Article

Mediated Skewed Diffusion of Issues Information: A Theory

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Abstract

The modern media ecology has changed drastically over the last decade yet scholarly theoretical perspectives lag behind lay theories regarding news diffusion making it difficult to fully articulate and understand the processes driving dissemination of information and persuasion across networks and media contexts. The proposed theoretical framework takes into account extant research on the multiple mechanisms, specifically, cognitive ego involvement, the media environment, and interpersonal processes that operate in concert to influence the way information about societal issues is diffused through digital communication channels. The theoretical framework of *mediated skewed diffusion of issues information* provides 11 testable propositions. These are put forth to provide a foundation and encourage future research on information dissemination, online persuasion, and position polarization.

Keywords

diffusion of information, persuasion, ego involvement, social media, social network sites, online communities, tie strength, filter bubbles

Scholars investigating how information is diffused through online channels have begun accumulating evidence regarding information diffusion processes, including information acquisition through search (Dubois & Blank, 2018; Dutton et al., 2017), distortions in the way information is diffused through a network (Bakshy, Rosenn, Marlow, & Adamic, 2012; Halberstam & Knight, 2016), and information literacy (Koltay, 2011). Despite these interests, the development of theory related to understanding the multifaceted nature of online information diffusion is still in a nascent phase. Although Rogers's (1995) pre-digital treatise on the diffusion and potential adoption of ideas and practices is foundational to our understanding of modern processes, the online environment introduces new concepts requiring understanding and explanation. Online media has contours and affordances contributing to the way information is diffused. The modern media environment is incredibly social; including online communities and social network sites (SNSs). Thus, an array of *relational* and *personal* variables influencing the mediated diffusion of information contribute to the phenomenon of online information diffusion. In addition, scholarly explanations of online behavior related to diffusion and influence should consider cognitive variables at the root of scholarship on persuasion such as attitudes, beliefs, and ego-involvement. In proposing this theory, the Mediated Skewed Diffusion of Issues Information (MSDII) theory, we attempt

to provide plausible explanatory mechanisms for perceptions of, and actual, increases of polarization on a variety of issues (Baldassarri & Gelman, 2008). Second, we provide a foundation for further work in online information diffusion by clearly articulating testable theoretical propositions.

The diffusion of information is an important phenomenon contributing to democratic deliberation. Democracies, whether or not they achieve this ideal, are founded on the precepts of free and truthful information. Ideally, a democratic citizenry can make appropriate governance choices because the citizens are aware of necessary, sufficient, and truthful information regarding the issues of the day (Berelson, 1952). Engaging in political discussion with people of opposing viewpoints can potentially contribute to understanding oppositional perspectives (Price, Cappella, & Nir, 2002). One of the early promises of the internet was that the dawning of the information age would increase the democratization of society through offering more avenues for participation in the public sphere, fostering networked communities, and

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changing the ownership structure and diffusion potential of media (Halpern & Gibbs, 2013; Kamarck & Nye, 2002; Papacharissi, 2015; Zuckerberg, 2017). Yet, today there are concerns about decreased participation due to filter bubbles, silo-ing information consumers into echo chambers, the spread of misinformation, and increased polarization (Allcott & Gentzkow, 2017; Faris et al., 2017; Garrett, Carnahan, & Lynch, 2013; Pariser, 2011). Comprehending the way information is diffused through online communication is important to understand debates on a wide range of issues including vaccines, climate change, and more. People still rely on traditional sources for information about the world they live in, such as broadcast and print journalism (Barthel, 2017; Matsa, 2017a, 2017b); however, social media influences how people are exposed to information and affects how information is diffused through interpersonal networks connected via technology (Toff & Nielsen, 2018). Scholars have called for more theoretically informed work on technology and opinion formation and diffusion (e.g., Dutton et al., 2017).

Within the MSDII theoretical framework, *issues information* is defined as information shared between network connections with the potential to influence opinions regarding a debated issue. Political discussions are a common framework for issues information, but our intention is to apply the MSDII framework to a wide range of issues such as economics, social concerns, environmental issues, and public health. Researchers interested in media, journalism, and communication technology are producing excellent scholarship (e.g., Allcott & Gentzkow, 2017; Bakshy et al., 2012; Beam, Hutchens, & Hmielowski, 2018; Dubois & Blank, 2018; Evans, 2016; Hermida, 2013; Nielsen & Schrøder, 2014; Toff & Nielsen, 2018; Weeks, Lane, Kim, Lee, & Kwak, 2017) to provide more accurate insight into the way information is diffused online. Yet, without a theoretical framework, studies may face difficulty contextualizing the directions and effects of these variables. The MSDII weaves together our knowledge gained from previous work to provide testable propositions for future research.

In seeking to understand the diffusion of media today, we posit the following. First, information consumers and disseminators have access to a wide variety of sources of issues information. These sources include social media, but also content produced by traditional news broadcast and print outlets (disseminated through either traditional or digital channels), as well as information generated and distributed through digital communities. Through selecting different media sources actively as well as passively receiving messages through social media news feeds, people receive both attitude-consistent and attitude-inconsistent messages. People highly invested in particular issues are the most likely to actively seek messages to share with their social media networks; however, their ego-involvement in an issue also makes it difficult for them to accurately assess the quality of those arguments. Therefore, many of the issues messages shared on social media are both polarizing and low quality;

however, messages one disagrees with are perceived as lower quality than messages one agrees with. In addition, people are likely to receive most oppositional messages from weak ties with whom they have little other contact. These factors are likely to lead to a cyclical process where individuals increasingly move to more polarized positions and find the oppositional positions to be static and uninformed.

Notes on Filter Bubbles, Echo Chambers, and Fake News

Before reviewing the specific tenants of our theoretical position, we wish to explain our position on current issues related to online information diffusion: filter bubbles, echo chambers, and fake news. We find these particular concepts to be related to the current debate and scholarship regarding online information diffusion. Our theoretical stance provides an alternative explanation for polarization without invoking filter bubbles and echo chambers. In addition, one of our propositions addresses low-quality arguments, which can be low quality and truthful, but also can be low quality due to being false.

Filter Bubbles/Echo Chambers

In the current theoretical vacuum, popular conceptualizations of online information diffusion have sprung up around the idea of filter bubbles and/or echo chambers. Both the filter bubble concept (Pariser, 2011) and echo chambers (Jamieson & Cappella, 2008; Sunstein, 2009) center on the theoretical principle that algorithmic and self-selected filtering will drive the way information diffuses through online social networks (Zuiderveen Borgesius et al., 2016). Taken together these theoretically similar models assume people will end up in "a unique universe of information" (i.e., filter bubbles, Pariser, 2011, p. 8) consisting of only people with similar viewpoints (i.e., echo chambers, Sunstein, 2009).

Explanations centered on information personalization are heuristically provocative—inspiring a bevy of both academic work (more than 1,600 scholarly publication have cited Pariser's book [Google Scholar]) and journalistic hot takes (Baer, 2016; Dreyfuss, 2016; Hess, 2017; Jackson, 2017; Newton, 2016; Thompson, 2016; Wortham, 2016). However, as noted by Stray (2012), the idea of a filter bubble is a powerful heuristic because "it's both significant and marvelously ill-defined" (para. 1). Dutton et al. (2017) argued, "Filter bubbles, echo chambers, and fake news are intuitively appealing . . . [but] not supported by the empirical evidence marshaled by the study of Internet users in seven countries" (p. 21).

One reason theoretical explanations invoking filter bubbles and echo chambers are flawed is such explanations generally only consider the information consumer within the online environment. People receive information through a variety of other channels, including face-to-face conversations (Dubois & Blank, 2018), conducting internet searches

(Dutton et al., 2017), and other internet information sources (Van Aelst et al., 2017). In 2014, television was still considered the most important source of news (Nielsen & Schrøder, 2014). However, newer research by Nielsen and colleagues argues for the importance of "ambient news" exposure through social media. The current media environment is one of "distributed discovery" where traditional news media are no longer the primary distributors of information. However, these media still produce much of the content people see whether they access content via reading a physical or digital newspaper, watching news broadcasts, or clicking on stories presented in their social media feeds (Toff & Nielsen, 2018).

The Reuters Institute digital report identified social media as one of the least trusted sources of news (Newman, Fletcher, Kalogeropoulos, Levy, & Nielsen, 2017). However, there are still multiple reasons to study the effects of social media on public opinion. First, social media platforms are not typically news producers and while people may report not trusting social media as a source, they may still view diverse stories through their social media feeds (Groshek & Koc-Michalska, 2017). The increase in mobile technologies allow people to use the interstices of their days to scan for news and entertainment via social media platforms (Meijer & Kormelink, 2014). People may find that for particular news topics they are less invested in, they end up receiving most of their information through the posts of friends invested in the topic (Toff & Nielsen, 2018). Furthermore, more recent work suggests time spent on social media appears to increase network heterogeneity, and active social media use led to experiences with more diverse information (Groshek & Koc-Michalska, 2017). This finding is logical given that distributed discovery expands opportunities to find and access information.

Empirical work attempting to measure filter bubbles in online media exposure have found little evidence for their existence (Bakshy, Messing, & Adamic, 2015; Goel, Mason, & Watts, 2010; Zuiderveen Borgesius et al., 2016). Garrett and colleagues (Garrett, 2009; Garrett et al., 2013) found people do not actively avoid information contradicting their views. People incidentally view counter-attitudinal messages through their social media newsfeeds (Beam et al., 2018; Weeks et al., 2017). The more interested people are in politics and the more diverse the media channels are, the less likely they are to be in an echo chamber (Dubois & Blank, 2018). In a multinational study, Dutton and colleagues (2017) found people regularly use search engines to seek out attitude-inconsistent information and sources. Thus, we argue rather than experiencing a filter bubble, most people passively, and actively, regularly view counter-attitudinal information.

Fake News

The veracity of information people share and consume is a critical component for several of our theoretical propositions. Although issues information may be verifiably false or settled science, the influence of shared information generally rests on the believability of a piece of information not on the objective truth regarding the information. The modern news environment presents challenges for journalistic norms of objectivity, verification, and factual reporting at its core. Social media platforms facilitate the grassroots, crowd-sourced spread of information, bypassing traditional press gatekeepers (Hermida, 2014). This diffusion of the locus of control provides new types of opportunities for the spread of false information, especially in times of crisis (Hermida, 2014). Concerns about variants of objective truth are timely as the *Oxford Dictionary* selected "post-truth" as the 2016 word of the year and White House advisors attempt to make a case for "alternative facts" (Perlman, 2017; Rutenberg, 2017). A disregard for truth (and a new media information ecology allowing the circulation of claims with weak and wildly differing standards of editorial control) lets content producers publish information in support of their stance on an issue with little regard for veracity.

The veracity of information both matters and does not matter in this information ecology. A lack of veracity has the potential to destabilize facts, as they are treated on par with opinion statements. News consumers have the ability to pick and choose information and opinions consistent with previously held beliefs and discount those that do not conform to their beliefs. Kahan (2017) called this phenomenon "factual polarization," in which individuals engage in a form of "identity-protective reasoning" (Flynn, Nyhan, & Reifler, 2017; Kahan, 2010). In this process of identity-protective reasoning, people have difficulty properly interpreting the veracity of information. Across a range of important issues including gun control and climate change, people interpret new information and information veracity according to previously held beliefs (Kahan, Peters, Dawson, & Slovic, 2017; Sunstein, Bobadilla-Suarez, Lazzaro, & Sharot, 2016). This type of reasoning does not seem to be dependent upon the intelligence level of the content recipient. Indeed, Kahan et al. (2017) found people with higher numeracy were more likely to misunderstand data regarding gun control bans.

Furthermore, the destabilization of media institutions related to information dissemination may make it more difficult for people to determine the credibility of information. Research across three countries (China, Denmark, and Iran) by Mahmoodi and colleagues (2015) found an "equality bias," showing in small group decision-making, individuals weight opinions of others equally to their own regardless of varying levels of competence. A. Anderson, Brossard, Scheufele, and Xenos (2012) found reading online comments about controversial science led readers to have more polarized views and mistrust the reported science. A. Anderson et al.'s findings may reflect the familiarity bias found by Pennycook, Cannon, and Rand (2017). Familiar headlines, even if fake, were rated as more accurate by participants than unfamiliar headlines.

The MSDII Framework

There is evidence of the spread of increasingly polarized (Beam et al., 2018), low quality (Faris et al., 2017), and fake news (Vosoughi, Roy, & Aral, 2018) via online channels. Drawing connections between the ways people are presented with information online, cognitively process that information, and disseminate that information to their social networks through social media channels can help us to understand why increased polarization occurs despite the lack of evidence for filter/echo bubble/chambers. The following outlines an understanding of information diffusion taking into account variables such as ego-involvement with a particular issue, type of online platform where information is disseminated, message quality, and diversity of network ties on a given issue.

Ego-Involvement

In considering how information is diffused through media systems, we must first consider aspects of people diffusing information. We suspect particularly relevant individual-level variables are people's ability to evaluate argument quality and ego-involvement.

Evaluation of Argument Quality. The ability to evaluate argument quality is relevant to the diffusion of information because this ability influences both if people will believe and share a piece of content and the perception others develop regarding the content and the sharer. Generally speaking, people are bad at evaluating the quality of an argument when it supports their beliefs and become much better at evaluation when the argument is in opposition to their beliefs. One early demonstration of this pattern was shown by Cathcart's (1955) study of persuasive messages concerning the death penalty. Cathcart demonstrated when the message was consistent with the audience's beliefs, they rated evidence and argument quality equally well when the message contained actual evidence and when it contained empty repetitions of the claim. On the contrary, when the message contradicted their beliefs, they rated evidence-based messages as higher quality than the empty assertions. Cathcart explained people "in agreement with a speaker tend to 'supply' their own evidence or to overlook the speaker's lack of evidence" (p. 232). This basic pattern has appeared repeatedly in persuasion experiments (Edwards & Smith, 1996; Giner-Sorolla & Chaiken, 1997; Lord, Ross, & Lepper, 1979; Morgan & Morton, 1944; Munro et al., 2002).

Although assessors of this cognitive bias may like to think these biases can be overridden by superior intellect or numeracy, as noted above, evidence suggests otherwise. Recent work has shown expertise in evaluating numeric evidence fails to affect this pattern (Kahan et al., 2017). When participants were asked to evaluate skin cream, those with superior numerical skill were better at evaluating scientific results than those who were not. Yet, when the data table was identical but the topic was the effectiveness of a handgun ban, numerical skill had minimal effect whereas political party affiliation had a strong effect on how participants evaluated the data. Specifically, accurately interpreting the results usually only occurred when the results were consistent with the participants' political orientation.

Ego Involvement and Argument Processing. Biased argument processing is a central MSDII mechanism. The extent to which a person engages in biased argument processing tends to be moderated by their level of ego-involvement. Someone can be described as highly ego-involved when they consider their stance on an issue to be a key part of their identity (Sherif & Cantril, 1947). Information consumers may be especially vulnerable to cognitive biases when they are highly ego-involved in the issue at hand. Some evidence and theory suggest the tendency to be a poor evaluator of attitude-consistent arguments and to be a critical evaluator of attitude-discrepant arguments is magnified by ego-involvement. Specifically, the general positive relationship between how attitude-discrepant the message seems to the person and the extent to which that person processes the message in a biased fashion tends to be stronger when the message receiver is more ego-involved (Eagly, 2007; Nickerson, 1998). Consistent with this position, Choi, Yang, and Chang (2009) found the extent to which people are ego-involved in an issue is positively associated with the extent to which they believe the media presents a biased perspective when reporting on that issue. Recent work by Carpenter (2018) found that when encountering a persuasive message on a political topic, the extent to which people perceive the message as presenting a position discrepant from their own is positively related to the degree to which they believe the source is biased, the extent to which the supporters of that position have been misled by inaccurate information, and the extent to which they believe they would be unlikely to be able to be friends with the message's author. These effects were much stronger for highly ego-involved rather than low ego-involvement audiences (Carpenter, 2018).

The Media Environment

News Diffusion. The MSDII's focus on the diffusion of news and information rather than the production of news by specific institutions allows researchers to begin to study the way that information is circulated and transformed through multiple channels within the networked information ecosystem (C. W. Anderson, 2010; Greenberg, 1964). Traditional or legacy forms of news distribution such as television broadcasting and print journalism remain important sources of information (Barthel, 2017; Matsa, 2017a, 2017b). However, these sources now exist within a more complex, high choice, media environment (Figure 1). Information flows within this hybrid media ecosystem, supplemented by interpersonal
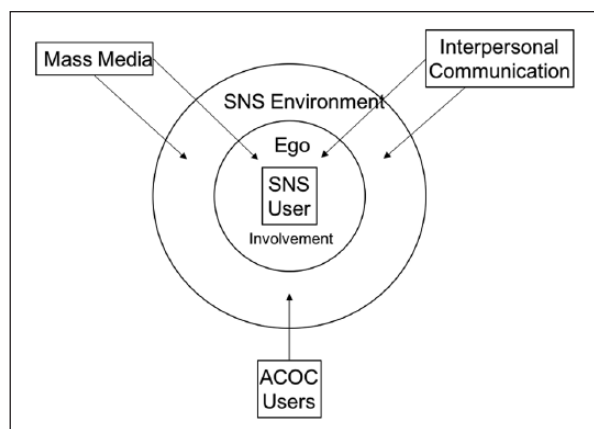
Figure 1. The media environment.

communication (Chadwick, 2013; Coleman et al., 2016). Understanding this hybrid media approach allows scholars to account for the complexity of online media ecologies and move beyond a binary perspective on the field (Witschge, Anderson, Domingo, & Hermida, 2018).

Journalism scholarship has examined how news moves through local media ecosystems and the ways in which information evolves as it is transmitted between news institutions (C. W. Anderson, 2010; Coleman et al., 2016; Pew Research Center: Journalism & Media Staff, 2010). Yet, the diffusion of information through the media ecosystem is not a linear process. Journalists at mainstream media outlets find themselves reporting and opining in the same digital attention economy as political activists, marketers, bloggers, celebrities, and average citizens (C. W. Anderson, 2010). The affordances of online websites make it increasingly easy to enter the "news" market (Allcott & Gentzkow, 2017). Thus, some information in this environment adheres to journalistic standards while much of the information on issues of the day are presented and amplified by "quasi-institutional digital actors acting in their own organizational interest" (C. W. Anderson, 2010, pp. 305-306). Even when considering local news, a networked, hybrid system emerges. People seek out local news not only to find information about where they live but also acquire news through interpersonal communication (a portion of which likely comes via mediated communication) (Coleman et al., 2016). Local news channels not only report local information but also repackage information and news previously published via other components of the media ecosystem (Pew Research Center: Journalism & Media Staff, 2010).

One result of the advent of distributed discovery (see Toff & Nielsen, 2018) is news institutions are no longer in control of the distribution of news, and the power that came along with that control is diminished (Carlson, 2017). The shift away from traditional mainstream media, for example, television networks, as powerbrokers in political communication has resulted in reconfigured relationships between politicians, citizens, and the press (Blumler & Coleman,

2015). These changing power dynamics have led to a weakening of the journalistic role as a watchdog on governmental workings and as an interpreter of information (Carlson, 2017). Traditional mainstream media outlets may no longer be viewed as the main gatekeepers on issues of the day (Hermida, 2013).

Evidence suggests people are active participants in co-constructing the media messages they consume (Gunther, 2008). Highly ego-involved individuals with a strong position on a particular issue tend to see the media in general as biased against their viewpoint, an effect known as the hostile media phenomenon (Vallone, Ross, & Lepper, 1985). Vallone et al.'s work on the hostile media phenomenon showed viewers perceived different biases and recollections of news content depending on their view of the issues. Those with greater knowledge of the issue reported a stronger perception of bias than low knowledge viewers. Other research has also found group affiliation to be related to perceptions of news coverage (Gunther, 1992). Highly involved or partisan individuals may seek to take "corrective action" in what they perceive to be a biased media environment and attempt to offset the perceived bias. Rojas (2010) argued such corrective action could, because of the highly ego-involved nature of those more likely to engage in corrective action, actually heighten polarization.

However, if people find the mainstream media to be biased, they are no longer limited to these sources (Allcott & Gentzkow, 2017). In a media environment where a plethora of options are available, highly ego-involved individuals cannot only deny mainstream stories, they can actively search for information fitting their particular worldview. This active seeking of information reflecting one's own biases appears to be what many of the news stories (Baer, 2016; Dreyfuss, 2016; Hess, 2017; Jackson, 2017; Newton, 2016; Thompson, 2016; Wortham, 2016) proclaiming we now live in filter bubbles seem to be calling a filter bubble. However, this media environment—while fragmented and allowing people to find content supporting their worldview regardless of the veracity of that worldview—is not a true filter bubble. People who visit even the most ideologically extreme sites are likely to visit sites with oppositional views (Gentzkow & Shapiro, 2011). Even highly ego-involved individuals are aware of the existence of differing worldviews, they just do not believe those views.

Existence of Attitude-Consistent Online Communities. Different types of online communication channels may provide different influences in the way users are introduced to and spread information. Although SNSs can introduce information from weak ties, online message communities may be particularly good at bringing together homophilous viewpoints (Centola, Gonzalez-Avella, Eguiluz, & Miguel, 2007). Chatrooms and message boards devoted to political issues are even more likely to have members with homogeneous perspectives (Wojcieszak & Mutz, 2009). People holding positions that

might have previously been geographically fragmented can find each other on the internet, reinforce their arguments, and organize for information diffusion and action. Spaces on the internet such as Reddit boards, Facebook groups, online forums, message board communities, and specialized platforms such as Gab allow internet users to find issues information fitting their particular worldview.

Participation in these groups can move people to more extreme or even radical positions. The reduced cue environment and anonymous or pseudonymous nature of online communities can increase group identification over time (Spears, Lea, & Lee, 1990). Increases in group identification likely lead to increases in ego-involvement. Arguments and discussions within such groups tend to be one-sided and may amplify the perceived strength of the majority opinion (Wojcieszak, 2010). Over time, these types of communities have the potential to move lurkers and casual participants to extreme viewpoints as they move toward the core beliefs of the group (Centola et al., 2007). For example, Wojcieszak (2010) found the longer people participated in a neo-Nazi online discussion forum, the more their extremism increased. Thus, seeking out a homophilous group on a particular issue may indicate a level of ego-involvement with a particular issue, and participating in the group may increase ego-involvement over time.

Proposition 1: Members of attitude-consistent online communities (ACOCs) are more likely to be highly ego-involved in the issue relevant to that ACOC than the general population. The longer an individual participates and the more active they are within an ACOC, the more their ego-involvement will increase.

SNSs. An important element in the diffusion of issues information consists of social media sites such as Facebook and Twitter. While the term social media can generally refer to "user generated content" (boyd, 2009), Carr and Hayes (2015) provide a more precise definition arguing social media are based on user-generated content but also "Internet-based, disentrained, and persistent channels of masspersonal communication facilitating perceptions of interactions among users" (p. 50). A subset of social media include SNSs. Ellison and boyd (2013) defined SNSs as social media sites where users have identifiable profiles, connections are publicly articulated, and users and their connections can consume and interact with each other's content.

Although people communicating in ACOCs may find fairly homogeneous groups, social networks are never bounded or finite (Barnes, 1969). Rather than being organized in predominantly geographically rooted social networks, individuals are now organized by "person-to-person" ties transcending place-based connections (Wellman, 2002). Non-ACOC social media applications, particularly SNS, facilitate the maintenance of more heterogeneous weak tie networks (Ellison, Steinfield, & Lampe, 2007; Tong & Walther, 2011). These weak tie networks, particularly Facebook, allow people to share news,

memes, and posts regarding social issues (De Mao, Ferrara, Fiumara, & Provetti, 2014). Weak ties are a particularly crucial component of social networks in regard to the dissemination of information (Granovetter, 1973). Echo chambers and filter bubbles are unlikely to occur via social media because social media can exposes people to greater diversity in opinion through facilitating a greater amount of weak tie connections (Barberá, 2015). Social media platforms enable individuals to view information they previously would not have sought, although some have investigated how politically heterogeneous such online networks actually are in practice (e.g., Yang, Barnidge, & Rojas, 2017). In a large-scale study of 10.1 million U.S. Facebook users, Bakshy and colleagues found individual choices determine whether or not they are exposed to "cross-cutting content" to a greater degree than affordances and constraints of the platform itself (Bakshy et al., 2015). Another study found self-reported SNS use was positively associated with a greater likelihood of exposure to information challenging their views (Kim, 2011). As weak ties can refer to extended family networks, acquaintances made throughout one's life history, and friends of friends, these ties have the ability to bring greater information diversity into the social media environment (Bakshy et al., 2012; Granovetter, 1973). In addition, weak ties promulgate the diffusion of information at a greater rate than strong ties (De Mao et al., 2014).

In addition, despite news stories to the contrary (e.g., Linder, 2016), people may not be likely to unfriend those with differing opinions. Using a sample of the adult, urban population in Colombia, Yang and colleagues (2017) found unfriending is not related to increased exposure to political disagreement on social media platforms. Similarly, Dutton et al.'s (2017) multinational survey found less than 20% of people had unfriended or blocked someone because of differing political views. So while popular press articles blame SNSs for increasing filter bubbles, these are actually the sites where people experience divergent views. The problem may not be social media enhancing selective exposure, the problem may be ego-involvement on certain issues can lead to biased processing of social media messages with divergent perspectives.

Proposition 2: Different types of social media facilitate the maintenance of different types of ties. The use of social media sites that facilitate the creation and maintenance of weak ties will increase the diversity of information exposure.

Proposition 3: Ego involvement will be positively and linearly related to the amount of information on a particular issue an individual is likely to share with the most highly ego involved seeking out and creating content to bring into SNS environments.

Proposition 4: People who have a low amount of ego involvement in a particular issue will be exposed to attitude-diverse messages on that issue through their use of SNSs. The polarizing nature of the messages shared by

more highly ego-involved individuals are likely over time to attract low ego-involved individuals to increasingly polarized positions.

Message quality in the information age. The proliferation of low-quality arguments as social media content may influence the way issues information is perceived. People use social media sites, particularly SNSs, to post links, messages, and memes supporting their particular positions, but much of the content regarding various issues appearing in people's news feeds does so in an over-simplified package. Many issues information statuses and tweets are links to web stories with clickbait headlines and image memes. However, due to the difficulty people have in ascertaining the quality of an argument and the limited bandwidth of social media, many of the posted messages are likely to be low-quality arguments. For example, Halpern and Gibbs (2013) found unfounded claims, unsupported claims, and arguments based on external quotes, data, or websites made up the majority of argument strategies in the comments on the White House's Facebook and YouTube pages. Text-based memes shared on Facebook tend to become abbreviated over time (Simmons, Adamic, & Adar, 2011). While people may be exposed to greater diversity of information through their social media networks, they may not click through headlines they disagree with. One large sample study of Facebook users found people were more likely to click on ads promising attitude-consistent information about presidential candidates than ads promising attitude-inconsistent information (Ryan & Brader, 2017). Flaxman, Goel, and Rao (2016) found social media use was strongly correlated with only reading ideologically consistent news articles.

Although most studies in the persuasion literature on the length of message or the number of arguments have conceptualized this variable as peripheral cues (Petty & Cacioppo, 1986), there is indirect evidence that less complex messages are more likely to be associated with biased processing. Shorter and more ambiguous messages have been found to encourage biased processing (Johnson & Wood, 1944; Ziegler & Diehl, 2003). The extent to which the information quantity in a message encourages biased processing awaits empirical testing, yet based on Johnson and Wood's (1944) work which examined perceptions of increasingly shorter messages of an issue, we posit the following:

> *Proposition 5*: The less information a message contains, the more likely it is to be (a) perceived as more factual, less biased, and of higher argument quality, by people who find the message consistent with their viewpoints and (b) found to be less factual, more biased, and of lower argument quality by people who find the message to be inconsistent with their viewpoints.

Highly ego-involved individuals may be more likely to post issues information–related posts to social media (Carpenter, 2018). The most popular messages posted on social media are also likely to be the most partisan and unreliable (Faris et al., 2017). Due to the above mentioned difficulties of ego-involved individuals to evaluate the argument quality of information supporting their position, it is likely many of the posted arguments will be lower quality and more difficult to defend. In addition, people may perceive the accuracy based on how much a message or headline matches their political beliefs rather than any actual credibility indicators (Pennycook et al., 2017). Regardless of message accuracy, ego-involved individuals are likely to post messages associated with the extreme poles of an issues debate.

> *Proposition 6*: The ego-involvement of individuals posting about a specific issue will moderate information diffusion processes in the following ways such that people who are highly ego-involved will experience the following more or less than people who are less ego-involved.
>
> *6a*: Individuals who are highly ego-involved about a specific issue will be more likely to post on social media about that issue.
>
> *6b*: Highly ego-involved individuals are less likely to accurately assess the quality of arguments.
>
> *6c*: Thus, highly ego-involved individuals are more likely to post low-quality arguments related to their position.
>
> *6d*: Highly ego-involved individuals are more likely to post messages associated with the extreme poles of a debate.

The Influence of Social Networks

Given the above factors, we argue that people have the opportunity to view a diverse array of messages on the internet. In addition, social connections on SNSs often reflect many different online social contexts. The diversity in the network ties likely facilitate a diversity of information sharing within a particular individual's network (Bakshy et al., 2015; Dutton et al., 2017). For example, Evans (2016) found YouTube videos regarding the Israeli–Palestinian conflict were viewed by a heterogeneous audience. Work analyzing Twitter interactions about the murder of an abortion provider found there was a small trend for people to interact more with those they agreed with. Yet there was a substantial amount of cross-position interaction between users, even on this contentious topic (Yardi & boyd, 2010). With regard to political affiliations, Bakshy et al. (2015) argued there are many Facebook connections with different political affiliations. Approximately 9% to 36% ($Mdn = .20$) of liberal Facebook users' ties are conservative and around 9% to 20% ($Mdn = .18$) of conservative Facebook users' ties are liberal (Bakshy et al., 2015). An article being shared by others within a user's social network is a strong predictor for what sources a news consumer chooses, particularly in regard to

what Messing and Westwood (2014) termed "ideologically misaligned sources" (p. 15).

As noted, social media users could unfriend those with divergent views. However, the MSDII seeks to explain behavior across a variety of societal issues beyond presidential elections. We posit it would be very difficult to pre-screen family, friends, and acquaintances for every debatable issue. Thus, it is unlikely social media users could maintain completely homogeneous networks and newsfeeds on every issue and therefore are likely regularly exposed to opposing viewpoints. In addition, for SNSs such as Facebook which cut across social contexts, we may be connected to individuals who share differing opinions on an issue but would be socially difficult to disconnect from. Kinship networks may provide examples of these types of connections, but friends of friends may also be structurally difficult to "defriend." Even if people have opposing viewpoints, they may remain connected to avoid social repercussions from the larger network.

Proposition 7: People using SNSs will be exposed to oppositional viewpoints.

7a: SNS users will be exposed to more posts portraying oppositional viewpoints, the more time they spend viewing a SNS newsfeed.

7b: The more connections a SNS user has, the more the user will be exposed to posts portraying oppositional viewpoints.

7c: The more one views SNS newsfeeds, the more posts portraying oppositional viewpoints people will be exposed to.

Although people will be exposed to oppositional viewpoints, people are likely embedded both in a social network with dominating viewpoints on polarizing topics as well as a cognitive network directing how messages regarding issues are received. In a sense, this cognitive network could be considered what philosophers Quine and Ullian termed "web of belief," in which a person's beliefs are embedded within aggregated sets of logically consistent groupings, and information encountered is rejected or dismissed based on how well it fits into this network (Quine & Ullian, 1970). Cognitive psychologists also suggest the existence of networked beliefs. As information in memory is distributed across neural networks, the human brain changes beliefs quite slowly (McClelland, McNaughton, & O'Reilly, 1995; Van Overwalle & Siebler, 2005). Small changes are necessary as large immediate attitude shifts cause disruption to entire neural patterns. Thus, in our distributive cognitive networks, behavior and attitudes are based not only on the messages presented to the system but also on the message receiver's prior knowledge (McClelland et al., 1995; Queller, 2002; Van Overwalle & Siebler, 2005). Thus, the way people

perceive issues information is likely to be influenced by their previous position. People will fill in the blanks of arguments they are predisposed to agree with and may be likely to quickly reject opposing arguments.

Proposition 8: People are more likely to perceive viewpoints closer to their own as more nuanced and of higher quality than messages that support oppositional viewpoints.

Although networks composed primarily of weak ties on SNSs are likely composed of heterogeneous members and thus contribute oppositional messages to our news feeds, these contributions may not be persuasive. People tend to reject or ignore counter-attitudinal messages (Arceneaux & Johnson, 2013). Some work suggests news shared on SNSs tends to be from partisan news sites (An, Quercia, & Crowcroft, 2013) and such sites may not be perceived as credible by opposing partisans. As noted in the previous section, the restrictions and norms of social media are likely to lead to the posting of low-quality arguments. When people see these arguments from their opponents, they are likely to already have conflicting evidence in mind and are motivated to engage in discrediting these arguments. There is also evidence people may see cross-cutting content but may not necessarily click on the content of opposing viewpoints (Bakshy et al., 2015). This phenomenon may limit users' understanding of the opposition's argument and increase their perspective that the opposition makes low-quality arguments.

In contrast, when people see issues posts from others with whom they agree, these arguments fit with their current understanding of the world and previously developed narrative frames. Thus, even when arguments are low quality, individuals cognitively provide themselves with additional information to make the message make sense. The information provided by the self to complete an argument or provide evidence for a premise is accepted as true and informative by that same self.

Proposition 9: People are more likely to view posts that are not aligned with their own viewpoint from weak tie connections in a negative light because of the prevalence of low-quality arguments in general, the propensity to provide less cognitive resources to evaluating the argument, and the presence of opposition from stronger ties.

Proposition 10: Over time, people will view the opposition as increasingly uninformed (i.e., the opposition does not know pertinent information) and misinformed (i.e., the opposition believes information that is not true).

We argue the sender and receiver processes outlined above will over time lead to a feedback loop intensifying these processes. Thus, increased time on social media should increase satisfaction with one's position. In addition,
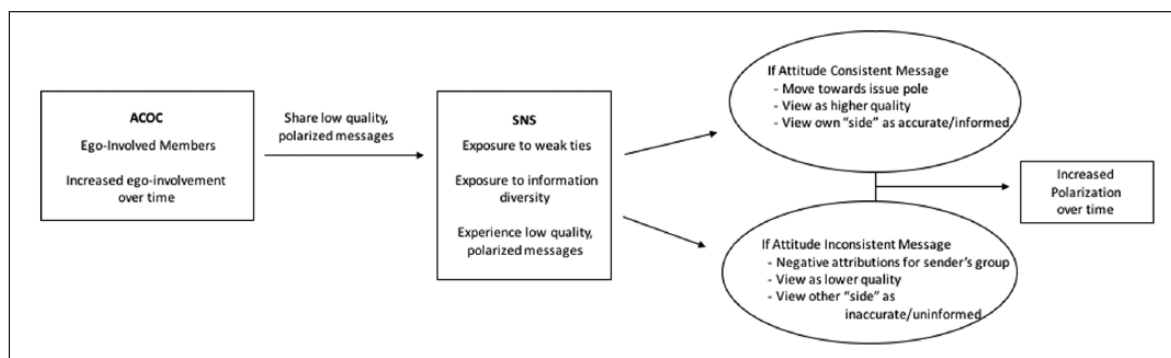
Figure 2. The MSDII process.

increased time on social media will increase our ego-involvement regarding a particular issue. In addition, increased time on social media should increase our credibility of issue supporters and decrease our perceptions of credibility of issue opponents.

Ego-involved individuals will likely be the most prolific social media posters on a particular issue. The highly ego-involved will be more likely to seek information supporting their view from other media sources and will be more likely to share and repost information from others in their network. In addition, over time, posting on a particular issue is likely to lead to increased ego-involvement as these posts represent a public statement of the poster's identity (Festinger, 1957). Over time, posts from highly ego-involved people are likely to draw the rest of the network closer to the poles of the debate.

Individuals who are close to the extreme ends of the poles in an issues debate will be more likely to think their opponents are less intelligent or easily misled. This assessment rests on three principles. First, as described above, the low-quality arguments of the opposition are evaluated more harshly than postings closer to one's own viewpoint. Second, the bulk of diversity in information received through social media is likely to be through weak ties (Bakshy et al., 2012). People are less likely to regularly interact with these ties in environments external to social media and thus are less likely to have additional evidence regarding their positive qualities. Finally, people are more likely to consider the opposition as more homogeneous.

These three principles lead to two outcomes. One, people are likely to believe the opposing side is coming from a sheltered, low information perspective, that is, the opposition resides with an informational filter bubble. Two, over time, the rejection of the arguments and negative characterization of the opposition will lead to greater polarization of positions within the social media environment. This phenomenon is not necessarily unique to the social media environment. As people engage in sharing and discussing information, these discussions are likely to lead to further polarization. Research has shown group discussions on issues leads to increased polarization (Isenberg, 1986; Myers & Lamm, 1975). We argue that via social media the processes outlined above are likely to be exacerbated (Figure 2).

Proposition 11: These processes are part of a cyclical feedback loop that intensifies the process over time. Increased time on social media should increase our ego-involvement and satisfaction with our own position. Increased time on social media should increase perceived credibility of issue supporters and decrease perceived credibility of issue opponents.

The MSDII Contributions

The theoretical explanations provided by the MSDII model are drawn from decades of work on media, information diffusion, cognitive processing, and interpersonal and networked relationships. Through drawing together work from interdisciplinary spheres, the MSDII could help further our understanding of communication processes occurring within a system of effects. Specifically, MSDII-based explanations take into account the networked relationships between those sharing messages, where message content originates, the quality of different messages, and the ego-involvement of communicators. The MSDII predicts that variance in these variables is likely to lead to different message effects. In this way, the MSDII has the potential to provide a more nuanced understanding than theoretical devices such as filter bubbles or echo chambers. Although both the MSDII and existing theoretical positions predict polarization can occur, our new model offers a description of the key processes involved and predictions of when and how polarization will occur.

This outlining of specific theoretical propositions provides only the first step in the investigation of increased polarization and message diffusion through digital channels. Empirical testing of the theory propositions is necessary. However, the results of said testing could help scholars, policy makers, and platform owners, to understand better the process underlying information diffusion online. An

improved understanding of these issues may allow moderators and participants in public deliberations a chance to create more high-quality discussion, and greater empathy for opposing views.

Given the depth of interdisciplinary and intertwined explanations presented here, we are currently concerned that, based on filter bubble theorizing, some are calling for efforts to increase exposing opposing sides to each other's messages to reduce the vitriol and polarization in online channels (Green, 2011; Hess, 2017; Keegan, 2016). The MSDII posits that polarized sides are already exposed to oppositional arguments and that it is that very exposure that can lead to greater polarization (see Propositions 5 and 11). Our theorizing suggests that those rushing out to try to pop filter bubbles may exacerbate the problems they are trying to solve. We argue a deeper understanding of the interplay between the dynamics of the media consumer, the information ecology, and the social network is likely to hold the most utility for scholars, journalists, and media consumers.

Although the foregoing analysis paints a dismal picture, there is some hope to be found in SNS use and political discussion. Some research suggests people use Facebook as a source of self-affirmation (Toma & Hancock, 2013). If people find self-affirmation of their self-worth in areas unrelated to a political topic, they tend to be less biased in their evaluation of information on that topic (Cohen, Aronson, & Steele, 2000). If people are self-affirmed by their social network on Facebook in areas not related to their political identity, they may be more likely to evaluate political information more objectively. If SNSs can be structured to encourage more of this kind of affirming interaction, perhaps some of the pitfalls illuminated by the MSDII can be ameliorated.

The MSDII represents an attempt to synthesize a broad swath of literature related to the problem of increasing polarization of issues information on social media platforms. While the propositions of the MSDII predict and explain current phenomenon in a way that is supported by the extant literature, each proposition needs further testing to understand how these factors work together as a system within the swirl of information to increase polarization of media consumers. We are hopeful this explication of the intertwined influences of this system of cognitive processes, media effects, and networked relationships will help scholars develop solutions, suggestions, and future research to explain the media ecology of today and tomorrow.

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