

The careful reader may notice that the corresponding author here, Chris J. Vargo is also the editor of the journal. This manuscript went through blind peer review under the previous editor, Salma Ghanem, and was accepted before Chris assumed editorship, but is just now appearing due to our backlog.

**Attention to issues and facts:**

Assessing the role of need for orientation as a predictor of political news sharing on Facebook

Need for orientation (NFO) has long been accepted as an antecedent to agenda-setting effects. This study assessed whether NFO can go further to explain a specific behavior, why individuals share political news on Facebook. A new method is introduced that combines survey data with users' Facebook accounts and their actual Facebook posts to reveal the historical news sharing behaviors of 741 U.S. citizens. Computer-assisted content analysis is employed to analyze nearly a million messages for the presence of political news content. Results suggest that a key component found in need for orientation — attention to relevant issues and facts — predicts observed political news sharing on Facebook. Other demographics such as age and gender also predict news sharing behavior. In all, the model employed here significantly predicts news sharing while commonly regarded antecedents to political sharing, including news consumption and political interest, fail to do so.

**Keywords:** Facebook, need for orientation, news sharing, politics, computational social science, social media



News diets are increasingly digital with 62% of U.S. adults now getting news through social media (Lee & Ma, 2012; Matsa & Lu, 2016). Beyond consumption, social media platforms afford the ability to share news with friends. Sharing via social media helps, in part, to diffuse information on a broad range of important issues (Hermida, Fletcher, Korell, & Logan, 2012). Many have studied the flow of news through social networks (Bakshy, Rosenn, Marlow, & Adamic, 2012). When studying networks and diffusion, scholars have shown that some people are more influential than others (Goyal, Bonchi, & Lakshmanan, 2010). Moreover, scholars have learned that certain types of news content are shared more than others: “soft news” tends to be shared more than “hard news” (Horan, 2013). News content that evokes emotional responses, such as outrage or awe, also sees increased amounts of shares (Berger & Milkman, 2012).

Beyond the content types and underlying social network formations that tend to drive news, little is known about the motivating factors that influence individuals to share news (Kümpel, Karnowski, & Keyling, 2015). The few studies that exist focus largely on demographic factors, political interest factors, or broad motivational orientations (Karnowski, Kümpel, Leonhard, & Leiner, 2017; Weeks & Holbert, 2013). This study expands on the reason behind the most discussed driver of news sharing on social media — news use — and suggests that a comparatively more precise measure, need for orientation (NFO), may function as a robust predictor of news sharing. Notably, prior research has almost exclusively explored NFO in the context of news consumption. However, we suspect that the NFO, as a motivational state characterized by topical interest, has important implications that extend beyond news consumption.

To test this assertion, we used a combination of survey and the actual, historical Facebook posts of users, specifically the news they shared on Facebook across time. While

previous news sharing studies have only been able to ask participants how likely they would be to share news in hypothetical situations, this study adopts a novel method where social media behaviors are recorded and analyzed. Through the combination of survey data and social media digital trace data, we generate a comprehensive picture of the relationship between individual motivational states and observed news sharing on social media. Using this method, we test NFO, its motivational states, and how it correlates with news sharing. We do so with a relatively robust panel of U.S. respondents ( $N = 741$ ), and identify 5,025 political news articles that these individuals shared across time.

### **Literature review**

When considering the motivating factors an individual might have to share politically oriented news on social media, prior research has generally focused on two antecedents: news consumption and political interest. These factors are generally linked to a broader line of research — uses and gratifications — which assesses the internal forces that motivate media usage decisions (Hanson & Haridakis, 2008; Lee & Ma, 2012). In this manuscript, we review news sharing and its known relationship between political interest and news consumption. We then compare these generalized motivating factors with a precise motivational state: NFO. In so doing, we articulate the theoretical factors that underlie our expectation that NFO will serve as a comparatively more robust predictor of online news sharing.

### News consumption as a driver of online news sharing

Prior research has associated online news consumption with online news sharing. In their investigation of Pew telephone survey data, Weeks and Holbert (2013) attempted to explain the self-report responses of news sharing on Facebook, MySpace, and LinkedIn. The researchers concluded that online news consumption behaviors (e.g., reading news on Facebook, searching the web for news and emailing news to friends) predicted the likelihood that an individual would share news on social media; “Theoretically, it is not surprising that reception of news is the strongest predictor of dissemination. The more people consume news within social media, the more likely they will share that news with others” (p. 226). In the context of Twitter, Holton, Baek, Coddington and Yaschur (2014) found that information-seeking (i.e., the use of Twitter to obtain news and information) played a significant and positive role in the sharing of information via hyperlinks on the platform. Others have since expanded on these findings to suggest that individuals who consume the majority of their news online tend to share news on social media with friends (Beam, Hutchins, & Hmielowski, 2016).

### Political interest as a driver of online news sharing

In addition to news consumption, prior research has linked interest and relevance to news sharing behaviors. Bobkowski (2015) showed participants news articles and asked how likely they were to share the article. In one condition, news content helped participants gain knowledge about a potential threat. In a different condition, the threat was altered to be inapplicable to the individual. Individuals were more likely to say they’d share online news when the threat was relevant.

In a social media-specific context, prior research has shown that Twitter users tend to share links they're interested in and ultimately want to learn more about (Holton et al., 2014). The same relationship exists when considering news content, interest, and sharing (Lee & Ma, 2012). Park, Kee, and Valenzuela (2009) revealed that individuals generate political content on Facebook, in part, because they are interested in politics. This aligns with a broader area of research that suggests individuals use social media in ways that mirror their offline political behavior (Gil de Zúñiga, Jung, & Valenzuela, 2012).

In all, news consumption is a logical, and proven antecedent to news sharing. As such, we expect that those who claim to read more news also share more news content on social media. Similarly, we surmise that those who express political interest also share news as a part of their information seeking process. Those who enjoy reading about politics are surely the ones with highest exposure, and in all, we suspect that this group of people will be most likely to share political news.

**H1: Both news consumption and political interest will be positively related to and explain news sharing behaviors on Facebook.**

Need for orientation

NFO refers to individual-level differences and the need for orienting cues from mass media (Chernov, Valenzuela, & McCombs, 2011). NFO has long been theorized as the psychological explanation of mass media's agenda-setting capabilities (Matthes, 2006). It is thought of as *why people consume news* on a particular issue or topic. McCombs and Weaver (1973) first tested

this notion during the 1972 presidential election. They reasoned that there were two key measurements in understanding an individual's need for orientation: *relevance* and *uncertainty*.

Relevance, as conceived in NFO, is referred to as the *interest* an individual has regarding a particular issue (McCombs, Shaw, & Weaver, 2004). In survey based approaches, self-interest is often used to gauge relevance, particularly as it pertains to politics (Matthes, 2006). Weaver (1977) himself used political campaign interest as a measure of relevance. Uncertainty, on the other hand, is the degree to which individuals are willing to accept additional information, in the form of news coverage, on a particular issue (Weaver, 1977). Uncertainty has been operationalized in many ways including “in terms of the consistency of voting record, strength of political party identification, and degree of certainty about choice of presidential candidate” (McCombs, Shaw, & Weaver, 2014, p. 784). Recent NFO studies have taken strength of political identification (e.g., how ideologically certain an individual is) and used it as a measure of political uncertainty (Camaj & Weaver, 2013). The premise is that those who identify strongly with a political party are also sure of their position as it comes to many political issues.

In moments of uncertainty, individuals attempt to construct a detailed cognitive map of their surroundings to self-orient and reduce dissonance. Individuals are thought to have moderate orientation needs when they possess either high interest and low uncertainty or low interest and high uncertainty. Low orientation needs are the result of low interest and low uncertainty (Weaver, 1980). If an individual had high interest in a political issue and was uncertain about it, that individual would be more likely to seek out information on the topic. Conversely, if individuals had high interest, but low uncertainty, they would likely be unmotivated to seek new information on the issue.

Scholars have shown the ability of NFO at its various levels to predict engagement with news content, and prior research has shown that those with strong orientation needs actively search out news, especially in political contexts (Matthes, 2006). Weaver (1977) found that individuals with a higher interest — but with high uncertainty — used the mass media more. Matthes (2008) also identified interest as an antecedent to news consumption. Karnowski et al. (2017) also studied news engagement and topical interest (e.g., politics, sports, celebrity news, and the economy). When news was topically interesting to the participant, intention to read and intention to look for further information increased, suggesting that news engagement also increases with interest, a core component of NFO.

#### Considering NFO beyond news consumption

When individuals exhibit either high or medium NFO, they are compelled to both consume and process news information. Given its theoretical attributes, others have shown that NFO is an antecedent to news consumption (Weaver, 1977). Here we diverge from extant research on NFO, which has sought to examine the theory in relation to only news consumption behaviors, to assess whether NFO is an antecedent to news sharing. We posit that higher levels of NFO will be associated with heightened levels of news sharing. It stands to reason that as people spend more time curiously learning about a specific issue or topic, they are increasingly likely to share the fruits of their inquiry with others in their social network. Curiosity is surely an antecedent to news consumption (Camaj & Weaver, 2013). However, given that NFO depicts a special type of *attentive* news consumption, here we suspect that NFO will “be more relevant for media effects than mere media exposure” (Camaj & Weaver, 2013, p. 1443).



Moreover, by measuring interest in a topically-focused way, (e.g., interest in politics), NFO also captures individual preferences. Individuals tend to mix and meld their news diets around topical interests (Shaw et al., 1999). This effect may be especially apparent on social media, where users tend to form networks around shared interests and common experiences in an effort to build community (Himmelboim, McCreery, & Smith, 2013). This, combined with a desire to obtain a positive status amongst friends by demonstrating in-depth knowledge on a given subject or topic means that individuals have clear topical preferences on social media (Lee & Ma, 2012). It stands to reason that those who are attentive to political news also have friends on their social media platforms who are also interested in political news. This topically-focused interest may motivate them to share news content on social media. Sharing content with one's social network may itself be understood as a strategy for uncertainty reduction. By sharing news content with others, individuals can solicit feedback and eventually arrive at in-network consensus on a given issue, thereby reducing the dissonance that is found in heterogeneous information environments. Finally, Holton et al. (2014) found that those who post links to content also seek information in that area through what the scholars refer to as "reciprocal linking" (pp. 33). Such reciprocity between news consumption (the focus of NFO studies) and news sharing (the focus of this study) may be evidence that both behaviors are related and animated by an underlying motivational state.

NFO also measures the *attentiveness* of an individual to a specific topic. In newer operationalizations of NFO, the interest variable has been further explicated to measure attention in specific ways. In his three subcomponents, Matthes (2006) identifies individuals' desires to pay attention to issues, facts, and journalistic evaluations. The author defines journalistic evaluations as journalistic assessments of issues, and equates these types of stories to affective

attributes in agenda-setting research. In these ways, NFO has been expanded to not just measure those who, in some vague way, pay attention to news coverage. It measures the degree to which individuals are concerned with and value the substantive details of news reporting in concrete ways. In the current context of political news, NFO measures not just general interest in reading political news, but also, those who value political reporting with attributes that correlate to quality journalism (e.g., quality facts and substantive issues).

Taken as a whole, we suspect higher levels of NFO represents a clear motivational state where individuals are attentively consuming news content, and may have clear motivations to share it. As such, we predict NFO will be a robust predictor of political news sharing on Facebook. While we expect previously identified antecedents to continue to be predictors, our intent here is to assess the degree to which NFO improves our ability to predict online sharing as it pertains to political news.

**H2:** NFO and its interest-related subcomponents will positively predict additional unique variance in political news sharing behaviors on Facebook.

## **Method**

### Digital trace data and survey data

By collecting the actual social media posts of a user, it is possible to retrieve news sharing data that is exhaustive and accurate. This method is in contrast to most studies on news sharing (Weeks & Holbert, 2013) which ask respondents to estimate the degree to which they share news

on social media sites. Such approaches are problematic because it is difficult for respondents to accurately recall the frequency in which they do tasks that are too repetitive to individually enumerate (Tourangeau, 2000). Recall designs are also subject to social desirability bias (Moy & Murphy, 2016), as sharing news on social media, particularly news of social value such as political news, could easily be conceived as socially desirable.

We chose to study Facebook in this research study because it is the single most used social media platform in the U.S. As of April 2016, 68% of all U.S. adults used the service (Social media fact sheet, 2017). Moreover, according to Pew 43% of Americans use Facebook to read news, over double the percentage of any other social media platform (Shearer & Matsa, 2018). As a semi-public platform, Facebook presents numerous difficulties as they pertain to researchers' abilities to examine on-site behaviors (Zhang & Leung, 2015). Most notably, and in contrast to Twitter, the Facebook Graph Application Interface (API) no longer allows for public scraping of user accounts (Zhang & Leung, 2015).<sup>1</sup> This Facebook data is of particular interest to the study. When users share news to Facebook, the most commonly do it on their own personal profile page. To address this limitation, we employed a novel method.

#### Facebook data collection

This study created a program that allowed users to release their full, historical archive of Facebook content to us for academic research. To do this, first a panel of participants were recruited through Qualtrics and their panel recruitment service. Qualtrics provides web-based software for collecting survey data. They also run a panel recruitment service that recruits and

<sup>1</sup> An API is the formal way to request and receive data a service, in this case Facebook.

compensates participants for completing surveys. We asked Qualtrics to only recruit a sample of U.S. people whose native language is English and reported to regularly use Facebook.

Participants were asked to complete a survey via the Qualtrics platform. Participants were provided with a consent form that articulated data collection. Our university's institutional review board (IRB) vetted and approved all study procedures. The Qualtrics application created an anonymous identification code, which was piped to a custom web application that the researchers designed. This service asked users to link their Facebook accounts by signing in. The users were then prompted by a dialog box, from Facebook which informed users that our application was about to access their Facebook posts. The users' acceptance authenticated the researchers and allowed them to retrieve the actual posts of users in the study. This content included status updates (mobile or desktop), notes, stories, and wall posts. This was done through the Facebook Graph API. Data was downloaded in raw JavaScript Object Notation format, a nested data structure often used to store data with text. Data was stored on a secure sever and was processed in Python, a leading script-based programming language popular amongst data scientists. All Facebook data for each user, from their very first post on the platform, was downloaded. The data was downloaded on June 3, 2017, so we had full historical archives for participants up until that day. A total of 892,596 posts were collected. Obviously, some users had more active accounts than others. See the "Control Measures" section of this method section for how we controlled for active platform duration length.

Screening of political posts

Facebook users have the option to generate many different types of content. For the purpose of this study, we looked at content where users could easily share political news content. Content types looked at were status updates (mobile or desktop), notes, stories and wall posts. Because the literature and relevant hypotheses dealt with the propensity to share news about political matters, Facebook posts needed to be identified on the basis of whether they were political or not for the purpose of assembling the analytic sample.

One hundred messages were chosen at random using NumPy's random sample generator, a popular Python library (Bressert, 2012). Two independent coders coded the data. They made a binary decision on whether the posts mentioned political talk (0 = no, 1 = yes). Political talk was coded as being present if a post: 1) mentioned a political figure; 2) discussed or was related to public policy [e.g., tax, policing, military, health]; 3) discussed legislation or legislative actions; 4) discussed municipal or local political issues; 5) mentioned high profile social issues; 6) mentioned the election or voting; or 7) was related to the Supreme Court or other high profile judiciary proceedings [e.g., the Trump Administration's Muslim ban].

Of the 100 decisions, the two coders disagreed once ( $\kappa = .80$ ). A random sample of 1,000 additional posts were then randomly selected and then distributed to the two coders. Both coded the data to see if they contained political talk. The annotations were used to build a supervised machine learning algorithm inside of the DataRobot platform (Pearson, 2017). Of the available algorithms, the AVG Blender, a neural network ensemble model, had the highest performance scores and was ultimately chosen.<sup>2</sup> After the initial model was built, subsequent

<sup>2</sup> This particular ensemble model was an average prediction score from the following models: Random Forests (Breiman, 2001), Gradient Boosted Greedy Trees with early stopping (Friedman, 2001) and Kernel SVM classifiers (Caputo, Sim, Furesjo, & Smola, 2002). Ensemble models can deliver superior classification due to their ability to leverage multiple machine

rounds of Facebook posts were randomly chosen, stratifying across both highly scored predictions, middle predictions, and low predictions to help reinforce learning across both classes. In all 5,006 (3,937 unique) annotations were made by the two researchers. Performance metrics went through 10-fold cross validation, each time training on a randomly selected 64% ( $n = 3,136$ ) of the data. The final model had a  $F_1 = .88$  and  $AUC = 0.98$ , suggesting that precision and recall for the algorithm were excellent (Fawcett, 2004). An accuracy of 94.66%, a false positive score of 3.72%, and a Matthews Correlation Coefficient of 0.85 all suggest that despite bias in classes (i.e., most Facebook messages were not political) the algorithm distributed its misclassifications evenly and was not prone to a specific type of error (Silva, Anuniação, & Lotz, 2011). A total of 9,841 political posts were identified for the 782 users. This means that only 1.1% of all Facebook posts generated by users were political in nature.

## Measures

### *Political news shares on Facebook*

Using the corpus of users' political posts, we next extracted, for each user, posts containing shared news content. If a URL was shortened, it was expanded to its final destination using Python's request functionality. Vargo, Guo and Amazeen (2018) published list of "credible" (a.k.a. established, journalistic) media sources. This list of sources was used to extract news content by media type from the Facebook posts. Many of the top URLs were vanity links (e.g.,

learning models at once and average predictions and eliminating effects of outlier models (Zhou, Wu, & Tang, 2002).

cnn.it, huff.to, bzfd.it), or had subdomains (e.g., news.yahoo.com). To address this, 700 of the most posted top-level domains were visited to investigate whether they were indeed news sites. This represented all domains that were posted at least 80 times in the dataset. These top 700 domains represented 694,610 unique URLs (80% of all the URLs in the entire dataset). Vargo et al.'s (2018) list covered 98.57% of news sites found in the list. Of the 700 domains, only 10 news websites were found that were not in the list. These media outlets were added. In addition, while there were very few occurrences, matching UK media were added (theguardian.com, independent.co.uk and dailymail.co.uk). In all, 5,025 political news shares were identified (51.06% of all political commentary) by the 782 users ( $M = 6.71$ ,  $SD = 43.24$ ). This means that only .56% of all Facebook posts generated by users were political news.

### *Political interest*

Political interest was measured using a single item (*I'm interested in politics*) placed on a seven-point Likert-type scale where 1 = strongly disagree and 7 = strongly agree ( $M = 5.56$ ,  $SD = 1.47$ ).

### *News use*

News use was measured using a single item that asked respondents to approximate the frequency with which they consume news content either online or in hardcopy (1 = never, 7 = frequently;  $M = 4.21$ ,  $SD = 2.05$ ).

### *NFO*

Because there exists some ambiguity on how to best measure NFO (see Matthes, 2006 and Chernov et al., 2011), two different approaches were used. The first approach was taken from Chernov et al. (2011). Here, general political interest was used as an indicator of political relevance. The uncertainty indicator was formed by recoding the measure of ideological voting preference into a four-point measure where more moderate responses were coded higher (accomplished by inverting the political certainty measure;  $M = 2.53$ ,  $SD = 1.15$ ). Next, the relevance scores were squared and subsequently multiplied by the uncertainty measure. The resultant continuous measure ( $M = 77.09$ ,  $SD = 44.69$ ) reflected “the notion that at low levels of relevance, NFO is low, while at higher levels of relevance, uncertainty must be taken into consideration” (Chernov et al., 2011, p. 149).

A second approach to the measurement of NFO involved using Matthes’ (2006) 9-item measure of interest/attentiveness. This conceptualization of NFO encompasses three (proposed) theoretically distinct NFO subcomponents. The first component, orientation toward issues, was measured using the following three items: *I want to be instantly informed about recent developments in politics*; *It is important for me to constantly monitor issues related to politics*; and *I would like to hear something about politics every day* ( $M = 5.08$ ,  $SD = 1.42$ ;  $\alpha = .92$ ). The second component, orientation toward facts, was also measured using three items: *I want to know/learn about many different sides of American politics*; *I would like to be thoroughly informed about the specific details of political decisions made by elected officials*; and *As it relates to politics, I expect the news media to provide detailed background information* ( $M = 5.41$ ,  $SD = 1.27$ ;  $\alpha = .86$ ). Finally, orientation toward evaluations was measured with three items: *I attach great importance to the political commentaries voiced by members of the mass*



*media; It is interesting to see how members of the news media comment on politics; and Whenever appropriate, members of the news media should state their opinions on politics* ( $M = 4.41$ ,  $SD = 1.51$ ;  $\alpha = .81$ ).

Notably, prior research suggests the presence of discriminate validity issues as they pertain to independence of the proposed subcomponents (Chernov et al., 2011). As such, we conducted an exploratory factor analysis. To first determine the number of factors to retain, a parallel analysis using 500 random permutations of the data was conducted. The results of this analysis suggested that the nine NFO items were best represented by two factors (real data eigenvalues: Root 1: 5.46, Root 2: 1.23, Root 3: 0.58 and simulated data eigenvalues [95<sup>th</sup> percentile]: Root 1: 1.17, Root: 1.15, Root 3: 1.10). Using a two-factor specification, an exploratory factor analysis was next conducted using maximum likelihood extraction and Promax rotation. The resulting solution explained 67.0% of the variance. Using the .60/.40 heuristic to inform scale inclusion, we used the results to create a five-item combined measure of issues and facts-based NFO ( $M = 5.21$ ,  $SD = 1.32$ ,  $\alpha = .94$ ) and a three-item measure of evaluations-based NFO. Table 1 shows the results of the exploratory factor analysis. Table 2 shows the zero-order correlations between the various NFO measures.

Table 1. Exploratory factor analysis of Matthes' (2006) NFO scale

	<b>Factor 1</b>	<b>Factor 2</b>
<i>I want to be instantly informed about recent developments in politics</i>	<b>0.92</b>	-0.05
<i>It is important for me to constantly monitor issues related to politics</i>	<b>0.91</b>	-0.02
<i>I would like to hear something about politics every day</i>	<b>0.83</b>	0.02
<i>I want to know/learn about many different sides of American politics</i>	<b>0.84</b>	-0.01
<i>I would like to be thoroughly informed about the specific details of political decisions made by elected officials</i>	<b>0.87</b>	-0.03
<i>As it relates to politics, I expect the news media to provide detailed background information</i>	0.49	0.28
<i>I attach great importance to the political commentaries voiced by members of the mass media</i>	-0.10	<b>0.94</b>
<i>It is interesting to see how members of the news media comment on politics</i>	0.13	<b>0.64</b>
<i>Whenever appropriate, members of the news media should state their opinions on politics</i>	-0.07	<b>0.76</b>
% Variance Explained	45.5%	21.5%

Note: Bolded items were included in final NFO scales. The first five items comprised the combined issues/facts scales and the last three items comprised the evaluations scale.

Table 2. Zero-order correlations between various NFO measures

	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
NFO Issues Measure (3-item) (1)		.81	.53	.97	.37
NFO Facts Measure (3-item) (2)			.57	.90	.38
<b>NFO Evaluations Measure (3-item) (3)</b>				.55	.24
<b>Combined Issues/Facts (5-item) Measure (4)</b>					.39
<b>Traditional NFO Measure (5)</b>					

Note: Bolded measures included in final models; all correlations significant at  $p < .01$

### Control measures

Using the Weeks and Holbert (2013) study as a guide, a number of factors were controlled for, including participant gender (0 = male, 1 = female; 58.6% female), participant age (in years;  $M = 39.41$ ,  $SD = 12.91$ ), whether or not they voted in the 2016 presidential election (0 = no, 1 = yes; 83.9% voted in 2016), who they voted for (0 = did not vote or voted someone other than Donald Trump, 1 = voted for Donald Trump; 30.8% Trump voters), political certainty (1 = strongly

liberal, 7 – strongly conservative;  $M = 3.71$ ,  $SD = 1.85$ )<sup>3</sup>, and overall Facebook usage intensity (*How often do you use Facebook?*; 1 = never, 7 = frequently;  $M = 6.46$ ,  $SD = 1.09$ ). Finally, we also measured the length of each respondent’s platform activity duration, which was calculated by measuring the number of days between the respondent’s first and last post ( $M = 2,645$  days,  $SD = 847.23$  days). To aid model convergence, this measure was subsequently converted to years ( $M = 7.25$  years,  $SD = 2.32$  years).

### Missing data analysis

A total of 782 valid responses were acquired. To examine patterns of missingness in the data, Little’s missing completely at random (MCAR) test was performed on the variables of interest. The results of this test suggested that data were, in fact, missing completely at random,  $\chi^2(106) = 106.19$ ,  $p > .05$ . As such, analyses focused on data collected from study participants who provided complete responses ( $N = 741$ ).<sup>4</sup>

### Analytic plan

The outcome variable of interest (number of political news shares on an individual’s Facebook page) took the form of over dispersed count data, rendering both traditional OLS and Poisson regression techniques inappropriate (Hilbe, 2014). Per Hilbe (2014), other models were fitted before selection of the negative binomial approach, including Poisson, Poisson-linked, and a

<sup>3</sup> This was recoded into a four-point measure where strong ideological preferences were assigned higher scores (i.e., 1 or 7 recoded as 4, 2 or 6 recoded as 3, 3 or 5 recoded as 2, 4 recoded as 1;  $M = 2.48$ ,  $SD = 1.15$ ).

<sup>4</sup> All reported descriptive statistics are from those that provided complete data ( $n = 741$ ).

series of hurdle and zero-inflated models.<sup>5</sup> Tests of fit and appropriateness suggested that the negative binomial approach was optimal. As such, negative binomial regression models were used for the purposes of hypotheses testing. Notably, the respondents in the current sample were active on the platform for varied periods of time, which could subsequently influence the number of posted news items. To account for this potentially confounding factor, a series of discrete models were estimated. First, a model controlling for the effects of site activity duration was modeled. Second, in addition to estimating a full sample model, all hypotheses were also tested using a subsample of users with a site membership duration at or above the full sample median (2,829 days/7.75 years;  $n = 370$ ). This model also specified site activity duration as a covariate. We reasoned that use of a reduced sample of longtime users, while also controlling for site activity duration, provided a fairly stringent means of assessing the stability of the parameter estimates of interest. Third, a proportional intensity (or offset) model was estimated. Proportional intensity models adjust for varying observation periods, resulting in an estimated coefficient that represents a rate of occurrence relative to a given time interval (here, shares per person per year). For the purposes of clarity, these models are referred to as the *full sample model*, the *reduced sample model*, and the *proportional intensity model*, respectively. For the hypothesis to be supported, we required the presence of a statistically significant effect to be present in all three models. As Hilbe (2014) specifies, robust standard errors (acquired via the HC0 estimator) were obtained for all model coefficients.

## Results

<sup>5</sup> For a review of the aforementioned models, see Ridout, Hinde and DeméAtrio (2001).

A review of the descriptive statistics for the final analytic sample can be found in Table 3. In addressing H1, as shown in Table 4, we did not observe consistently significant relationships between the criterion variable and the news consumption and political interest variables. Specifically, news consumption was only a significant predictor in the full sample model. Political interest was not significant in either of the three models. H1 is rejected.

H2 asserts that NFO will predict political news sharing on Facebook, even after accounting for factors more commonly tied to news sharing (news consumption, political interest and other control variables). We failed to identify a significant relationship between the traditional measure of NFO and political news shares in any of the estimated models.

We did, however, see a positive and significant relationship between the combined issues and facts NFO measure and political news shares in all three models. In the full-sample model, a 1-unit increase in the combined issues/facts NFO model was associated with a 48% increase in political news shares. In the above-median model, this effect was stronger, specifically such that a 1-unit increase in the combined issues/facts NFO measure was associated with a 72% increase in news shares. Finally, in the proportional intensity model, a 1-unit increase on the combined issues/facts measure was associated with a 65% increase in the annual rate of political news shares. Surprisingly, however, the need for evaluations measure was negatively related to political news shares. In the full-sample model, a 1-unit increase on the evaluations measure was associated with 25% decrease in political news shares while in the above-median sample, a 1-unit increase on the evaluations measure was associated with 48% decrease in the frequency of political news shares. In the proportional intensity model, a 1-unit increase on the NFO evaluations model was associated with a 26% decrease in political news shares per year.

Given that the goal of H2 was to assess the general degree to which NFO accounts for variability in social media-based political news sharing behavior after accounting for the effects of news consumption and political interest, we interpreted the results as partially supportive of the posited hypothesis. While the traditional NFO measure was not predictive, the combined NFO measure held significant throughout.

Table 3. Descriptive Statistics for Continuous Items

<b>Variable</b>	<b>M</b>	<b>SD</b>	<b>Alpha</b>
Relevance	5.56	1.47	---
Conservatism	3.71	1.85	---
Ideological Certainty	2.48	1.15	---
Ideological Uncertainty	2.53	1.15	---
News Use	4.21	2.05	---
Need For Orientation (Chernov et al. Measure)	77.09	44.69	---
Need For Orientation (Issues) [Matthes Scale]	5.08	1.42	0.92
Need For Orientation (Facts) [Matthes Scale]	5.41	1.27	0.86
Need For Orientation (Evaluations) [Matthes Scale]	4.41	1.51	0.81
Need For Orientation (Issues/Facts Combined) [Matthes Scale]	5.21	1.32	0.94
Age (years)	39.41	12.91	---
Facebook usage Intensity	6.46	1.09	---
Platform Activity Duration (years)	7.25	2.32	---

News sharing on Facebook

Table 4. Negative binomial models used to assess the relationship between NFO and political news sharing on Facebook

	Full Sample Model			Reduced Sample Model			Proportional Intensity Model		
	<i>b</i>	se <sub>r</sub>	Exp(B)	<i>b</i>	se <sub>r</sub>	Exp(B)	<i>b</i>	se <sub>r</sub>	Exp(B)
Facebook Activity Duration (Years)	0.07	0.05	1.08	0.11	0.11	1.11	--	--	--
Facebook Intensity	0.34**	0.10	1.40	0.26**	0.10	1.29	0.37**	0.11	1.44
Age	0.04**	0.01	1.05	0.05**	0.01	1.05	0.05**	0.01	1.05
Gender (1 = Female)	-1.07**	0.20	0.34	-0.55*	0.24	0.58	-0.89**	0.23	0.41
2016 Voter (1 = Yes)	0.61*	0.30	1.83	0.73**	0.28	2.07	0.45	0.33	1.58
Trump Voter (1 = Yes)	-1.50**	0.26	0.22	-1.61**	0.24	0.20	-1.65**	0.29	0.19
News Consumption	0.15**	0.05	1.16	0.16*	0.06	1.18	0.12	0.06	1.12
Political Interest	-0.11	0.25	0.90	0.29	0.20	1.34	-0.12	0.27	0.88
Political Certainty	0.89**	0.27	2.43	0.13	0.24	1.14	0.96**	0.29	2.60
Traditional NFO Measure	0.01	0.01	1.01	0.00	0.01	1.00	0.01	0.01	1.01
NFO Issues/Facts Measure	0.39**	0.13	1.48	0.55**	0.13	1.72	0.50**	0.19	1.65
NFO Evaluations Measure	-0.29**	0.08	0.75	-0.47**	0.08	0.62	-0.30**	0.11	0.74
Log Likelihood Ratio ( <i>df</i> )			139.00(12)**			92.53(12)**			126.80(11)**
Pearson $\chi^2$			890.85			370.53			1217.70
Dispersion Statistic			1.22			1.04			1.67
Dispersion Parameter ( $\alpha$ )			4.60			3.10			4.88

Note: \*  $p < .05$ , \*\*  $p < .01$

## Discussion

The findings here provide partial support for NFO as an additional factor that should be considered as a predictor of political news sharing on social media. Specifically, the present data suggest that two components found in the Matthes (2006) operationalization of NFO – interest in political topics and facts – have implications that extend beyond news consumption, which has been the NFO’s traditional focus. In our model, the issues and facts/component of NFO outperformed other more conventional factors (news consumption and political interest).

This study raises a potentially problematic finding. Individuals’ accounts of the degree to which they have interest in politics and consume news have been widely thought as antecedents to social media news sharing. The intuition is simple, the more individuals are interested in politics, and purports to read news, the more likely they are to share it with friends online. Prior research has relied on participants’ recall (e.g., *how many articles did you share in the last month?*). Our data was unable to replicate these findings. Our method here concretely measures the amount of political news content each user shared on the platform. It erases concerns related to self-report measures, such as social desirability bias and the recall of minor, repetitive tasks. The inability to replicate these findings reopens the question as to what best drives individuals to share news on social media. Here we invite scholars to begin to rethink the question, or develop better survey mechanisms that will correlate with actual behavior, as opposed to self-recall measures.

Unsurprisingly, the more individuals post public content to Facebook, the more they share political news on the platform. As a first step towards rethinking news sharing, our data suggest that news sharing varies across demographics. Males share political news more and those



who are older tend to do so as well. Of course, as with any new findings, this study needs replication. There are many other contextual variables that can be considered such as location, economic status, and race. Moreover, the theoretical underpinnings of why such patterns are observed here for age and gender are ripe for extrapolation.

Perhaps most obviously, we believe our study presents a step forward in the theoretical development of NFO. Although NFO is widely considered one of the classic theories of mass communication (Matthes, 2006), it has been subject to a relatively small amount of theoretical development, especially in comparison to other theoretical perspectives such as agenda setting. Our study is one of the first to provide evidence that the components that comprise NFO (e.g., here attention) have behavioral implications that stretch beyond the selection and consumption of news content.

That said, the present data indicate that the relationship between NFO and news sharing is not straightforward. Specifically, we identified a relatively robust relationship between the issues and facts components of Matthes' (2006) measure. This finding is broadly in-line with prior empirical presentations of NFO in the sense that it suggests media-related behaviors are contingent upon individually-determined needs. Some individuals seek cues from the media in order to orient themselves, others are sure of their stance and do not. This finding paints a picture of media users who are interested in the details of political news – they valued political issues and facts. In some important ways, this research both builds upon and advances prior scholarship pertaining to online news sharing (Weeks & Holbert, 2013). Here we offer a first insight as to why individuals consume more news.

On the other hand, the robustly negative association between the evaluations component of NFO and Facebook-based news sharing is, on its face, inconsistent with the NFO's presumed

theoretical properties. Why would those with high needs for media-based commentary be less likely to share political news content? One potential explanation can be derived from the literature on news media repertoires. Researchers have previously shown that media users tend to create usage repertoires on the basis of media platform (Yuan, 2011) and topic (Reagan, Pinkleton, Chen, & Aronson, 1995). It therefore stands to reason that consumers may also form repertoires on the basis of informational subjectivity. In this study, we operationalized political news as information originating from media outlets that, as a standard professional practice, have a journalistically objective posture. Absent from this list were blogs and other digital sites that primarily seek to interpret news events. It may be the case that those with high evaluation needs tend to share opinion-based news content (rather than the objective journalistic content that was the subject of this study), and that such behavior can be discriminated from the behavior of those with high issue and facts-based cue needs.

The current findings also have implications as they pertain to the operationalization of NFO. In the current study, the traditional measure of NFO, derived from Chernov et al. (2011), was not associated with news sharing in any of the models reported in Table 3. The key difference between the two final composite variables was the way in which political news interest was measured. In the general measure, political interest was simply inferred from how interested individuals were in politics, in general. In the Matthes (2006) measure, more nuanced questions were asked - ones that assessed the interest individuals had towards facts and issues. This specificity provides clearer detail on which types of individuals share news. By defining a more exact type of political interest, we know that our news sharers are individuals who pay attention to, and value the facts and issues presented to them in the news they read. These

respondents are not simply those who enjoy politics. Instead, our data suggests that those who share news are interested in the substance and details in the reporting.

However, as others have tried and failed (Chernov et al., 2011), we too were unable to empirically replicate the dimensional structure described in Matthes' (2006) initial rendering of the construct. This suggests that while the Matthes (2006) construct is a potentially powerful predictive tool, it should be subject to refinement in future research. Such clarification may be especially important given our finding that the facts/issues and commentary-based NFO dimensions were associated with the criterion variable in opposite directions. It may be inappropriate to collapse the individual subcomponents of Matthes (2006) measure, as such dimensional reduction may mask oppositional effects, resulting in either diluted effect sizes or misleading interpretations of independent – dependent variable relationships.

This study, like any that samples social media data, is subject to limitations. First, the final sample of 741 participants, while approximately equal to or larger than many of the social news sharing samples reviewed here (with the exception of Weeks & Holbert, 2013, which leveraged secondary Pew data), is likely not representative of all U.S. Facebook users. Further study is needed to validate the entirety of the claims laid here. Moreover, as an initial investigation, this study surveyed users on the most commonly studied motivations that drive media-related behaviors. There are, no doubt, many other motivations that have been shown under uses and gratifications theory to drive behavior (Hanson & Haridakis, 2008 for a broader list). Further study should test a larger battery of motivating behaviors to see their impact on social media sharing. Finally, it remains possible that individuals' sharing behaviors may vary from social media platform to platform according to the platform's various features, such as the way news is filtered, displayed and shared. Because each social media platform is different,

unique features afford users with different ways to share and engage with news. These affordances may mediate the news sharing process. Cross platform investigations are needed to see if individual's behaviors remain stable, or if the platforms themselves play pivotal roles in news sharing.

In all, this paper is a first step in what we believe is a fruitful expansion of NFO theory. To-date, the theory has been primarily used as a means of understanding why people consume media and, therein, how individual-level motivations are associated with agenda-setting effects. Our work argues that individual needs pertaining to media-based cues constitute a motivational state, which has behavioral implications. Importantly, these motivations extend beyond mere media consumption. As an initial inquiry into the relationship between NFO and news sharing, there are many directions for future research. Three areas seem especially fruitful. First, and especially in light of the dimensionality issues related to the Matthes (2006) NFO construct, future research could specifically develop and test a measure of NFO that better and more accurately explains not the agenda-setting effect, but a broader array of media behaviors. While we believe the employed approach is theoretically sound, it may be the case that an NFO measure specifically positioned towards news sharing would explain a greater proportion of the variance in user behavior. Second, future research should better explore the observed negative relationship between evaluation-based cue needs and political news sharing on Facebook. In this manuscript, we suggest that the observed negative relationship may be related to distinct media repertoires formed on the basis of media cue-based needs. This is only a suggestion that should, of course, be empirically examined. Notably, researchers have previously explored uses and gratifications factors as important variables in information source repertoire formation and use (Yuan, 2011). Examining NFO in relation to repertoire formation may potentially provide a

powerful means of understanding how media consumers assemble and interact with personalized media clusters. Finally, it seems both appropriate and important to integrate the concept of news sharing into other foundational mass communication theories such as agenda setting and opinion leadership.

## References

- Bakshy, E., Rosenn, I., Marlow, C., & Adamic, L. (2012). The role of social networks in information diffusion. *Proceedings of the 21st International Conference on World Wide Web*, 519-528. doi:10.1145/2187836.2187907
- Beam, M. A., Hutchens, M. J., & Hmielowski, J. D. (2016). Clicking vs. sharing: The relationship between online news behaviors and political knowledge. *Computers in Human Behavior*, 59, 215-220. doi:10.1016/j.chb.2016.02.013
- Berger, J., & Milkman, K. L. (2012). What makes online content viral? *Journal of Marketing Research*, 49, 192-205. doi:10.1509/jmr.10.0353
- Bobkowski, P. S. (2015). Sharing the news: Effects of informational utility and opinion leadership on online news sharing. *Journalism & Mass Communication Quarterly*, 92, 320-345. doi:10.1177/1077699015573194
- Breiman, L. (2001). Random forests. *Machine Learning*, 45, 5-32. doi:10.1023/A:1010933404324
- Bressert, E. (2012). *Scipy and Numpy: An overview for developers*. New York, NY: O'Reilly Media, Inc.
- Camaj, L., & Weaver, D. H. (2013). Need for orientation and attribute agenda-setting during a US election campaign *International Journal of Communication*, 7, 1442-1463.
- Caputo, B., Sim, K., Furesjo, F., & Smola, A. (2002). Appearance-based object recognition using SVMs: Which kernel should I use? *Proceedings of NIPS workshop on Statistical Methods for Computational Experiments in Visual Processing and Computer Vision, 2002*, 149-158.

- Chernov, G., Valenzuela, S., & McCombs, M. (2011). An experimental comparison of two perspectives on the concept of need for orientation in agenda-setting theory. *Journalism & Mass Communication Quarterly*, 88, 142–155. doi:10.1177/107769901108800108
- Fawcett, T. (2004). ROC graphs: Notes and practical considerations for researchers. *Machine Learning*. Retrieved from <http://binf.gmu.edu/mmasso/ROC101.pdf>
- Friedman, J. H. (2001). Greedy function approximation: A gradient boosting machine. *Annals of Statistics*, 29, 1189-1232. doi:10.1214/aos/1013203451
- Gil de Zúñiga, H., Jung, N., & Valenzuela, S. (2012). Social media use for news and individuals' social capital, civic engagement and political participation. *Journal of Computer-Mediated Communication*, 17, 319-336. doi:10.1111/j.1083-6101.2012.01574.x
- Goyal, A., Bonchi, F., & Lakshmanan, L. V. S. (2010). Learning influence probabilities in social networks. *Proceedings of the Third ACM International Conference on Web Search and Data Mining*, 241-250. doi:10.1145/1718487.1718518
- Hanson, G., & Haridakis, P. (2008). YouTube users watching and sharing the news: A uses and gratifications approach. *Journal of Electronic Publishing*, 11(3). doi:10.3998/3336451.0011.305
- Hermida, A., Fletcher, F., Korell, D., & Logan, D. (2012). Share, like, recommend: Decoding the social media news consumer. *Journalism Studies*, 13, 815-824. doi:10.1080/1461670X.2012.664430
- Hilbe, J. M. (2014). *Modeling count data*. New York, NY: Cambridge University Press. doi:10.1017/CBO9781139236065

- Himmelboim, I., McCreery, S., & Smith, M. (2013). Birds of a feather tweet together: Integrating network and content analyses to examine cross-ideology exposure on Twitter. *Journal of Computer-Mediated Communication, 18*, 40-60.
- Holton, A. E., Baek, K., Coddington, M., & Yaschur, C. (2014). Seeking and sharing: Motivations for linking on Twitter. *Communication Research Reports, 31*, 33-40.  
doi:10.1080/08824096.2013.843165
- Horan, T. J. (2013). 'Soft' versus 'hard' news on microblogging networks: Semantic analysis of Twitter produsage. *Information, Communication & Society, 16*, 43-60.  
doi:10.1080/1369118X.2011.649774
- Karnowski, V., Kümpel, A. S., Leonhard, L., & Leiner, D. J. (2017). From incidental news exposure to news engagement. How perceptions of the news post and news usage patterns influence engagement with news articles encountered on Facebook. *Computers in Human Behavior, 76*, 42-50. doi:10.1016/j.chb.2017.06.041
- Kümpel, A. S., Karnowski, V., & Keyling, T. (2015). News sharing in social media: A review of current research on news sharing users, content, and networks. *Social Media+ Society, 1*(2). doi: 10.1177/2056305115610141
- Lee, C. S., & Ma, L. (2012). News sharing in social media: The effect of gratifications and prior experience. *Computers in Human Behavior, 28*, 331-339. doi:10.1016/j.chb.2011.10.002
- Matsa, K. E., & Lu, K. (2016, September 14). 10 facts about the changing digital news landscape. Retrieved from <http://www.pewresearch.org/fact-tank/2016/09/14/facts-about-the-changing-digital-news-landscape/>



- Matthes, J. (2006). The need for orientation towards news media: Revising and validating a classic concept. *International Journal of Public Opinion Research*, 18, 422-444. doi: 10.1093/ijpor/edh118
- Matthes, J. (2008). Need for orientation as a predictor of agenda-setting effects: Causal evidence from a two-wave panel study. *International Journal of Public Opinion Research*, 20, 440-453. doi:10.1093/ijpor/edn042
- McCombs, M. E., Shaw, D. L., & Weaver, D. H. (2014). New directions in agenda-setting theory and research. *Mass Communication and Society*, 17, 781-802. doi:10.1080/15205436.2014.964871
- McCombs, M. E., & Weaver, D. H. (1973, April). *Voters' need for orientation and use of mass communication*. Paper presented at the Annual Meeting of the International Communication Association, Montreal, Canada.
- Moy, P., & Murphy, J. (2016). Problems and prospects in survey research. *Journalism & Mass Communication Quarterly*, 93, 16-37. doi:10.1177/1077/699016631108
- Park, N., Kee, K. F., & Valenzuela, S. (2009). Being immersed in social networking environment: Facebook groups, uses and gratifications, and social outcomes. *CyberPsychology & Behavior*, 12(6), 729-733.
- Pearson, R. (2017, April 15). Introduction to the DataRobot R package. Retrieved from <https://cran.r-project.org/web/packages/datarobot/vignettes/IntroductionToDataRobot.html>
- Reagan, J., Pinkleton, B., Chen, C., & Aaronson, D. (1995). How do technologies relate to the repertoire of information sources? *Telematics and Informatics*, 12, 21-27. doi:10.1016/0736-5853(94)00035-R.

- Ridout, M., Hinde, J., & DeméAtrio, C. G. (2001). A score test for testing a zero-inflated Poisson regression model against zero-inflated negative binomial alternatives. *Biometrics*, 57(1), 219-223.
- Shearer, E. & Matsu, K. (2018). *News Use Across Social Media Platforms 2018*. Pew Research Center. Retrieved from <http://www.journalism.org/2018/09/10/news-use-across-social-media-platforms-2018/>
- Silva, S., Anunciação, O., & Lotz, M. (2011). A comparison of machine learning methods for the prediction of breast cancer. In C. Pizzuti, M. D. Ritchie, M. Giacobini (Eds.), *Lecture Notes in Computer Science: Vol 6623. Evolutionary Computation, Machine Learning and Data Mining in Bioinformatics* (pp. 159-170). doi:10.1007/978-3-642-20389-3\_17
- Social media fact sheet. (2017, January 12). Retrieved from <http://www.pewinternet.org/fact-sheet/social-media/>
- Tourangeau, R. (2000). Remembering what happened: Memory errors and survey reports. In A. A. Stone, C. A. Bachrach, J. B. Jobe, H. S. Kurtzman, & V. S. Cain (Eds.), *The science of self-report: Implications for research and practice* (pp. 29-47). Mahwah, NJ: Lawrence Erlbaum.
- Vargo, C., Guo, L. & Amazeen, A. (2018). The agenda-setting power of fake News: A big data analysis of the online media landscape from 2014 to 2016. *New Media & Society*, 20(5) 2028–2049.
- Weaver, D. H. (1977). Political issues and voter need for orientation. In D. L. Shaw and M. E. McCombs (Eds.), *The emergence of American political issues: The agenda-setting function of the press* (pp. 107-120). New York: West Publishing Co.

- Weaver, D. H. (1980). Audience need for orientation and media effects. *Communication Research*, 7, 361-373. doi:10.1177/009365028000700305
- Weeks, B. E., & Holbert, R. L. (2013). Predicting dissemination of news content in social media: A focus on reception, friending, and partisanship. *Journalism & Mass Communication Quarterly*, 90, 212-232. doi:10.1177/1077699013482906
- Yuan, E. (2011). News consumption across multiple media platforms. *Information, Communication, & Society*, 14, 998-1016. doi:10.1080/1369118X.2010.549235
- Zhang, Y., & Leung, L. (2015). A review of social networking service (SNS) research in communication journals from 2006 to 2011. *New Media & Society*, 17, 1007-1024.
- Zhou, Z. H., Wu, J., & Tang, W. (2002). Ensembling neural networks: many could be better than all. *Artificial intelligence*, 137(1-2), 239-263.