



# Cognitive and affective responses to political disinformation in Facebook

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## ABSTRACT

The epidemic of political disinformation in social media has in part triggered the transition to the post-truth era in which emotional and ideological appeals are more influential in shaping public opinion than objective facts. In this study we examined the cognitive and affective responses that political disinformation prompted in Facebook, as the most popular social media platform. Through text analysis of user comments corpora on nearly 2,100 political posts from popular sources in Facebook, we found that compared to true news, political disinformation received significantly less analytic responses from Facebook followers. While the results indicated greater anxiety in responses to true news, responses to political disinformation were filled with greater anger and incivility. We also found similar (low) levels of cognitive thinking in responses to extreme conservative and extreme liberal disinformation. Contrary to prior research findings, our results indicated that responses to extreme liberal disinformation in Facebook were filled with greater anger and incivility. This suggests that the incivility and outrage in online political discourses should not be attributed to a specific political party without considering the concurrent political events.

## 1. Introduction

Social media has dramatically transformed the news industry; it has significantly reduced the costs of producing news and distributing it to a large audience. While these changes have diminished the journalists' gatekeeping role, they lend themselves to "yellow journalism" that uses eye-catching headlines to peddle ill-researched news of questionable accuracy or veracity in order to generate click-throughs and online advertisement revenues. Propaganda campaigns have also used social media to influence politics during the 2016 US presidential elections and the 2016 Brexit referendum in the UK (Allcott & Gentzkow, 2017; Bastos & Mercea, 2019). Such dramatic effects led Oxford Dictionary to select "post-truth" as its 2016 Word of the Year, defining it as "relating to or denoting circumstances in which objective facts are less influential in shaping public opinion than appeals to emotion and personal belief."

The epidemic of information disorder in social media has in part triggered the transition to the post-truth era. There are three types of information disorder online (Born & Edgington, 2017): disinformation, which concerns intentionally false information that is promulgated deliberately; propaganda, which refers to potentially correct information packaged in a way (e.g., through emotional appeal) to disparage opposing viewpoints or rally public support; and misinformation, which concerns false information that is unintentionally propagated. In this classification, misinformation differs from disinformation in that it is not deliberate, and it differs from propaganda in that it is always

factually incorrect. Of note, there is a lack of consensus on the scope of these information disorders (Jackson, 2017).

Following Tucker et al. (2018) in their meta-analytic review and for simplicity, in the rest of this paper we use "political disinformation" as an umbrella term to refer to all three types of information disorder explained above. Specifically, political disinformation in this study is defined as any information that could lead an individual to a factually incorrect view of politics. It accordingly concerns both intentionally or unintentionally propagated false information, including politically slanted information, hyper-partisan news, fake news, rumors (i.e., non-confirmed information), and online propaganda. Notwithstanding the growing body of literature on disinformation, little is known about the effects of exposure to political disinformation online, making it one of the substantive research gaps identified by Tucker et al.'s meta-analytic review.

Motivated by this research gap, the present study examines the cognitive and affective responses prompted by political disinformation in Facebook. We choose Facebook as the context of this study since it is the leading news source among all social media platforms (Matsa & Shearer, 2018). Furthermore, much of the research on disinformation in social media was conducted with Twitter data (Tucker et al., 2018), and little is known about the effects of exposure to political disinformation in the most popular social network (i.e., Facebook).

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## 2. Political disinformation and discourse in social media

The advantages of online news consumption over that of traditional news channels (e.g., newspapers and television) are manifold. These advantages include convenience of 24-h access, ease of access with a few clicks on a computer or smart phone, and access to a multitude of news sources in aggregator apps like Google News or Flipboard. Furthermore, social media platforms have enabled citizens to provide live updates from affected sites during terrorist attacks (e.g., November 2015 Paris attacks) or natural disasters (e.g., 2008 China earthquake; see Li & Rao, 2010).

Online news advantages notwithstanding, the volume of political disinformation is estimated to be greater than the volume of political information online (Tucker et al., 2018). One potential reason is the almost costless nature of production and distribution of news (of questionable accuracy or veracity) online. Clickbait websites, hyper-partisan media, fake news sites, foreign governments, and computational propaganda tools (e.g., bots and trolls) are actively spreading political disinformation for pecuniary or ideological reasons. In addition, news ranking algorithms could be manipulated (e.g., through hashtag hijacking) to make disinformation more likely to appear. Another potential reason for greater volumes of political disinformation has its roots in user behavior; that is, most of the political information shared by social media users is partisan (Bakshy, Messing, & Adamic, 2015), which in turn diminishes the average quality of online political information.

Furthermore, many citizens are self-insulating themselves in online echo chambers in which they can only hear amplified echoes of their own partisan beliefs. In addition to limiting exposure to different opinions from fellow citizens (which is a desideratum for a well-functioning democracy; see Sunstein, 2017), echo chambers create cyber-cascades in which political disinformation can spread like wildfire, “simply because so many people seem to believe it” (Sunstein, 2017, p. 57). Pennycook, Cannon, and Rand (2018), for example, suggest that a single exposure to blatantly false news stories in Facebook can increase subsequent perceptions of their accuracy. In a similar vein, exposure to slanted news encourages inaccurate beliefs, even when the individual is aware of the contradicting evidence (Garrett, Weeks, & Neo, 2016). Taken together, these findings become even more concerning since an average adult was estimated to see and remember at least one fake news story during the 2016 US presidential campaigns (Allcott & Gentzkow, 2017).

Counterintuitive findings from a few studies (Bakshy et al., 2015; Flaxman, Goel, & Rao, 2016), however, suggest that exposure to ideologically diverse news and opinion in social media is more frequent than what is commonly assumed. Nonetheless, Bail et al. (2018) recently discovered that exposure to opposing partisan views in Twitter could also increase polarization. In other words, exposure to heterogeneous political information is necessary but not sufficient for reducing polarization, which in turn underscores the quality of information that users are introduced to.

The epidemic of political disinformation online is accompanied by the declining quality of political discourses in social media. Compared to non-political fora, for example, political discussions in Reddit during the 2016 US presidential campaigns were overwhelmingly less civil (Nithyanand, Schaffner, & Gill, 2017). Furthermore, offensive comments in these political discussions received positive feedbacks from the Reddit community. This was also the case in the New York Times website, where despite the preferences of comment moderators, partisan incivility received the most engagement from news audiences (Muddiman & Stroud, 2017). The low quality of online political discourses does not go unnoticed by social media users either. Nearly half of the participants in a 2016 survey of American social media users (Duggan & Smith, 2016) found the political discussions in social media angrier and less civil than in-person discussions, believing that “people say things while discussing politics [in social media] that they would

never say in person” (p. 1). In other words, online political discussions could be more stressful and frustrating than offline ones.

### 2.1. The present study

Despite the abundant research that now spans several disciplines, we still know little about the effects of exposure to political disinformation in social media, especially Facebook. The question is also of practical relevance, since almost 70% of American adults are estimated to at least occasionally use social media to get news, even though 57% of these users view social media news as “largely inaccurate.” With about 43% of US adults getting their daily dose of news from it, Facebook leads social media platforms as pathways to news (Matsa & Shearer, 2018).

Given these observations, the purpose of the present study is to assess the cognitive and affective responses that political disinformation prompts among its Facebook followers (as the first audience of disinformation in Facebook). More specifically, we compare the cognitive and affective content of responses that political disinformation and true news (as political information) receive from their followers in Facebook. Given the bipolar nature of political disinformation and how it is contributing to America's cavernous partisan divides, we also examine the cognitive and affective responses that extreme conservative and extreme liberal disinformation prompt among Facebook followers. We explore these questions through text analysis of the corpora of user comments on nearly 2,100 political information and disinformation posts in Facebook.

The closest empirical paper to ours is the study by Vosoughi, Roy, and Aral (2018), whose crux is demonstrating that compared to true news in Twitter, false rumors spread farther, faster, deeper, and more broadly. As a supplement to their study, the authors examined emotions in reply tweets to rumors. Our work complements and extends this study on both affective and cognitive aspects of responses to political disinformation in Facebook. In addition, it compares the cognitive and affective responses to political disinformation of different extremes (i.e., extreme conservative and liberal). Finally, Vosoughi et al. (2018) computed emotions from single tweet replies that used to be less than 140 characters (typically less than 30 words) during the study period. It should be noted, however, that interpreting emotional scores computed from such short texts calls for certain caution (LIWC, n.d.)—a concern that we have addressed in the present study.

## 3. Theoretical background

Emotion was long viewed as a detrimental force against cognitive reasoning. Thus, it was initially suggested that decision-making should be insulated against human affect—a virtue Plato envisioned for an ideal philosopher-king (Neuman, Marcus, Crigler, & MacKuen, 2007, pp. 1–20). Admitting that emotion could not be extirpated, however, subsequent moderate formulations suggested that one should either control emotion's detrimental impacts on reasoning, or use appropriate emotions to fortify accurate beliefs, thereby achieving a productive affect-cognition alliance (see Marcus, 2003, pp. 182–221 for a historical analysis of affect-cognition interactions in political psychology). The pivotal presumption of the existence of a dichotomy between affect and cognition (as two antagonist forces) remained potent and established the central role of cognition in information processing models through 1980s (Spezio & Adolphs, 2007).

Findings from neuroscience, however, challenge the above presumptive claim that devalues emotional processes in decision-making. Specifically, neurobiological studies establish that the “affect-cognition distinction is phenomenological, rather than ontological” (Duncan & Barrett, 2007, p. 1184). Contrary to the perspective on noxious impacts of emotion, the works of Damasio (1994, 2010) suggest that emotions can enhance information processing. The relatively new field of neuropolitics (which is the intersection of neuroscience, politics, and

psychology) is seeking to understand how people process political information, form political attitudes, and engage in political activities (see [Schreiber, 2017](#) for a review of the past 20 years of research in neuropolitics).

The present research is theoretically inspired by political psychology studies that used dual-process theories ([Chaiken & Trope, 1999](#)) to explain political information seeking and processing (for a review, see [Isbell, Ottati, & Burns, 2006](#)). It is important to note, however, that dual-process theories do not correspond to the presumed dichotomy between emotion and cognition as two antagonist forces. Rather, they merely hypothesize two modes of information processing, namely less and more effortful modes (both of which involve emotion). In such affect-driven dual-process models, “cold” cognitive processing of political information (which is independent of emotion) is not even possible ([Lodge & Taber, 2013](#)). In a similar vein, the dual-process framework has been employed by researchers in neuropolitics to explain differences in political judgments between political sophisticates and novices ([Schreiber, 2007](#), pp. 48–70). In summary, by applying a dual-process framework (heuristic-systematic model, specifically), the present study does not hypothesize that emotion “dominates” cognition in processing political disinformation. Rather, it examines cognitive and affective responses to political disinformation versus information (true news).

The heuristic-systematic model's dual-process framework ([Chaiken, Liberman, & Eagly, 1989](#)), specifically, delineates two coexistent, yet qualitatively dissimilar, modes of information processing. Systematic processing involves a relatively analytic scrutiny of information and cognitive examination of the validity of the advocated position. Judgements formed through the systematic processing are accordingly responsive to the actual semantic content of the information. Heuristic processing of information, on the other hand, entails the application of simple judgmental rules (i.e., heuristics) to easily-processed cues (e.g., “consensus implies correctness”). In contrast to (effortful) systematic processing, heuristic processing of information requires minimal cognitive effort.

Because followers of a political disinformation page (e.g., Breitbart or Occupy Democrats) in Facebook have already exposed themselves to disinformation that reinforces their preexisting beliefs, they are less likely to disrupt that selective exposure by scrutinizing the merits and veridicality of disinformation. In the absence of sufficient motivation to exert cognitive effort, partisan cues in disinformation can lend validity to the advocated position. Prior research (e.g., [Arceneaux, 2008](#); [Rahn, 1993](#)) has examined the role of partisan cues in political information processing.

Social comparison theory ([Festinger, 1954](#)) identifies another set of cues in disinformation pages in Facebook that may also affect political attitudes. In the absence of objective means, the theory suggests that the individual evaluates her abilities and opinions through comparisons with others. In contrast to upward ability-based comparisons in Facebook (which have detrimental effects on well-being and mental health; see [Jang, Park, & Song, 2016](#); [Lee, 2014](#); [Vogel, Rose, Roberts, & Eckles, 2014](#)), the individual often assesses her opinions through comparisons with those who hold similar opinions ([Festinger, 1954](#)). The echo chamber effect in political disinformation pages in Facebook may facilitate these opinion-based comparisons by showing the user that her opinions do not deviate from the group norm. To present herself in a socially desirable light, the user may even push her opinions toward the extremes of the perceived partisan norm, which could in turn polarize her political attitudes.

### 3.1. Preregistered hypotheses

In light of these theoretical observations, our study is governed by three preregistered generic hypotheses. Our first hypothesis is that compared to true news, political disinformation prompts less cognitive effort among its Facebook followers. More precisely, followers of

disinformation are not sufficiently motivated to exert cognitive effort to examine its validity, since such analytic scrutiny may disrupt their selective exposure to partisan disinformation and increase cognitive dissonance. Furthermore, because disinformation usually covers politics at a surface level, it does not provide sufficient in-depth information (which is necessary for data-seeking systematic mode of processing). Guided in part by least effort motives in their information processing, Facebook followers may consider partisan cues to form a judgment in favor of the veridicality of political disinformation.

Our second generic hypothesis concerns the affective content of responses to political disinformation in Facebook. Disinformation sources generally use negative partisanship to draw attention (for a review, see [Caruana, McGregor, & Stephenson, 2015](#)). They sometimes push this negativity to incivility and outrage through using over-generalizations, ad hominem, and combative information to provoke visceral responses. The social-emotional influences from social comparisons (conducted through exposure to vitriolic discourses in disinformation pages) could liberate the user from social constraints on expressing intense negative emotions in support of the extreme partisanship embedded in the disinformation. Accordingly, our second generic hypothesis is that compared to political information (i.e., true news), Facebook followers' responses to political disinformation are filled with greater anger (which could also be expressed through offensive language; see [Jay, 2000](#)).

Continuing in the same vein, findings from political psychology also suggest that anger impairs political information seeking and processing on the Internet ([Valentino, Hutchings, Banks, & Davis, 2008](#)). By contrast, anxiety motivates people to seek more political information (for a review, see [Isbell et al., 2006](#)). For example, [Parker and Isbell \(2010\)](#) found that voters in the fear (anxiety) condition engaged in greater systematic processing of online information than those in the anger condition.

Given that bipolar disinformation in social media contributes to polarization in the American public ([Tucker et al., 2018](#)), our third hypothesis concerns intense emotions in responses to hyper-partisan disinformation in Facebook. The third generic hypothesis builds upon prior studies that indicated Republican discourses in both mainstream and social media were more outrageous and uncivil than Democratic ones (e.g., [Nithyanand et al., 2017](#); [Sobieraj & Berry, 2011](#)). Thus, we expect to find greater levels of outrage and incivility in followers' responses to extreme conservative disinformation in Facebook.

## 4. Method

### 4.1. Data sample

To construct the political disinformation sample, we focused on Facebook posts from ten popular sources that are known for promulgating political disinformation in Facebook ([Otero, 2018](#)), namely Addicting Info, AlterNet, Breitbart, Conservative Tribune, Daily KOS, Newsmax, Occupy Democrats, RedState, The Blaze, and The Daily Caller. Facebook posts from these sources often contain incomplete, inaccurate, misleading, or fabricated information. Even when these sources report factually correct information in a Facebook post, they package it in a way to rally public support or disparage the opposing viewpoints; that is, the essence of the post is not so much to present the factually correct information as it is to propagandize. Accordingly, Facebook posts by these sources correspond to different types of information disorder (see §1) and, by extension, to political disinformation (which is defined in the present study as any information that could lead one to a factually incorrect view of the political world). Among the selected hyper-partisan disinformation sources, Breitbart, Conservative Tribune, Newsmax, RedState, The Blaze, and The Daily Caller are extreme conservative, whereas Addicting Info, AlterNet, Daily KOS, and Occupy Democrats are extreme Liberal. A typical political disinformation source in this list has nearly 2.5 million followers in

Facebook.

In a similar vein, we focused on posts in Facebook pages of ten well-established news organizations to construct our true news (i.e., political information) sample. This list includes Associated Press, BBC News, Bloomberg, NPR, Reuters, Politico, The Hill, The New York Times, The Wall Street Journal, and The Washington Post. On average, these news organizations were founded nearly 100 years ago, and many of them won the Pulitzer Prize for their achievements in American journalism. While journalists and political editors in these news organizations may hold certain biases stemming from their personal opinions, they are required to comply with professional ethics, promulgated by the Society of Professional Journalists Code of Ethics. This compliance in part constrains personal biases from spilling into fact reporting, which in turn minimizes partisan bias in this list (compared to the list of hyper-partisan disinformation sources). Nonetheless, the data provided by Bakshy et al. (2015) indicates that except The Hill and The Wall Street Journal (which have a minor tilt in the conservative direction), stories from the list of well-established news organizations are shared more by neutral and liberal users in Facebook.

Under a university-approved IRB, we used Facebook Graph API to extract all public data from the verified Facebook pages of our twenty selected sources throughout February 2018. We scraped post headings, links, and all publicly available user comments on each post. Given the recent privacy concerns with Facebook, we did not collect any user specific data (e.g., gender and age). In summary, no information in our data can trace comments back on Facebook or identify users.

#### 4.1.1. Text data cleaning

User comments in Facebook contain a lot of noise, such as misspelled words, shorthand notations (e.g., LOL for laugh out loud), and non-textual content such as emojis (images of faces, objects, and symbols) and emoticons (punctuation marks, letters, and numbers used to create pictorial icons to display emotions). We cleaned all user comments in our data by first replacing non-ASCII values, HTML tags, escape characters, emojis, and emoticons with their relevant text representations. We then fixed the shorthand or colloquial conventions as suggested by Pennebaker, Booth, Boyd, and Francis (2015); e.g., by replacing notations like b/and 'cause with their corresponding proper words between and because. In addition, we replaced consecutive non-alphanumeric characters with the appropriate single character (e.g., ??? with ?). This process also eliminated user comments that just had a single non-alphanumeric character.

Next, we replaced masked swear words with actual ones (e.g., F@# % with fuck and a55 with ass). For this step, we drew on the list of popular swear words suggested by Wang, Chen, Thirunarayan, and Sheth (2014) and supplemented that with additional swear words we observed in our data. In summary, we found 381 unique combinations of masked swear words in user comments. Finally, we used the Hunspell spellchecking library (hunspell.github.io) to correct the misspelled words in user comments.

Our final data sample consisted of 2,074 political posts, which included 1,316 disinformation and 758 information (true news) posts, along with publicly available user comments on them.

#### 4.2. Measures

To compute the affective and cognitive measures, we employed the Linguistic Inquiry and Word Count (LIWC) software (for details, see Pennebaker, Boyd, Jordan, & Blackburn, 2015). The LIWC2015 dictionary contains words, word stems, punctuations, numbers, and short phrases prevalent in social media texts. The dictionary is structured hierarchically into several sub-dictionaries, each tapping a basic affective or cognitive dimension. In addition to words, the LIWC2015 dictionary contains word stems. For example, its anger dictionary includes 'kill', which allows for any target word that matches the first four letters to be counted as an anger word. Of note, the LIWC2015

dictionary has gone through a rigorous validation process, involving up to eight judges working in seven steps, which took several years to complete. It has been tested on over 80,000 blog posts, novels, natural speeches, expressive writings, and New York Times articles (totaling over 231 million words), and the LIWC2015 dictionary captured over 86 percent of the words on average. Prior research has also validated the LIWC word categories across different psychological domains (Pennebaker, Boyd, et al., 2015).

To examine the cognitive and affective responses prompted by political disinformation and information in Facebook, we conducted the present analysis at the Facebook post level (as a unit of information/disinformation in Facebook). For each Facebook post in our data, accordingly, we concatenated all (cleaned) publicly available user comments left on that post. This in turn related every Facebook post in our data to one (and only one) corpus of user comments left on that post. By focusing on the post level, we were able to capture all cognitive and affective content of responses that a unit of political disinformation or information prompted among Facebook followers.

Toward this end, we used the LIWC2015 software to compute the affective and cognitive measures for each corpus of user comments. Specifically, we scored each corpus for positive emotions, basic negative emotions, incivility, and cognitive thinking. For basic negative emotions, the LIWC2015 dictionary allows for scoring each comments corpus for anger, anxiety, and sadness, which is in line with the hierarchical organization of emotion concepts (Shaver, Schwartz, Kirson, & O'Connor, 1987). For incivility (offensive language), we used the LIWC2015 swear dictionary with 131 offensive words and word stems.

To capture cognitive thinking, we used the LIWC2015 analytical thinking, a new summary variable in the LIWC software suggested under Categorical-Dynamic Index (for details, see Pennebaker, Chung, Frazee, Laverne, & Beaver, 2014). Analytical thinking captures the categorical language style (i.e., cognitive complexity and intensive abstract thinking) by scoring the degree of logical, formal, and hierarchical thinking patterns in texts, which is then summarized into an overall metric using principal component analysis on eight function word dimensions.

To ensure the robustness of the cognitive and affective measures, we excluded any Facebook post whose corresponding user comments corpus contained less than 50 words, given the concerns with interpreting LIWC2015 scores from such short texts (LIWC, n.d.). In summary, each tuple in the final dataset was comprised of a Facebook post with a flag for information/disinformation (and a follow-up flag for extreme conservative/extreme liberal, if the post was flagged as political disinformation), along with the affective and cognitive responses the post prompted among Facebook followers, captured by the LIWC2015 scores for positive emotion, sadness, anxiety, anger, incivility (offensive language), and analytical thinking (which were computed from the corpus of comments left by Facebook followers on the post).

#### 5. Results

To examine the first research question discussed in §2.1, we conducted a multivariate analysis of variance on comments corpora left on the 2,074 posts (see §4.2) to compare the affective and cognitive responses that political disinformation and information prompted among Facebook followers. The vector of dependent variables was comprised of analytical thinking, positive emotion, sadness, anxiety, anger, and incivility. Given the two groups with sufficiently large samples (1,316 disinformation posts and 758 information posts), we let Multivariate Central Limit Theorem relax the multivariate normality assumption. The MANOVA results indicated that the two vectors of dependent variables were significantly different; that is,  $Wilk's \Lambda = 0.88$ ,  $F = 46.9$ , and  $p < .0001$ .

We conducted a series of Welch's ANOVAs to examine the univariate differences in specific cognitive and affective dimensions (see Delacre,



**Table 1**  
Responses to political disinformation and information (true news).

Dependent variable	Disinformation (n = 1,316)	Information (n = 758)	Welch's t	P
Analytical thinking	61.0	66.7	91.1	< .0001
Positive emotion	3.75	4.16	22.1	< .0001
Incivility	0.62	0.32	189.1	< .0001
Anger	1.48	1.08	11.3	.0008
Anxiety	0.31	0.37	102.3	< .0001
Sadness	0.59	0.63	1.4	.24

Lakens, & Leys, 2017 for benefits of Welch's ANOVA). Table 1 suggests that compared to true news, an average disinformation post in Facebook received a significantly less analytic response from followers. Similarly, Facebook followers expressed significantly less positive emotion in reply to political disinformation than to true news.

On the other hand, user responses to political disinformation were filled with significantly greater anger and incivility than responses to political information (true news). The strengths of these vitriolic responses to political disinformation and information were of striking contrast; e.g., an average response that political disinformation prompted among its Facebook followers was nearly two times more uncivil than the one prompted by true news. While the results indicated no significant difference in sadness, user responses to true news were filled with greater anxiety.

To answer the second research question on user responses to extreme conservative and extreme liberal disinformation in Facebook, we conducted another multivariate analysis of variance, yet this time on the pool of comments corpora left on political disinformation posts in our data (N = 1,316). Of the 1,316 disinformation posts in the sample, 726 were extreme conservative and 590 were extreme liberal. The vector of dependent variables was again comprised of analytical thinking, positive emotion, sadness, anxiety, anger, and incivility. The MANOVA results suggested that the two vectors were significantly different, with Wilk's  $\Lambda = 0.83$ ,  $F = 45.1$ , and  $p < .0001$ .

Table 2 contains the results of Welch's tests on specific cognitive and affective dimensions of responses to extreme conservative and liberal disinformation in Facebook. In terms of cognitive thinking, there was no significant difference between responses to extreme conservative and extreme liberal disinformation after applying the Bonferroni correction. Likewise, there was no significant difference in positive emotion between responses to extreme conservative and liberal disinformation.

Interestingly, however, our findings in part challenge previous research findings about the prevalence of incivility and outrage in Republican political discourses. Specifically, while there was no significant difference in sadness, responses to extreme liberal disinformation were filled with significantly greater incivility, anger, and anxiety. In fact, the level of incivility in an average response to extreme liberal disinformation in Facebook was more than two times larger than

**Table 2**  
Responses to extreme conservative and extreme liberal disinformation.

Dependent variable	Extreme conservative (n = 726)	Extreme liberal (n = 590)	Welch's t	p
Analytical thinking	61.5	60.3	3.5	.06
Positive emotion	3.8	3.7	2.6	.11
Incivility	0.41	0.87	211.8	< .0001
Anger	1.22	1.81	148.2	< .0001
Anxiety	0.27	0.36	25.6	< .0001
Sadness	0.58	0.61	0.8	.39

the level of incivility in an average response to extreme conservative disinformation. We discuss these findings in §6.

## 6. Discussion

### 6.1. Cognitive and affective responses to political disinformation and true news

The purpose of the present study was to examine the cognitive and affective responses that political disinformation prompted in Facebook, as the most popular social media platform. The results are broadly consistent with the heuristic-systematic model of social information processing, in that Facebook followers—who have exposed themselves to political disinformation—are less motivated to ignore partisan cues for cognitive scrutiny of disinformation, which can disrupt their selective exposure and increase cognitive dissonance. This is in part reflected in our finding that user responses to political disinformation in Facebook were less analytic than responses to true news.

In a similar vein, lower levels of positive emotion in responses to political disinformation were expected, given the dominance of negative partisanship in disinformation pages. To provoke visceral responses, political disinformation sometimes pushes this negativity to incivility and outrage through ad hominem and combative information. Taken together with the heuristic mode of processing disinformation and the corresponding role of partisan cues, this could in part explain the fierce anger and incivility in responses to political disinformation in our results.

Our finding about the opposite directions of anger and anxiety in responses to political disinformation is in line with previous findings in political psychology. That is, while anger reduces the cognitive effort put into thinking about politics, anxiety enhances both quantity and quality of political information seeking and thoughtfulness (Brader & Marcus, 2013; Huddy, Feldman, & Cassese, 2007). In our results, too, analytical responses to true news (compared to disinformation), carried significantly less anger but greater anxiety. This is also consistent with Weeks, (2015) findings about susceptibility to political disinformation, in that while anger encourages partisan evaluation of disinformation, anxiety promotes beliefs based less on partisanship and more on information.

Social comparison theory may explain our finding about the prevalence of offensive language in responses to political disinformation. Through opinion-based social comparisons in a disinformation page in Facebook, the user may learn that her partisan beliefs are not considered abnormal. This could in turn polarize her opinions as she pushes the partisanship (expressed in her comments) toward extremes to present a desirable image of herself to the group. At the same time, exposure to uncivil political discourses in the disinformation page may liberate the user from social constraints on using offensive language to express her strong emotions.

Compared to political disinformation, true news is not packaged in a way to evoke strong emotional responses. Furthermore, articulating moderate emotions (i.e., sadness and anxiety; see Shaver et al., 1987) is not as socially constrained as using angry and offensive language. In other words, Facebook followers seem to freely express their sadness and anxiety in reply to true news. This is also in line with what we discovered in the data provided by Bakshy et al. (2015), in that news stories from the well-established sources are mostly shared by neutral and liberal users in Facebook (who may be sad and anxious about the concurrent political events).

### 6.2. Responses to extreme conservative and liberal disinformation

Political disinformation in Facebook has been contributing to the rise of polarization in the American public (Tucker et al., 2018). Motivated by this concern, in this study we examined the cognitive and affective responses that extreme conservative and liberal

disinformation prompted in Facebook. Our results in part challenge previous research findings about the prevalence of anger and incivility in Republican political discourses. For example, Sobieraj and Berry (2011) found that right media outlets engaged in more outrageous and uncivil discourses than left media, and Nithyanand et al. (2017) found that the rise of incivility in political discourses in Reddit was overwhelmingly located on Republican subreddits. By contrast, our results indicated that user responses to extreme liberal disinformation in Facebook were filled with greater anger and incivility. Furthermore, while Nithyanand et al. (2017) found that Democratic political discourses in Reddit were more linguistically complex than Republican ones, our results indicated no significant difference in cognitive complexity between responses to extreme conservative and liberal disinformation in Facebook.

However, we should note the differences in context and timing between our study and Sobieraj and Berry (2011) and Nithyanand et al. (2017). First, Sobieraj and Berry (2011) and Nithyanand et al. (2017) studied political discourses in media outlets (e.g., cable news) and Reddit respectively, whereas our work studied user responses to extreme conservative and liberal disinformation in Facebook. Furthermore, Sobieraj and Berry's (2011) findings concern the spring of 2009—right after Obama's presidential term started, which could partly explain the outrage in the right discourse. On the other hand, Nithyanand et al. (2017) results pertain to the period of May 2016 to May 2017, half of which concerned the 2016 US presidential elections while Democrats were still in the White House. By contrast, our data belongs to February 2018, more than a year after Donald Trump came into power despite all polls, which may explain the outrage, offensive language, and anxiety in responses to extreme liberal disinformation in Facebook. In summary, we suspect one cannot attribute the incivility and outrage in online political discourses (at least in political disinformation pages in Facebook) to a specific political party without considering the timing and concurrent political events.

### 6.3. Limitations and opportunities for future research

Future research can alleviate the present study's limitations and advance it in different directions. First, the present study examined the cognitive and affective responses prompted by political disinformation and information from a list of twenty popular sources in Facebook. Future research can be conducted using a more comprehensive list of disinformation and information sources. Second, our data sample was limited to February 2018, and hence offered a cross-sectional view of user responses. Future studies can extend this to longer durations to examine the discovered patterns along a longitudinal perspective to a course of political events. Third, we studied user responses to a wide swath of political news in Facebook. Future research may explore if and how cognitive and affective responses to information disorder extend to specific topics such as gun control, abortion, or global warming. Finally, although most of the user comments in our sample were from followers of political information and disinformation sources (i.e., we scraped comments from information and disinformation posts in the source pages in Facebook), we were not able to eliminate those comments that were not from Facebook followers, since we did not collect any user specific data for privacy concerns.

Continuing in the same vein, future research can study the cognitive and affective responses that political disinformation prompts among users with opposing viewpoints. Findings from political psychology suggest that people, especially those with greater political sophistication (knowledge), spend more time processing and subsequently denigrating political information that does not agree with their prior beliefs, which results in attitude polarization (Taber, Cann, & Kucsova, 2009). This backfire effect also exists in social media, in that exposure to opposing information in Twitter can increase political polarization (Bail et al., 2018). In the context of political disinformation, too, future research can examine cognitive and affective responses to pro- and

counter-attitudinal disinformation. For example, does a liberal user (who follows Occupy Democrats in Facebook) exert more cognitive effort when she encounters a Breitbart post in her Facebook News Feed?

## 7. Conclusion

Political disinformation in social media has been contributing to America's cavernous partisan divides. Despite its limitations and to the best of our knowledge, the present paper is one of the first to study the cognitive and affective responses prompted by political disinformation in Facebook. We conducted the study through text analysis of user comments corpora left on posts from twenty popular sources of political disinformation and true news in Facebook. Our study has the advantage of capturing user emotions and cognitions in their natural settings and does not suffer from reactivity or Hawthorne effect; that is, user responses are not conditioned by forced laboratory exposure to news content.

The results of our analysis point to the lack of cognitive thinking and the prevalence of anger and incivility in responses to political disinformation in Facebook. On the other hand, the results indicated greater anxiety in responses to true news. Further text analysis of comments corpora left on political disinformation indicated that both responses to extreme conservative and extreme liberal disinformation carried similar (low) levels of cognitive thinking, as well as positive emotion. Yet, responses received by extreme liberal disinformation were filled with significantly greater incivility, anger, and anxiety, which suggests that the incivility and outrage in online political discourses (at least in disinformation pages in Facebook) should not be attributed to a specific political party without considering the concurrent political events.

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