due To Russia Investigations

The president's son-in-law and senior adviser has drawn scrutiny in multiple probes of possible collusion between Trump's campaign and Russia.

HUFFINGTONPOST.COM | BY MARINA FANG



1

4 Comments 3 Shares



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Taxpayers billed \$1,092 for an official's two-night stay at Trump's Mar-a-Lago club

An invoice from the president's Palm Beach property surfaces, showing that the government was charged for someone to spend the weekend.

WASHINGTONPOST.COM | BY DREW HARWELL



8

6 Comments



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Example real news items with strong strength of social endorsement cues:



Federal Court Says Trump Administration Can't Deny Funds To Sanctuary Cities

The administration wanted to use crime-fighting grants as incentives to gain the cooperation of local officials in battling illegal immigration.

NPR.ORG

4.2K

486 Comments 652 Shares

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Exclusive: Hillary Clinton says Trump associates helped Russia meddle in the 2016 election

Exclusive: Hillary Clinton says she is convinced that associates of candidate Donald Trump helped Russia meddle in the 2016 campaign.

USATODAY.COM

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662 Comments 585 Shares

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Trump Associate Bragged That Real Estate Deal With Putin Could Help Make Trump President

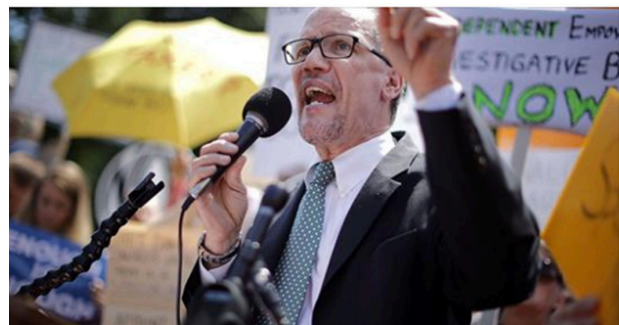
Today's mystery: Did Ivanka really sit in Putin's chair?

SLATE.COM

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DNC slams Trump's National Hispanic Heritage Month proclamation as 'hypocritical'

The Democratic National Committee (DNC) on Wednesday slammed President Trump's proclamation for an upcoming National Hispanic Heritage Month as "hypocritical" and...

THEHILL.COM

6.9K

6.4K Comments 558 Shares

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Example fake news items with weak strength of social endorsement cues:



Nancy Pelosi's Son Arrested For Murder
Will his elitist left-wing money buy his freedom?
THELASTLINEOFDEFENSE.ORG

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Obama: The Country Deserves Me A Debt Of Gratitude For My Leadership

CONSERVATIVEDAILYPOST.COM | BY MARTIN R. WALSH

1

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FBI Uncovers Evidence That 62 Million Trump Voters are All Russian Agents! - Us Politics Info
Anonymous sources within the FBI have revealed to The Times that they have new evidence indicating that everyone who voted for Donald Trump is an agent of the FSB (formerly the...
USPOLITICSINFO.COM | BY US NEWS FEED

4 2 Comments

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Donald Trump Signs Executive Order Allowing The Hunting Of Bald Eagles
WASHINGTON, D.C. (AP) — Today President Donald Trump made what could very well prove to be the most controversial move of his presidency by signing Executive Order 14841,...
VIRALCORDS.COM

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Example fake news items with strong strength of social endorsement cues:



Trump wants to deport American Indians to India

Washington (dpo) - As part of his plan to improve national security and combat illegal immigration, US President Donald Trump intends to send around 3 million American Indians back to where they came from – India. He is to sign an executive order to this effect this week.

THE-POSTILLON.COM

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2.8K Comments 1.8K Shares

👍 Like 💬 Comment ➦ Share



BUSTED: Russian Mansions Obama Seized Were Meant To Be Illegal Gifts To Sasha And Malia

Well, well, well...it looks like Obummer wasn't actually trying to punish Russia for anything after all (since there's nothing to punish them FOR) — he was actually just trying to get a...

BREAKING.NEWSFEEDHUNTER.COM

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2.7K Comments 1.2K Shares

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MAN PARDONED BY OBAMA 3 MONTHS AGO ARRESTED FOR MURDER | The Underground Report

Just 94 days ago, James G. Winters of Gainesville, FL was pardoned from a life sentence by former President Barack Obama. Yesterday Winters was arrested for the murder of his...

UNDERGROUNDNEWSREPORT.COM

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Paul Ryan: "22 Million Americans Choose To Be Poor, So It's Their Own Problem If They Can't Afford To Be Healthy"

House Speaker Paul Ryan (R-WI) this week disputed reports that 22 million people would lose insurance under the Republican health care plan. During an interview that aired on Tuesday,...

POLITICOT.COM

👍👎👤 3.6K

1.2K Comments 701 Shares

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Study 1

Preregistration:

1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?

Does the amount of shares and likes (i.e. social information) obtained by a news item influence people's likelihood of (hypothetically) sharing it on Facebook?

3) Describe the key dependent variable(s) specifying how they will be measured.

Participants will be asked "If you were to see the above article on Facebook, how likely would you be to share it?" Responses will be recorded on a 6-point scale from "Extremely unlikely" to "Extremely likely".

4) How many and which conditions will participants be assigned to?

Participants will be in one of three conditions: 1) Control condition where they are asked to indicate their willingness to share a set of 12 fake and 12 real news articles that are pictured with no shares, likes or comments, 2) Low likes conditions where they are asked to indicate their willingness to share a set of 12 fake and 12 real news articles that are pictured with less than 20 likes and less than 5 comments or shares, and 3) High likes conditions where they are asked to indicate their willingness to share a set of 12 fake and 12 real news articles that are pictured with more than 1,000 likes and more than 500 comments or shares.

Half of each type (fake v. real) is Pro-Democratic and half is Pro-Republican. The fake and real news headlines were pretested to be equally partisan.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

We will run a mixed design 3 (social information: low v. control v. high) x 2 (type: fake, real) ANOVA with mean willingness to share as the dependent variable.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Participants have to indicate having a Facebook account to complete the study.

Those who indicate anything other than yes on the following question will be removed from the analysis: "Would you ever consider sharing something political on Facebook? Yes/No/I don't use social media".

7) How many observations will be collected or what will determine sample size?

No need to justify decision, but be precise about exactly how the number will be determined.

600 participants on Mechanical Turk (any extra participants who complete the study will be retained).

8) Anything else you would like to pre-register?

(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

We will also run a larger omnibus mixed design ANOVA with the following factors: social information (low v. control v. high), Type (fake, real), Valence (Pro-Democrat headline, Pro-Republican headline), and political ideology* (Democrat, Republican)

*This will be done using a forced choice between Democrat/Republican parties. However, as a robustness check, we will also use party affiliation.

We will also be collecting data on the Cognitive Reflection Test, Fear of Negative Evaluation, trust in various information sources, belief in god and other demographic information for exploratory purposes.

Results: All Significant Effects & All Nonsignificant Effects that Include Condition

Analysis	Variables	df	F	MSE	P value
Primary	Type	F(1, 307)	31.037	14.616	$p < 0.001$
	Condition	F(2, 307)	0.773	1.543	0.462
	Type * Condition	F(2, 307)	1.408	0.663	0.246
Secondary	Type	F(1, 303)	26.948	25.15	$p < 0.001$
	Condition	F(2, 303)	0.74	2.923	0.478
	Ideology	F(1, 303)	4.639	18.33	0.032
	Type * Condition	F(2, 303)	0.96	0.896	0.384
	Condition * Ideology	F(2, 303)	0.601	2.374	0.601
	Condition * Valence	F(2, 303)	3.052	2.931	0.049
	Type * Valence	F(1, 303)	14.688	5.784	$p < 0.001$
	Valence * Ideology	F(1, 303)	238.959	229.44	$p < 0.001$
	Type * Condition * Ideology	F(2, 303)	0.389	0.363	0.678
	Valence * Condition * Ideology	F(2, 303)	0.031	0.032	0.968
	Type * Valence * Condition	F(2, 303)	1.303	0.513	0.273
	Type * Valence * Ideology	F(1, 303)	18.815	7.41	$p < 0.001$
	Type * Valence * Condition * Ideology	F(2, 303)	0.896	2.275	0.104

Study 2

Preregistration

1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

2) What's the main question being asked or hypothesis being tested in this study?

Does the amount of shares and likes (i.e. social information) obtained by a news item influence people's judgments of accuracy?

3) Describe the key dependent variable(s) specifying how they will be measured.

Participants will be asked: "To the best of your knowledge, how accurate is the claim in the above headline?". Responses will be recorded on a 4-point scale from "Not at all accurate" to "Very accurate".

4) How many and which conditions will participants be assigned to?

Participants will be in one of three conditions: 1) Control condition where they are asked to indicate accuracy judgments for a set of 12 fake and 12 real news articles that are pictured with no shares, likes or comments, 2) Low likes conditions where they are asked to indicate accuracy judgments for a set of 12 fake and 12 real news articles that are pictured with less than 20 likes and less than 5 comments or shares, and 3) High likes conditions where they are asked to indicate accuracy judgments for a set of 12 fake and 12 real news articles that are pictured with more than 1,000 likes and more than 500 comments or shares.

Half of each type (fake v. real) is Pro-Democratic and half is Pro-Republican. The fake and real news headlines were pretested to be equally partisan.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

We will run a mixed design 3 (social information: low v. control v. high) x 2 (type: fake, real) ANOVA with mean judgments of accuracy as the dependent variable.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Participants have to indicate having a Facebook account to complete the study.

7) How many observations will be collected or what will determine sample size?

No need to justify decision, but be precise about exactly how the number will be determined.

600 participants on Mechanical Turk (any extra participants who complete the study will be retained).

8) Anything else you would like to pre-register?

(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)

We will also run a larger omnibus mixed design ANOVA with the following factors: social information (low v. control v. high), Type (fake, real), Valence (Pro-Democrat headline, Pro-Republican headline), and political ideology* (Democrat, Republican)

*This will be done using a forced choice between Democrat/Republican parties. However, as a robustness check, we will also use party affiliation.

We will also be collecting data on the Cognitive Reflection Test, Fear of Negative Evaluation, trust in various information sources, belief in god and other demographic information for exploratory purposes.

Results: All Significant Effects & All Nonsignificant Effects that Include Condition

Analysis	Variables	df	F	MSE	P value
Primary	Type	F(1, 594)	2881.673	521.495	$p < 0.001$
	Condition	F(2, 594)	0.022	0.004	0.979
	Type * Condition	F(2, 594)	0.908	0.164	0.404
Secondary	Type	F(1, 590)	2722.986	956.925	$p < 0.001$
	Valence	F(1, 590)	50.24	9.49	$p < 0.001$
	Condition	F(2, 590)	0.082	0.029	0.922
	Condition * Ideology	F(2, 590)	0.689	0.247	0.502
	Type * Condition	F(2, 590)	1.278	0.449	0.279
	Valence * Condition	F(2, 590)	0.7	0.013	0.933
	Type * Ideology	F(1, 590)	14.628	5.141	$p < 0.001$
	Valence * Ideology	F(1, 590)	239.497	45.232	$p < 0.001$
	Type * Condition * Ideology	F(2, 590)	2.767	0.972	0.064
	Valence * Condition * Ideology	F(2, 590)	1.67	0.315	0.189
	Type * Valence * Condition	F(2, 590)	0.685	0.064	0.505
	Type * Valence * Condition * Ideology	F(2, 590)	0.537	0.05	0.585

Study 3

Preregistration

1) Have any data been collected for this study already?

No, no data have been collected for this study yet.

2) What is the main question being asked or hypothesis being tested in this study?

Does the amount of shares and likes (i.e. social information) obtained by a news item influence people's likelihood of (hypothetically) sharing it on Facebook?

3) Describe the key dependent variable(s) specifying how they will be measured.

Participants will be asked "If you were to see the above article on Facebook, how likely would you be to share it?". Responses will be recorded on a 6-point scale from "Extremely unlikely" to "Extremely likely".

4) How many and which conditions will participants be assigned to?

Participants will see fake and real news articles that have either many likes/shares/comments or very few likes/shares/comments. Articles will also be either Democrat-Consistent or Republican-Consistent (based on a pretest).

Participants will be presented with both fake and real news where both are equally likely to have low or high likes.

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.

We will run a mixed design ANOVA with mean willingness to share as the dependent variable and the following factors: social information (within subject: low v. high likes/comments/shares) x type (within: fake, real) x political concordance* (within subject: concordant, discordant). We will follow-up significant interactions with t-tests or ANOVAs, as appropriate.

*Political concordance will be based on a forced choice between Democratic/Republican parties (e.g., Democrat-consistent items will be coded as politically concordant for people who select the Democratic party). However, as a robustness check, we will also use party affiliation.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

Participants have to indicate having a Facebook account to complete the study.

Those who indicate anything other than 'yes' on the following question will be removed from the analysis: "Would you ever consider sharing something political on Facebook? Yes/No/I don't use social media".

7) How many observations will be collected or what will determine sample size?

No need to justify decision, but be precise about exactly how the number will be determined.

200 participants on Mechanical Turk (any extra participants who complete the study will be retained).

8) Anything else you would like to pre-register?

(e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses)

planned?)

We will run the ANOVA as above, but with Democrat/Republican preference (using the forced choice question) as an additional factor. Additional interactions with Dem/Rep will be followed up using t-tests and ANOVAs, as above.

We will also be collecting data on the Cognitive Reflection Test, Fear of Negative Evaluation, trust in various information sources, belief in god and other demographic information for exploratory purposes.

If responses to the "ever share" item differ across conditions, we will analyze everyone (to avoid a selection effect).

Results: All Significant Effects & All Nonsignificant Effects that Include Condition

Analysis	Variables	df	F	MSE	P value
Primary	Type	F(1, 175)	13.251	24.659	$p < 0.001$
	Condition	F(1, 175)	5.518	3.252	0.02
	Concordance	F(1, 175)	91.285	166.146	$p < 0.001$
	Type * Condition	F(1, 175)	0.923	0.544	0.338
	Type * Concordance	F(1, 175)	6.958	4.138	0.009
	Condition * Concordance	F(1, 175)	0.077	0.035	0.782
	Type * Condition * Concordance	F(1, 175)	0.05	0.018	0.823
Secondary	Type	F(1, 174)	12.157	22.743	0.001
	Concordance	F(1, 174)	68.757	123.463	$p < 0.001$
	Condition	F(1, 174)	2.464	2.044	0.064
	Condition * Ideology	F(1, 174)	0.803	0.474	0.371
	Type * Condition	F(1, 174)	0.522	0.88	0.349
	Type * Concordance	F(1, 174)	11.867	6.832	0.001
	Concordance * Condition	F(1, 174)	0.088	0.4	0.767
	Type * Concordance * Ideology	F(1, 174)	6.787	3.907	0.01
	Type * Condition * Ideology	F(1, 174)	0.016	0.009	0.9
	Condition * Concordance * Ideology	F(1, 174)	0.012	0.005	0.914
	Type * Condition * Concordance	F(1, 174)	0.075	0.027	0.784
	Type * Condition * Concordance * Ideology	F(1, 174)	0.033	0.012	0.855