THE DYNAMICS OF ENGAGEMENT WITH NEWS CONTENT IN ONLINE ENVIRONMENT: EXPLORING THE ROLE OF NORMATIVE SOCIAL CUES IN RISK COMMUNICATION

By

Ji Youn Kim

A dissertation submitted in partial fulfillment of

the requirements for the degree of

Doctor of Philosophy

(Mass Communications)

at the

UNIVERSITY OF WISCONSIN—MADISON

2014

Date of final oral examination: December 3, 2014

The dissertation is approved by the following members of the Final Oral Committee:
Dominique Brossard, Professor of Life Sciences Communication
Daniel Bolt, Professor of Educational Psychology
Dietram A. Scheufele, John E. Ross Professor of Life Sciences Communication
Michael A. Xenos, Professor of Communication Arts
Shawnika Hull, Assistant Professor of Journalism and Mass Communication

TABLE OF CONTENTS

DISCLAIMER

This material is supported by grants from the National Science Foundation to the Center for Nanotechnology in Society at Arizona State University (Grant No. SES-0937591) and the UW-Madison Nanoscale Science and Engineering Center in Templated Synthesis and Assembly at the Nanoscale (Grant No. SES-DMR-0832760). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

ACKNOWLEDGEMENTS

Completing a long journey as a graduate student, I would like to thank all of the people who helped me so far. Without their supports and encouragements, I would not have finished my doctoral program and have completed this dissertation.

I have been fortunate to have opportunities to work with excellent mentors at the University of Wisconsin-Madison. First, I would like to express my sincere gratitude to my academic advisor, Dr. Dominique Brossard, who shared much of her experience and energy in helping me succeed in my work. She has provided me support, encouragement, and guidance during my graduate studies. I would also like to extend my special thanks to the great scholars, Drs. Dietram Scheufele and Mike Xenos for their supports and guidance throughout my doctoral program. Specially, I have always grateful for the opportunities they have given me to work on various research projects. I wish to extend thanks to the members of my committee, Drs. Daniel Bolt, and Shawnika Hull, for providing thoughtful comments and suggestions on this dissertation. In addition to my committee members, I would like to thank Drs. Dhavan Shah, and Al Gunther for being such wonderful teachers.

My sincere thanks also go to the following research members involved in the "nano group": Ashley Anderson, Sara Yeo, Mike Cacciatore, Doo-Hun Choi, Heather Akin, Nan Li, Xuan Liang, Kristin Runge, Maria Stubbings, Larisa Doroshenko, and Leona Yi-Fan Su. I have enjoyed working closely with in many research projects. Especially, this dissertation would not have been possible without our nano group members' help with the process of online content coding.

None of this would have been possible without the support of my family. I would like to send my special appreciation to my parents, Dongwoon Kim and Youngshin Choi, and parents-in-law, Yook Namkoong and Youngju Lee, for their unconditional love, endless supports, and prayer. I sincerely thank my sister, sisters-in-law, and brothers-in-law. I would also like to give my deepest gratitude to my girl, Ellie Namkoong. None of this would have been possible without her love and patience.

Lastly but most importantly, I would like to dedicate this dissertation to my husband and best friend, Kang Namkoong. I sincerely thank him for the love, encouragement, advice, and support. I am truly blessed to have such a wonderful lifetime companion. I would not be where I am without him.

THE DYNAMICS OF ENGAGEMENT WITH NEWS CONTENT IN ONLINE ENVIRONMENT: EXPLORING THE ROLE OF NORMATIVE SOCIAL CUES IN RISK COMMUNICATION

ABSTRACT

The media environment in recent years has undergone dramatic changes. One of the most significant of these concerns the means of media production, distribution, and consumption. The process of news consumption, news selection (Chung, 2008), and news participation (Ha & Ahn, 2011) is now powerfully influenced by online media users. Online users can be and are involved in social information networks, easily sharing or promoting information. In fact, if they so choose they can be news content contributors (e.g., news distributors, news recommenders). In online communication, media users can easily share external news content by linking to news stories in their posts (Szabo & Huberman, 2010) and they can discuss, in real time, the issue with people all over the world (Lee & Ma, 2012). Despite such beneficial potential, if media users do not engage with the process of democratized communication online then no benefit is gained. Eventually, people are able to have some degrees of influences on societal issue when they engage with certain issue by actively sharing and commenting on news content about societal issues in online space (Goode, 2009).

Hence, in this dissertation, I am interested in how technologies that have been developed to promote convenient Internet participation, e.g., the sharing function in social media, play a role in media users' engagement with news content in online setting. Specifically, I demonstrate that perceived social norms, inferred from the social signals

conveyed in an online environment, can affect users' information processing and engagement with news content about a controversial social issue.

This dissertation mainly focuses on the influences of normative social cues (e.g., numbers of likes and shares) that may be presented in different risk-level news stories in online communication. The dissertation investigates (a) whether social media users indeed engage with online news content (e.g., sharing an external online content in social media platforms), and if so, (b) what motivates them, based on the attributes of online content (i.e., in this dissertation, normative social cues), to participate in this process. To confirm the role of social media as a place for information distribution, the preliminary study explores (1) how much certain online information is shared by media users by their including an external link in a tweet and (2) what sentiments do social media users predominantly express on Twitter, for indeed the presented sentiment could provide a social cue regarding the issue to other users. The two major foci of the research questions posed for my main study are as follows. First, I investigate how the presented normative social cues (e.g., the numbers of likes or shares of Facebook content) influence people's attitude or evaluation of messages. Second, I demonstrate how the given normative social cues encourage people to participate in the process of engagement with news content (i.e., sharing and endorsing news about a specific issue) in the online space. In sum, I use the controversial issue of nuclear energy as a case study and examine how normative social cues expressed in online content stimulate cognitive processing and engagement with information online.

In the preliminary study, presented in Chapter 2, I investigate the degree to which Twitter users share information pertaining to nuclear energy. My findings indicate that

after the 2011 nuclear disaster at Fukushima Daiichi, the total volume of tweets about nuclear energy unmistakably increased. Additionally, the amount of nuclear energy-related tweets that were linked to outside information (by providing external links in tweets) far outnumbered tweets containing no external link. Results also indicate that the predominant tone in these tweets was one of pessimism about nuclear energy. In the tweets with an external link, the most common sentiment regarding nuclear energy was pessimism followed by optimism and then neutrality. Tweets without an external link were also predominantly pessimistic, but neutrality was the next most common sentiment followed by optimism. In sum, when people "tweeted" about nuclear energy and included an external link, they tended to express a more slanted opinion (either positive or negative) on the issue. Based on this case, the preliminary study revealed the potential social media users have to express their opinions and share information about societal issues.

My main study (Chapters 3, 4, and 5) explores the direct and moderating effects of normative social cues within online content on (1) news processing and (2) engagement with news content. For this, I use an experiment-embedded survey to assess the degree to which levels of normative social cues help forecast media users' roles as news consumers and news gatekeepers. My results indicate a direct and positive effect of normative social cues on news processing in the online space. As expected, the online content with a high numbers of likes and shares (i.e., normative social cues) show significant direct and interactive effects on respondents' news consumption intention, presumed different levels of others' engagement with news content, and perceived importance of the news story. Furthermore, normative social cues play a significant role

in online news content engagement intention. Interestingly, findings suggest that normative social cues can play a role in the process of online news consumption, but that this influence can differ depending on individual circumstances or attributes of the message itself.

This dissertation not only revisits existing information-processing approaches to predicting the public (1) processing of online news and (2) intention to engage with it, but also contributes theoretically to bridging the information model and social comparison model by considering, in online communication, both internal and external influences (e.g., perceived status of news story inferring from normative social cues, and presumed normative social pressure from the news article). Further important theoretical, methodological, and practical contributions of the results are discussed and directions are suggested for future research.

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1. INTRODUCTION AND OVERVIEW

As many scholars have discussed (e.g., Becker, Dalrymple, Brossard, Scheufele, & Gunther, 2010), media environment has changed dramatically in recent years. In the new media paradigm in the digital age, the Internet represents perhaps the most important medium used in people's daily lives, with more Americans now getting their news online than from local newspapers (Purcell, Rainie, Mitchell, Rosenstiel, & Olmstead, 2010). The development of new technologies, especially the Internet, has shifted the media paradigm away from traditional communication, which is limited in its opportunities for social interaction. As known, the Internet has contributed to building a better network-based community that overcomes geographic boundaries (Wellman, 2001). The Internet enables users to communicate easily with many people over a long distance (DiMaggio, Hargittai, Neuman, & Robinson, 2001).

Although critics argue that the Internet creates a digital divide between low and high socioeconomic groups (e.g., Hindman, 2009), many proponents believe the Internet can reduce inequalities between SES groups because it offers opportunities to participate in information exchange and discussion for little or no cost (e.g., Anderson, Bikson, Law, & Mitchell, 1995). Indeed, a digital divide might have been a real risk in the past, yet Bimber (2003) suggests the gap has narrowed recently, and that inequalities in access and participation might end altogether soon. Furthermore, "mobilization theorists" (see, Norris, 2001) suggest that interactive media like the Internet allow every individual, including young, isolated, and minority citizens, to participate in political conversations. This gives people a chance to set the public agenda (Benkler, 2006), discuss issues raised

in the news (Hardy & Scheufele, 2005), and engage in political deliberation or debates (Norris, 2001).

In this new media environment, the paradigm of media message production or distribution, as many scholars have discussed (e.g., Becker et al., 2010), has indeed changed. For example, ordinary people can now generate and share their own news content (Gane & Beer, 2008; Hardy & Scheufele, 2005). People have more of an opportunity to share information by sending a link or attaching a file to an e-mail (Barensch, Knight, Harp, & Yaschur, 2011). Social media, furthermore, provide a "share" function so content and messages can be easily forwarded (e.g., through the "share" function on Facebook), facilitating a wider distribution of content (Nisbet & Kotcher, 2009).

Living in the digital age when people are exposed to a vast amount of information, individuals tend to rely more on others to get need-to-know information (Purcell, Rainie, Mitchell, Rosenstiel, & Olmstead, 2010). Conforming with this need, nearly half of the online users post external links and share news with others via their social media platforms (Baresch, Knight, Harp, & Yaschur, 2011). Through the social functions in new media, online users can easily access information shared by others. Similarly, in a *New York Times* article, Stelter (2008) reported that the younger generations tend to take on the roles of news messengers or news deliverers using online tools. Specifically, Stelter notes that younger people are more likely to send links and videos to their friends or acquaintances via email. Further, he acknowledges that young people tend to rely more on their online connections for news because they believe that

they can be informed about important news from their friends or online networks without having to seek it out themselves.

In one study (Baresch, Knight, Harp, & Yaschur, 2011), researchers found that a great number of social media users (49% of participants in their study) have shared news with others by posting links to external news sites on social media platforms. By participating in news sharing online, individuals can get more involved in societal issues (Kushin & Yamamoto, 2010), express personal opinions about and interest toward the societal issues with others (Jin, Wang, Luo, Yu, & Han, 2011; Roosendaal, 2011), and are able to share information and attitudes about the issues (Rosenblatt, 2007).

Noticeably, the new paradigm of online media provides an opportunity for users to be exposed to a diversity of issues that may receive little attention in the press, such as science issues. In particular, controversial issues are discussed more frequently and more in depth online than in traditional media (Anderson, Brossard, & Scheufele, 2013). Hence, Anderson and her colleagues (2013), suggest using online media as an alternative communication channel for controversial issues.

Social Media: A Field of Opportunity in Issue Engagement

In terms of participating in information engagement in online space, people have a chance to be involved in a social information network and easily engage with online content by sharing or endorsing information with others. A noteworthy difference between communication via social media and face-to-face communication is that the information shared on social media is usually open to the public (Liere, 2010).

Social media including social network sites (SNS) have shown remarkable growth in the past few years. In accordance with these developments, scholars have demonstrated

an interest in (a) why people engage with issues using social media (e.g., Brandtzaeg & Heim, 2009; Ellison, Steinfield, & Lampe, 2007; Ji, Hwangbo, Yi, & Rau, 2010; Less & Ma, 2012), (b) to what degree the use of social media influences democracy (e.g., Kushin & Yamamoto, 2010), and (c) how information flows on social media (e.g., Lotan, Graeff, Ananny, Gaffeney, Pearce, & Boyd, 2011; Tonkin, Pfeiffer, & Tourte, 2012).

Individuals use social media for a variety of reasons. According to Thelwall's classification (2009), the functions of social media (particularly social network sites in his study) could be explained into three ways: (a) socializing: finding amusement, (b) networking: forming social relationships, and (c) navigation: exploring information and resources. Concerning the role of social capital, earlier studies have found that people are more likely to use Facebook to find people they know offline and less likely to form new relationships with strangers (Lampe, Ellison, & Steinfield, 2006). However, more recent studies suggest that many people are using social media both to meet new people, i.e., bridging social capital, and to interact with old friends, i.e., bonding social capital (Brandtzaeg & Heim, 2009; Ellison, Steinfield, & Lampe, 2007).

Regarding the function of information sharing, some people use social media to seek and share information (Marwick & Boyd, 2011), and to exchange opinions toward certain issues (Kushin & Yamamoto, 2010). They respond, in such manner, to mass emergency events (Palen, Starbird, Vieweg, & Hughes, 2010). For instance, in Palen and colleagues research (2010), when warnings of flood were sent out, people "tweeted" more about those issues. Particularly, people can easily to find certain information through the use of Twitter's "hashtags" (Romero, Meeder, & Kleinberg, 2011). It should

be noted, however, that, based on their findings, Lotan and colleagues (2011) suggested that people tend to share more conversation that support their preexisting belief.

New Roles for Engaging Users in Online Communication

With the development of online communication tools, the public can participate in the process of news engagement, e.g., by posting self-produced online content as well as consuming news produced by others (Gane & Beer, 2008; Hardy & Scheufele, 2005). They can do this at a low or no cost (Benkler, 2006; Bimber, 2003; DiMaggio, Hargittai, Neuman, & Robinson, 2001). Furthermore, individuals can easily share news and facilitate a wider distribution of content on the Web. For instance, social media offer the opportunity to easily share media content. As Nisbet and Kotcher (2009) pointed out, social networking sites not only allow people to easily forward content, but also encourage them to engage with the issue across geographic and time boundaries (Rosenblatt, 2007). Advanced Internet technology enables people to be news contributors (e.g., news distributors or news introducers) if they so choose. Accordingly, the influence of social media users on news media and news consumption merits close attention.

Reflecting the infinite potential of new media, researchers in the field of communication have expanded their interests over the years. In the past, most communication researchers paid more attention to the reception effects of media messages. For example, many scholars applied framing theory, one of most famous communication theories, to examine how media frames or individual frames affect media audiences' interpretation of issues and situations (e.g., Druckman, 2001; Kahneman & Tversky, 1979, 1984; Schütz & Wiedemann, 2008). To understand the influence of media on news consumers, scholars are justified in considering reception effects of media

messages. However, with more individuals engaging in news content production or distribution, many researchers are also beginning to pay attention to expression effects of media, meaning how individuals are influenced through a process of expressing own opinions to others. For instance, Han and his colleagues (2011) explore the benefits and psychological outcomes of message expression and reception for participants in an online cancer support group (Han, Shah, Kim, Namkoong, Lee, Moon, et al., 2011). Furthermore, as individuals' increasingly participate in the process of news content production and distribution, researchers have become interested in the behavioral component of such media participation. For instance, several researchers have investigated why people share their knowledge with others (e.g., Hsu & Lin, 2008).

Despite extended research in online communication, research has not yet fully explored the dynamic role of social media users in the processes of news content engagement. For instance, there is very little research to date that considers the quantity of content shared via social media users for a certain issue. Further, little research has investigated what motivates people to engage with news content (in sharing and distributing the content) about an issue using social media platform. Considering the recent dramatic changes to the media environment and its potential on engaging users in news content, research concerning social media is an area that warrants exploration. Hence, as a part of the researches concerning the role of social media on societal issues, in this project, I mainly contribute to an expansion and deepening of our understanding of how normative social cues belonging to the online news content influence media users' information processing and engagement with online news content.

Namely, I am interested in how technologies that have been developed to promote convenient Internet participation, e.g., the sharing function in social media, play a role in media users' engagement with news content in online setting. Specifically, I propose that perceived social norms, inferred from the social signals conveyed in an online environment, can affect users' information processing and engagement with news content about a controversial social issue. In order to investigate how social cues within the online news influence individuals' issue processing, I believe scholarship should concern both the perceived social influences as well as contextual forces. But first, I will review the theoretical background of information-processing models and subsequently provide an overview of the perspectives on the roles of normative social cues in online settings.

Background on Information Processing

In the 20th century, researchers proposed several theories to explain attitude formation through message-based persuasion. McGuire (1968a, 1968b, 1972) suggested that attitude formation occurs in three steps. In the first step, an individual pays attention to a message. In the second step, the individual comprehends the message content, and in the third step, he/she accepts or rejects the message's conclusion. Other studies in persuasion focus on the cognitive responses that contribute to people's information processing (Greenwald, 1968; Petty, Ostrom, & Brock, 1981). In this model, people use mental reactions, i.e., cognitive responses, to process the persuasive messages.

Although these approaches provide helpful insights into the persuasion process, they do not identify all of the factors that affect the way in which individuals process persuasive messages. In other words, since the cognitive response approach to persuasive messages focuses only on the conditions under which people actively process information,

it is less applicable to situations in which people process a given message content passively. To address this limitation, later studies suggested dual process models of information processing, e.g., the elaboration likelihood model and heuristic-systematic model, to predict how people process given information (e.g., Frewer, Howard, Hedderley, & Shepherd, 1997; Khalor, Dunwoody, Griffin, Neuwirth, & Giese, 2003).

Unlike the cognitive response model, the elaboration likelihood model (ELM) considers both active and non-active processing of a persuasive message. The ELM suggests two different routes of processing that individuals may follow when exposed to a persuasive message: central route or peripheral route. According to Petty and his colleagues (2009), the central route is characterized by a careful and thoughtful evaluation of messages. Once the recipients process the arguments, they are likely to use all integrated cognitive structures to actively engage in a high level of elaboration and create a cognitive link between their preexisting attitudes and the content of the message's arguments. Thus, attitude change through the central route tends to be more enduring, and more resistant to counter persuasion. On the other hand, the peripheral route involves a simple reading of a persuasive message without complex cognitive processing. In this route of processing, individuals tend to rely on their peripheral cues, e.g., source credibility or message quality, when making a decision about the content in the message. Although the peripheral approach can be very effective in the short term, attitudes changed (or formed) using the peripheral route tend to be less resilient and more susceptible to counter persuasion than attitudes formed using the central route of processing.

Furthermore, as Cappella (2006) pointed out, the ELM explicates the interactive roles between motivation, ability, and message variables when considering the central and peripheral routes to persuasion. In detail, individuals with higher motivation levels are more likely to utilize the central route to process a persuasive message. However, even with more motivation, people still cannot engage in central route processing if they do not have the ability to process the message. In this case, message distraction, repetition, and comprehensibility may determine the level of individuals' cognitive processing of a message.

Although the ELM provides very important insights into understanding people's information processing, it is less likely to explicate a relationship between its two processing modes, that is, it treats the central and peripheral routes as separate in the persuasion process. Hence, scholars suggested another model of information processing, the Heuristic-Systematic Model (HSM) (Chaiken, 1980; Eagly & Chaiken, 1993).

Both the ELM and HSM focus on the persuasion process, and they share the idea that persuasion can occur through dual processing channels. The heuristic-systematic model assumes that people use two modes of processing when judging a message's validity and forming attitudes about an issue (Eagly & Chaiken, 1993). One type of message processing can take place through systematic mode, which needs cognitive elaboration of message itself, and simultaneously heuristic processing, which saves people's time and energy necessary to systematic processing when making decisions about a message. Meanwhile, the HSM assumes that persuasive messages are most effective when recipients are highly motivated and able to process attitude-relevant information (Chaiken, 1980; Chaiken, & Eagly, 1989; also see, Griffin, Neuwirth, Giese,

& Dunwoody, 2002). Thus, the HSM introduces three conditions of motivation in systematic processing: (1) a perceiver motivated by accuracy evaluates the information based on relevant fact, although cognitive factors, e.g., prior knowledge, and heuristic cues, may sometimes bias the information; (2) a perceiver motivated by defending their views processes the information based on their preferred attitude; and, (3) an impressionable perceiver is motivated to assess the information based on the social acceptability of the message, to minimize possible social disagreement (Eagly & Chaiken, 1993).

Unlike the ELM, the HSM suggests that systematic and heuristic processing can occur simultaneously. In other words, the HSM implies that heuristic and systematic processes are not mutually exclusive. Thus, certain factors may affect the mode an individual uses when processing new information. For example, people with higher motivation and ability to process messages in a cognitive way tend to rely on fewer heuristic cues. However, the systematic process can be biased when individual's heuristic cues, e.g., previous beliefs on certain issues, influence their systematic processing.

Considering people can be influenced by different factors (spurring heuristic and systematic modes) simultaneously when processing information (Eagly & Chaiken, 1993), in this dissertation, I use the HSM model as my theoretical framework, rather than the ELM one, to analyze what kind of heuristic cues in relation to online content affect media users' process of the given information. Specifically, among those potential heuristic cues, I explore the role of normative social cues within online content (e.g., numbers of 'likes' or 'shares' on Facebook) on information processing because normative social cues expressed on social media can be served as heuristics when people process news contents

in online environment. Hence, I examine whether the normative social cues and a personal inclination for cognitive processing simultaneously influence news evaluation and media users' intention to engage with news content.

Normative Social Cues in Online Communication

Since humans are social beings, people emulate others' behaviors in their social environments (social cognitive theory in Bandura, 2001). In detail, people are continuously comparing themselves with others, and may change their attitudes or behaviors to conform to others, particularly those in their reference groups (social comparison theory, proposed by Festinger, 1954). This is because people consider that "if others think that something is good, then I should, too" (bandwagon heuristic in Sundar, 2008, p. 83).

Recently, researchers became more interested in applying these structural approaches, including the social comparison model, social cognitive theory, and bandwagon heuristic, to studies of online communication. For instance, a recent study found that, in online spaces, just as in the real world, when individuals consider the social implications of their behaviors, they tend to be consciously perceptive of the normative expectations of others, to avoid being excluded or disregarded by respected others (Spartz, Su, Brossard, Dunwoody, & Griffin, 2012).

In the online media environment, people can infer the social influence of given information in a variety of ways. For example, by checking the number of normative social cues expressed in online content (e.g., 'like' button in Facebook, and 'thumbs up' on YouTube), media users can gauge the influence of online content on others' attitudes toward the information. The publicly displayed statistics for 'sharing' or 'liking' content

on a website (i.e., normative social cues in online setting) show how many people read, approve or recommend the post. It seems that the influence of normative social cues provided with news content has probably been strengthened. Social cues expressed on Facebook not only give third-party online content providers an opportunity to increase traffic to their websites, they also allow Facebook users to share their own interests with other users (Roosendaal, 2011). By encountering the normative social cues expressed online, media users can gauge others' opinions or attitudes toward the information, and can then be influenced by these social cues when evaluating relevant issues (Sundar, Oeldorf-Hirsch, & Xu, 2008; Sundar, Xu, & Oeldorf-Hirsch, 2009).

In addition to the quantification of normative social cues (e.g., social plugins in social media platforms), a dominantly expressed sentiment toward a certain issue could be perceived as such a cue. It could be used to infer information about others' opinions about relevant issue. That is, people are more likely to form a perception about majority opinions on a given issue by tracking the opinions of others. They can find these frequently expressed in online discourse. When making a decision about the issue, people can be influenced by this perceived dominant sentiment.

Considering the potential importance of normative social cues in online communication, recent studies have analyzed how social cues expressed in social media play a role in information processing. For instance, Spartz and his colleagues (2012) examined how the number of views of a specific video posted on YouTube may influence people's attitudes toward climate change. By seeing social cues, expressed as how many media users had engaged with content, people can a) infer cultural or social normative beliefs about an issue (Rosen, Barnett, & Kim, 2011), (b) make an assessment about how

popular the information is (Knobloch-Westerwick, Sharma, Hansen, & Alter 2005; Sundar, Oeldorf-Hirsch, & Xu, 2008), and (c) determine their behaviors how to process the given information (Knobloch-Westerwick, Sharma, Hansen, & Alter 2005). Thus, we can expect that if people perceive more positive social cues within certain online content (e.g., higher number of likes of shares), they are also more willing to contribute to the content by endorsing (clicking 'like' button) or sharing the content in online environment to conforming to their social groups or to avoid being excluded by their reference groups.

It is worthy to explore how media user's intention to engage with online content (e.g., sharing, or endorsing the given content) is related to the perceived social cues within the content because online media users, is that unlike traditional media, typically a top-down, journalist-centered form of information delivery, have a powerful influence on the process of news consumption, news selection (Chung, 2008), and news participation (Ha & Ahn, 2011). As mentioned before, the advancement of online communication tools has enabled people to become engaging users with online content if they so choose. As Smith (2010) proposed, "Twitter is more than a message engine – it is a platform for social connection and promotion" (p. 332). In social media, media users can easily share external news content by linking to news stories in their posts (Szabo & Huberman, 2010), and they can discuss the issue with people all over the world in real time (Lee & Ma, 2012).

The Internet has indeed played an influential role in issue engagement across social contexts. Interestingly, Facebook published a list of their most shared articles in the U.S. in 2011, and the *New York Times'* article "Satellite photos of Japan, before and after the quake and tsunami" was ranked the most-shared article. Facebook reported that

its users shared this article with their friends or other individuals roughly 600,000 times (Facebook, 2011). By sharing such an article, these social media users contributed to popularize the event in the world of online. However we should concern the fact that although the Internet allows individuals to be influential in the new paradigm of communication, there is no beneficial effect of the Internet if media users do not participate in the process of democratized communication online. Eventually, by actively engaging with online content (e.g., sharing and commenting on news content) about societal issues in online space, people are then able to engage with certain issues (Goode, 2009) with their own opinions.

Engaging with news online by using and observing social cues are not only beneficial to media users, it is also advantageous to media agencies. As the media users' actively participate in news distribution, news agencies can observe and respond to the flow of their media messages online. According to Roosendaal (2011), many of the major news sites have embedded Facebook's social plug-ins in their sites to link their content to the widely used social media. By doing so, they are able to promote their websites to a wider number of social media users. He also notes that social cues, such as the social plugins, within the news content on Facebook has helped online content providers to increase the amount of traffic coming to their sites (Roosendaal, 2011).

Context of Enquiry: Nuclear Energy

Since its first use in 1951, the production of radioactive waste as an outcome of generating nuclear energy has made nuclear power a controversial issue. The fact that there are both benefits and risks associated with nuclear energy provokes constant dispute (Yeo, Cacciatore, Brossard, Scheufele, Runge, Su, et al., 2014). Individuals who identify

as pro-nuclear energy support the technology because of the benefits it provides, such as clean and renewable energy, while those who are opposed to nuclear energy are against the technology due to the risks of disposing of nuclear waste and the threat of nuclear disasters (Brook & Lowe, 2010).

Since nuclear power plants are one of the major means to generate electricity without producing greenhouse gases, groups who support nuclear energy, such as the nuclear industry, politicians, and other stakeholders, promoted the promise of a "nuclear renaissance" (Whitfield, Rosa, Dan, & Dietz, 2009), at least until the accident at the Fukushima Daiichi power plant in Japan in 2011[1]. Indeed, the disaster seemed to reawaken widespread concerns about the safety of nuclear power. A hazardous event such as a nuclear disaster could led to the social amplification of the perceived risks, because such a disaster is considered as a dreaded event (Kasperson, 2012). Undoubtedly, increased risk perception toward nuclear energy negatively affects people's attitudes toward this technology, and may result in widespread opposition to nuclear power (Whitfield, Rosa, Dan & Dietz, 2009).

In spite of the damage to public perception of nuclear power caused by the recent nuclear disaster, public opinion related to the technology is still ambivalent. In fact, a 2012 report showed that 44 percent of Americans support increased use of nuclear energy, while about half of Americans are against it (Pew Research Centre for the People & the Press, 2012). Public controversy over nuclear energy has potentially been exacerbated by

[1] On March 11, 2011, the largest nuclear disaster since the Chernobyl disaster of 1986 occurred in the coast of Japan. A magnitude 8.4 earthquake and Tsunami produced a series of a loss of power to the plant's cooling system, nuclear meltdowns, and escape of radioactive material at the Fukushima Daiichi nuclear power plant.

how the media has covered the issue. Indeed, despite several historic and monumental tragedies caused by nuclear disasters, there has been a growing trend toward highlighting the benefits of nuclear energy, e.g., portraying the technology as an alternative form of energy, in media discourse (Pralle & Boscarino, 2011). Further, studies have asserted that, for Americans, mass media is the most easily available and important source for science information (Lee & Scheufele, 2006; National Science Board, 2002; Nelkin, 1995). When it comes to public awareness of scientific and technological issues, mass media can influence how individuals' form judgments about these issues (Scheufele & Lewenstein, 2005). Therefore, media coverage of nuclear energy has been associated with how publics form attitudes toward the technology (Yeo, Cacciatore, Brossard, Scheufele, Runge, Su, et al., 2014).

I intend to use an established controversial, scientific issue, nuclear energy, as the context of enquiry to explore the effect of normative social cues in online news engagement processes. As I discussed earlier, people tend to conform to their social groups and to compare themselves with their reference groups (Festinger, 1954). In particular, to treat the controversial issue such as nuclear energy, people are perhaps more likely to seek more social cues to confirm the general opinions of others toward the issue because they do not want to counter with others' normative expectations (Spartz, Su, Brossard, Dunwoody, & Griffin, 2012). In influencing peoples' cognitive attitudes toward the complex issue, interestingly however, negative information is often making for a stronger effect than positive information (Bizer & Petty, 2005) while the tone of media coverage of the nuclear energy tended to be changed over time (Nisbet, 2009). Moreover, Japan's nuclear disaster in March of 2011 returned nuclear energy to being a

hot-button issue. In the disaster's aftermath, media coverage—Japanese and foreign—was massive, stoking widespread discussion of the accident itself and of radiation contamination (Lazic, 2013). Four months later, a Google search produced approximately 22,400,000 results for the search terms "Fukushima and radiation" (Friedman, 2011). The ongoing conflict of opinions among the public on the pros and cons of nuclear energy, and its social and political implications, therefore, justify the use of nuclear energy as a topic of focus in this project.

Research Questions and Dissertation Overview

Considering what is discussed above, this dissertation is mainly interested in how normative social cues expressed in online content (e.g., the numbers of likes and shares) stimulate cognitive processing and news engagement with information in online (e.g., sharing and endorsing). As discussed, social media users can participate in online content production in different ways and I, in this project, explore two of those ways: 1) sharing by providing external links with an expressing sentiment toward certain issue on social media platforms, and 2) engaging with online news by contributing to normative social cues expressed on Facebook. By exploring it in interactive communication setting, this dissertation not only revisits existing information-processing approaches to predicting the public's processing of news and intention to engage with it, but also contributes theoretically to bridging the information model and social comparison model by considering perceived status of news story inferring from normative social cues, and presumed normative social pressure from the news article.

More specifically, using the issue of nuclear energy as the context of enquiry, through the study A, I explore (1) how much certain online information is shared by

media users via including an external link in a tweet to confirm the role of social media as a place for information distribution, and (2) what sentiment about certain issue is dominantly expressed by social media users on Twitter because the presented sentiment could give a social cue to social media users in terms of understanding the issue. Following, the two major foci of the research questions posed for study B were as follows: first, I examine how the presented normative social cues (e.g., the numbers of likes or shares in Facebook content) influence people's processing of messages. Secondly, I investigate how the given normative social cues encourage people to engage with the online news content (i.e., sharing and endorsing news about a specific issue).

My dissertation is structured as follows: The preliminary study (Study A) presented in Chapter 2, by conducting content analysis, explores whether or not social media users are indeed participating in the process of online content engagement in social media setting and what sentiments about nuclear energy people express in a specific social media platform, Twitter.

After verifying social media users' substantial participation in online content engagement (i.e., sharing an external content) in Chapter 2, Chapter 3 focuses on a theoretical framework for my main study (Study B), the effect of normative social cues on the processing of online information about nuclear energy. Based on a literature review, I formulate a set of hypotheses concerning the effect of normative social cues in online information process. The first set of hypotheses relates to the effect of normative social cues on the news processing and news evaluation (from the news consumers' perspective). Following, in the second set of hypotheses, I shift my focus to the influence of normative social cues on media users' intention to engage with certain online content

(from the news gatekeepers' perspective). Especially, based on my literature review, I proposed that there will be a difference in the influence of normative social cues expressed in online setting for content expressing either high or low risks for nuclear energy.

Chapter 4 provides an overview of the experimental design, procedures and used in the analyses of my main study. In this chapter, I provide the rationale for the experimental design and briefly review the two communication perspectives, framing and the role of normative social cues in online setting, used in this research. Also, Chapter 4 discusses how the experiment was designed, how data were collected, and how the manipulations were checked. Finally, I explain how the outcome and individual variables were measured.

The analyses in Chapter 5 were conducted to address the hypotheses presented in Chapter 3. In Chapter 5, I present the results of the analyses, including the significant influence of normative social cues on (1) news processing (e.g., intention to read the full story and evaluation of news article) and (2) news engagement (i.e., sharing and endorsing the news) intention. Next, I summarize the findings of this chapter, and discuss the implication of this study.

In the final chapter, Chapter 6, I provide concluding remarks and the implications of this dissertation research. I summarize the key findings of this dissertation, identify key theoretical and methodological contributions of this project, propose practical applications of this research for practitioners who are interested in engaging the public using online deliberation, and propose directions for future study.

In wrapping up the first chapter of this dissertation, I should point out that the concept of media users' engagement with online content denotes individuals' participation in (or contribution to) online news content (e.g., sharing or endorsing the news content in online space). In this study, the concept of individuals' engagement with online content encompasses media users' online news participation behaviors such as clicking normative social cues (e.g., "like," "recommend," or "share" buttons), writing comments beneath the online content, inserting the external news link in their posting and so on. I tried to be consistent with the terms throughout this dissertation, though the concept of engagement with online content is used interchangeably in places with news distribution, news sharing, news endorsing, news engagement, and news contribution.

Also, for the sake of simplicity, I refer to the many different types of news consumption behaviors in the process of news processing (e.g., reading the full news article, evaluating a news story, perceiving normative social pressure to approve of a news article, and perceiving influence of a certain news item) as "news processing" or "processing of a news article."

Lastly, the concept of normative social cues implies the technical function of social plugins embedded in social media, and the presented sentiment (or tone) of public opinions toward certain issues. The different types of social cues, for instance, a) likes or shares on Facebook, b) views on YouTube, c) re-tweeting/favorites on Twitter, as well as eventually d) expressions of sentiment in Twitter could be considered a concept of normative social cues throughout this study. However, in the main study, I use the technical function of social plug-ins in Facebook (i.e., "likes" or "shares" button

belonging to Facebook posts) as an indicator of normative social cues in online communication.

CHAPTER 2. "SHARED" INFORMATION ACROSS WEB PLATFORMS: EXPLORING SENTIMENT EXPRESSION RELATED TO NUCLEAR ENERGY ON TWITTER

(PRELIMINARY STUDY, STUDY A)

Many people today enjoy sharing valuable information with their social networks. As I described in the previous chapter, people tend to share and deliberate over a wide range of issues in the online world. As I explained, users may be sharing information about nuclear energy online, particularly since the Fukushima Daiichi nuclear power plant disaster in Japan in 2011. Indeed, the *New York Times* reported that their article "Satellite Photos of Japan, Before and After the Quake and Tsunami*"* was the article the most shared by Facebook users in the US in 2011 (Facebook, 2011). It is significant that this article was ranked as the most shared because the article dealt with an issue that many people were unfamiliar with. That is, even though Americans may not have known much about the science of nuclear power plants, they were still engaged in distributing information about the issue online.

Even though social media users can undoubtedly engage with a diversity of issues online, there is very little research that has explored empirically the dynamics of engagement with online content, e.g., news sharing, in the world of social media. Hence, I explore in this preliminary study how online information with an expressing sentiment toward a specific societal issue is shared among social media users. Considering the presented sentiment could give a social cue to gauge others attitudes toward the given issue, it is worth to explore what sentiment about certain issue is dominantly expressed by social media users when certain information is shared in online space.

Scientific Issues in Social Media

As I have discussed earlier, today's paradigm of media message production and distribution has undergone a transformation in recent years. Internet technology enables people to be news distributors (Nisbet & Kotcher, 2009). The ease of information distribution using social media means that any individual can be influential in disseminating information among his or her peer groups. Considering the viewpoints of collective power or collective intelligence, ordinary individuals can play an influential role in online content contribution by engaging with online information using social media. Bakshy and colleagues (2011) agree with this view of the influential, finding that ordinary individuals may use Twitter to attain the status of the influential.

Considering the significant role individuals can play in sharing information through social media, it is important to explore the amount of information on any given topic that is shared by media users online. In online communication, media users can easily share external news content by linking to news stories in their posts (Szabo & Huberman, 2010). Far too few studies, however, have explored how much scientific information is shared by social media users. Particularly, as part of an effort to improve their news readership in a flood of information, many news agencies devote a lot of efforts such as implementing the social plug-ins from Facebook in their websites in order to attract more online users to their sites. Despite it is important to entice online users to read more certain articles to promote a specific event, there is a scarcity of research studies that have conducted empirical content analysis to understand the amount of nuclear energy-related content that linked to outside information that has been distributed using social media. On Twitter, media users can share online news by inserting web links

to external sites in their tweets. By doing so, others can reach the original information by clicking the link shared. Hence, I use one of the most prevalent social media outlets, Twitter, as a case study, and pose the following research questions:

> ***Research Question 1a:*** What is the volume of (1) tweets that contain external links to nuclear energy-related content and (2) tweets about nuclear energy without external links on Twitter?
>
> ***Research Question 1b:*** What is the proportion of tweets with external links to nuclear energy-related content to tweets about nuclear energy without links on Twitter?

Additionally, despite the ease of distributing content in online and social media, there are few empirical studies that assess public sentiment expressed about scientific issues in online discussion, particularly when people are sharing their opinions about certain issues with others (for an exception, see Runge et al. 2013).

In terms of nuclear energy, the volume of print and online news coverage mentioning the issue increased noticeably after the Fukushima Daiichi disaster (Yeo, Cacciatore, Brossard, Scheufele, Lunge, Su, et al., 2013). Although there is evidence that the frames used in media coverage of nuclear energy have changed in accordance with the issue attention cycle and social mood (Nisbet, 2009), little research has used large-scale content analysis to gauge the sentiment toward the technology in social media, in particular when a nuclear energy-related news link is shared with others. Considering presented sentiment could give a social clue to gauge public attitudes toward the issue, what sentiment about certain issue is dominantly expressed among social media users on

Twitter is worth to explore. But, it is difficult to predict what the dominant response (or opinion) is to nuclear energy-related news coverage that is shared using social media because different processing toward a same event (e.g., a nuclear disaster) could be influenced by personal traits (e.g., ideology, in Yeo et al., 2013). Therefore, this study puts forth the following research questions:

> ***Research Question 2:*** After the Fukushima Daiichi nuclear disaster, what sentiment do users express about nuclear energy when they (a) share links to content about the technology on Twitter? and (b) tweet about the technology (but do not share a link) on Twitter?

Methods

Content Analysis

In this chapter, I focus especially on the use of Twitter, which is a unique and widely used channel for online communication. Twitter is a microblogging website that allows users a limit of 140 characters per post, or "tweet." Twitter allows users to engage in public discourses on certain issues through its website, including on mobile Internet devices. Based on a report published by Twitter (2012), over 140 million active unique users throughout the world send more than 340 million tweets per day. Indeed, the service has contributed to enabling online users to participate in collective action, disseminate emerging news, and exchange opinions (Runge, Yeo, Cacciatore, Scheufele, Brossard, Xenos, et al., 2013).

In order to gauge, a) the volume and b) the sentiment of the tweets that have been shared by users on Twitter for nuclear energy related content, I collected tweets related to

nuclear energy that were shared over a period of 36 months (October 1, 2010 through September 30, 2013). I ran for a specified timeframe because the Fukushima Daiichi nuclear power plant disaster in Japan in March 2011 was more likely to affect the amount of (and sentiment of) nuclear energy-related tweets.

For this study, I collected and analyzed data using an automated nonparametric content analysis software, Forsight, developed by Crimson Hexagon. The social media monitoring and analysis company, Crimson Hexagon, uses a "trained" algorithm to track linguistic patterns of specific concepts identified by human-coders (Hopkins & King, 2010). There are several benefits associated with using this software for online content analysis. Since Crimson Hexagon's platform captures the complete posts of all publically posted tweets, there is no concern about a sampling margin of error. Additionally, the categorization performed by the algorithm has shown a satisfying reliability with a +/- 3% margin of error (see http://www.crimsonhexagon.com/products/technical-specifications/).

To conduct the content analysis, a total of 10 trained coders from a graduate program at the University of Wisconsin-Madison were involved in the process of train the software. To improve the reliability of coding process, a single consensus codebook was provided to the every interrelated teams, and all coders shared their questions or discussed any ambiguous tweets at a weekly basis meeting. In the process of content analysis, our coding team developed a set of keywords related to nuclear energy, and the program randomly selected a set of publically available tweets that used these keywords (see Appendix A for the content analysis search string). These tweets were analyzed and classified into specific categories by human coders (see Table 2.1 for samples of tweets coded; Appendix B for a screenshot of the software in the process of training session).

It should be pointed out that the Crimson Hexagon approach is not an absolute case-by-case classification, i.e., does not provide the exact number of tweet for each category of interest. Rather, it provides estimates of proportions of content (tweets, in this study) that belong to the each category of interest established during the training process.

Table 2.1: Samples of Tweets mentions[a)] coded according to the conceptualization of interest.

	With an external link	Without external link
Optimistic	OnLookin blogging: Developing Atomic Power as Alternative Energy http://is.gd/AcynQJ	@NoMassMurderer Nuclear reactors could provide power almost indefinitely.
Pessimistic	Video: Nuclear radiation threatens Japan's food, economy http://feeds.cbsnews.com/~r/CBSNewsBusiness/-3/ioVzIOUdwFg	Stop poison factory nuclear power plants. #nuclear #fukushima
Neutral	#China will surpass the United States as the world's largest consumer of #uranium before 2030. http://bit.ly/hf5d23 #nuclear	Cold fusion is a theoretical type of nuclear reaction that would occur at, or near, room temperature

Note: a) I refer to a mention as any tweet that matches the set of keyword, and date range for my analysis. Mentions represent the size of relevant and irrelevant discourse about the issue because any tweet that includes multiple keyword is still considered as a single mention.

For this study, I created four different Crimson Hexagon platforms (what Crimson Hexagon names "monitor" to assess the volume or sentiment in online discourses) to train the software to recognize tweets that discussed nuclear energy. In order to gauge the volume of relevant content on Twitter, the monitors collected tweets on nuclear energy that either did or did not include a link to an external site. To assess how the tweets framed the technology, a monitor was created that categorized tweets under each "with

link" and "without link" group as optimistic, neutral, or pessimistic, with human coders training the program by classifying an initial set of tweets into each category.

Optimistic refers to positive attitudes expressed about the future of nuclear energy or beneficial outcome associated with the technology. *Pessimistic* refers to a gloomy picture or outlook toward nuclear power, or a tendency to see the negative aspects of the energy source. *Neutral* refers to content that contained no overt judgment or neither a positive or negative outcome associated with the nuclear energy (see Table 2.1 for examples of tweets fitting into each sentiment category).

During the process of training the monitors, tweets that were off-topic or failed to fit into any of the specific categories were labeled *"off topic"* and subsequently coded by the monitor as such. To compare the total volume of shared tweets to the volume of original tweets, one monitor was created that categorized tweets under each "with link" or "without link" group as either original tweets or shared tweets, by relying on the Twitter function of retweet (RT) or modified tweet (MT).

Table 2.2: Content analysis coding classification.

Title of each Monitor	Categories under each Monitor
1. Tweets with external link: Sentiment	Optimistic; Pessimistic; Neutral; Off topic
2. Tweets without link: Sentiment	Optimistic; Pessimistic; Neutral; Off topic
3. Tweets with external link: Original vs. Shared	Original; RT/MT; Off topic
4. Tweets without link: Original vs. Shared	Original; RT/MT; Off topic

Once the human coders had coded at least 20 example posts in each category, the program was considered sufficiently trained. Next, I ran the monitors for a specified time period to collect all relevant, English language tweets using the keyword searching string

and classifying all tweets into the established categories. The tweets that did not fit into any of the presented categories were eliminated in the final analyses.

Results

Over a period of the 36 months chosen for analysis (between October 1, 2010 and September 30, 2013), the software identified a total of 29,034,859 English-language tweets in Twitter that contained nuclear-related content (as defined by the keyword searching string). Of those nearly 30 million tweets, however, 10,992,166 were identified as "off-topic" based on the software training outlined. Hence, 18,042,693 tweets were used for gauging the sentiment of nuclear energy in the final analysis.

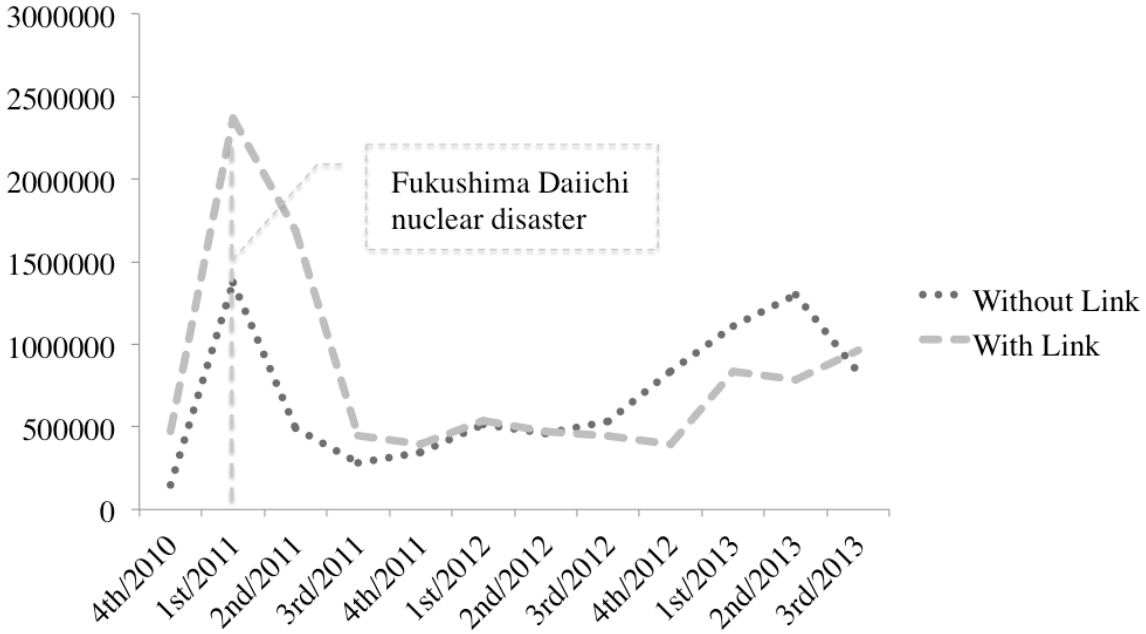


Figure 2.1a: A comparison of the volume of tweets on nuclear energy that contained an external link and those that did not, from the fourth quarter of 2010 to the third quarter of 2013.

To answer Research Question 1a, I first explored the volume of nuclear energy-related tweets that included a link to external information (e.g., online news) and the

volume of nuclear energy-related tweets that contained no link. As shown in Figure 2.1a, the amount of nuclear energy Twitter content that contains external links is noticeably greater than the volume of tweets without a link for the period of time after the 2011 Fukushima Daiichi nuclear disaster, up to the first quarter of 2012. Regardless of whether the tweets did or did not include an external link, the total volume of tweets about nuclear energy noticeably increased after the nuclear plant accident (more detailed timeline, just before and after the accident, is presented in Figure 2.1b).

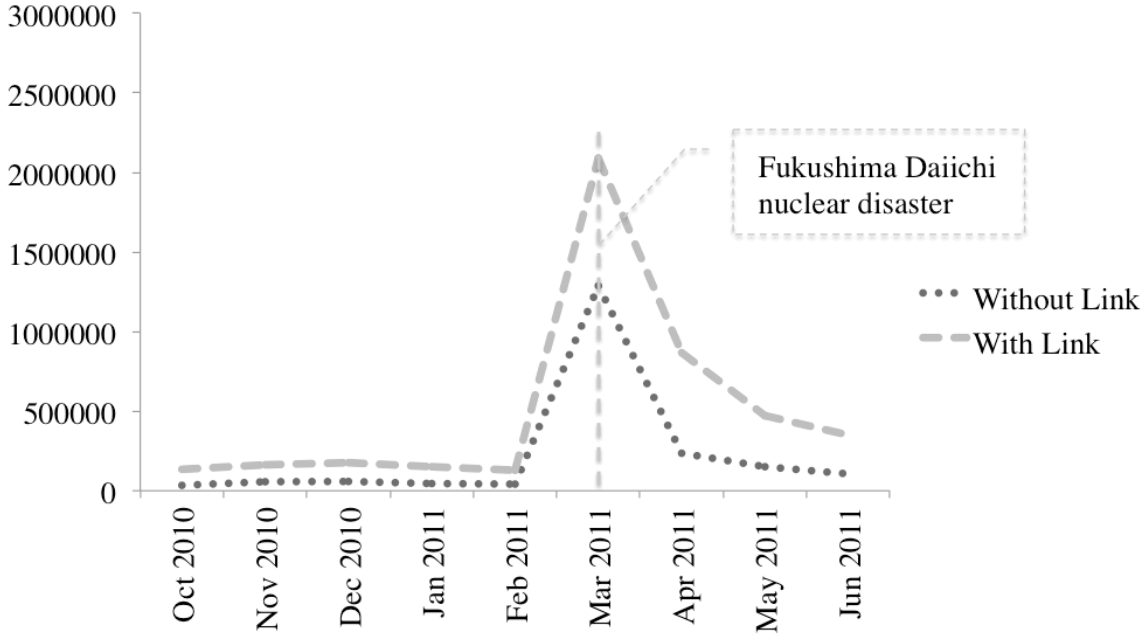


Figure 2.1b: A comparison of the volume of tweets on nuclear energy that contained an external link and those that did not, from October 2010 to June 2011.

In order to answer the next research question, 1b, I compared the proportion of nuclear energy-related tweets that included an external link to the nuclear energy-related tweets without a link (Figure 2.2).

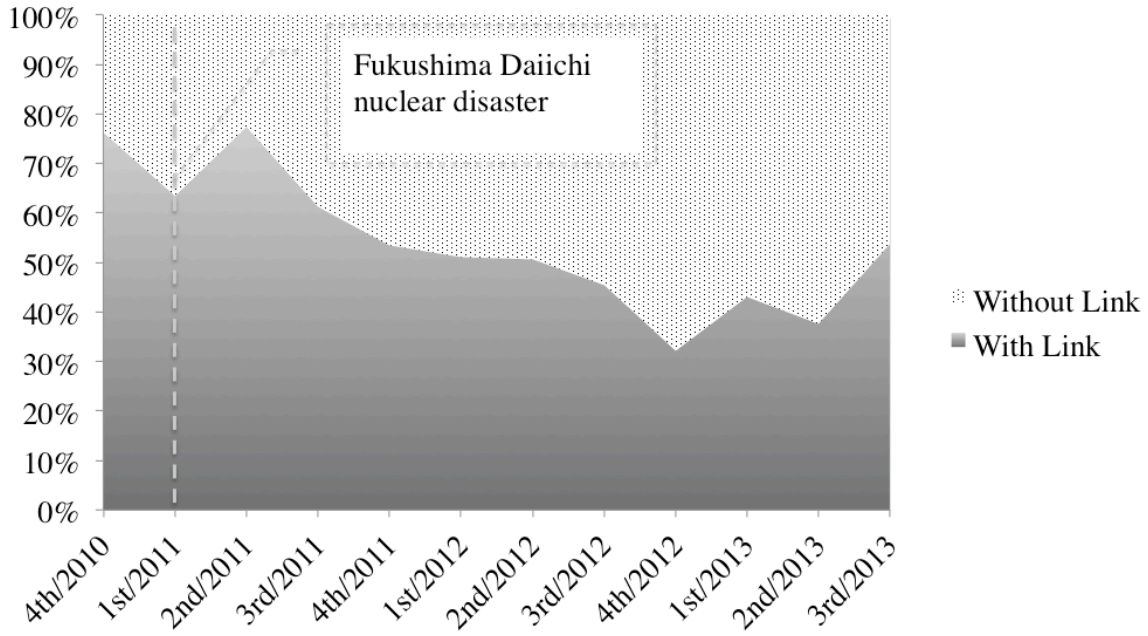


Figure 2.2: The proportion of tweets about nuclear energy that contained an external link to tweets that contained no link from the fourth quarter of 2010 to the third quarter of 2013.

During the six months after the nuclear accident, the proportion of tweets about nuclear energy that linked to an external site was about two times greater than the proportion of tweets without external links. For the six months after the Fukushima Daiichi nuclear disaster, on average, tweets with an external link comprised 69 percent of the tweets about nuclear power, and tweets without a link comprised 31% of the tweets. However, as time passed after the event, the proportion of tweets with an external link became almost equivalent to the proportion of tweets without a link.

The next research question (Research Question 2a) addresses the sentiment expressed about nuclear energy in tweets with and without external links. On average, over the time period sampled, 30 percent of the tweets that linked to external sites expressed optimism, 52 percent expressed pessimism, and 18 percent were neutral on the technology. In the nuclear energy-related tweets that contained no link, 11 percent were

optimistic, 50 percent were pessimistic and 40 percent were neutral about nuclear energy. It seems that the proportion of pessimistic sentiment about nuclear energy was the dominant tone across all the tweets over the entire time sampled period (see Figures 2.3 and 2.4).

Noticeably, there are more dynamic changes in the sentiments expressed in tweets with external link over the period of analysis. Shortly after March 2011, the month of the Fukushima disaster, the volume of pessimistic tweets toward nuclear energy grew dramatically. For six months after the accident, pessimism remained the dominant tone of tweets that contained an external link (see Figures 2.3 and 2.4).

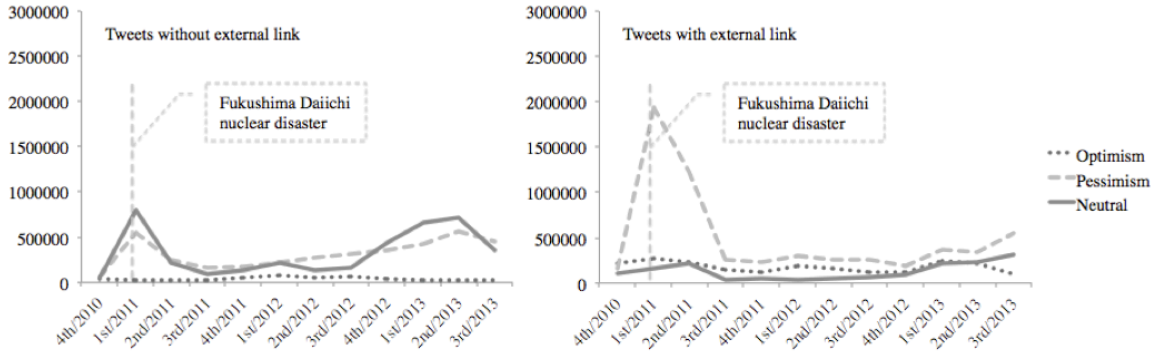


Figure 2.3: A comparison of the sentiment expressed in nuclear energy related tweets without an external link to those with an external link, the fourth quarter of 2010 to the third quarter of 2013 (by volume).

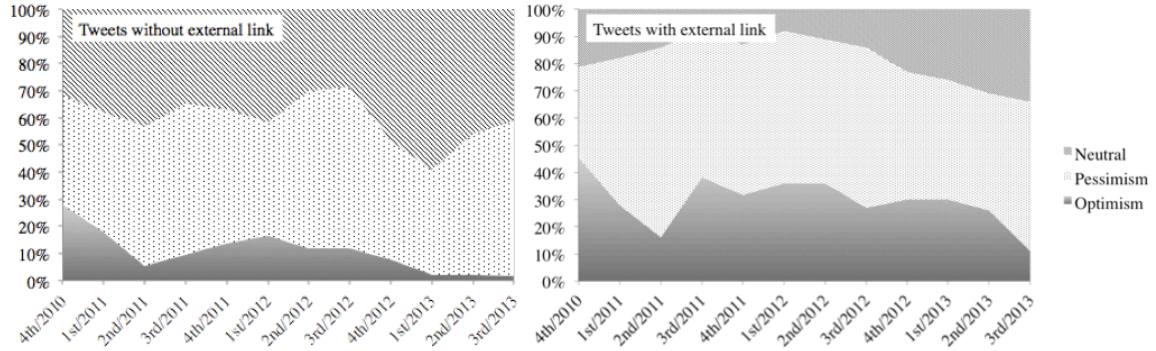


Figure 2.4: A comparison of the sentiment expressed in nuclear energy related tweets without an external link to those with an external link, the fourth quarter of 2010 to the third quarter of 2013 (proportion).

During the months of January 2011 and February 2011 (before the Fukushima event occurred), the larger proportion of tweets that linked to an external site were optimistic in tone, with 38 percent of the tweets expressing optimism, 37 percent expressing pessimism, and 25 percent of opinions expressing neutral opinions about nuclear energy. After the events at the Fukushima Daiichi power plant, pessimism was the predominant opinion expressed in the tweets that linked to another site. For the two months following the event, April and May 2011, 15 percent of the tweets were optimistic, 73 percent were pessimistic, and 13 percent were neutral toward nuclear energy.

Over time after the disaster, when people tweeted about nuclear energy and linked to an external site, pessimism was the dominant sentiment expressed about nuclear energy (54 percent), followed by optimism (28 percent) and neutral sentiment (18 percent). However, for tweets that did not include an external link, although pessimism was also the dominant sentiment toward nuclear energy (51 percent), neutral sentiment was the second-most predominant tone toward the technology (41 percent), followed by optimism (8 percent).

Discussion

The goal of this preliminary study was to investigate how online information with an expressing sentiment toward a controversial technology of nuclear energy is shared as in providing external links among social media users. The findings indicate that after the nuclear disaster at Fukushima Daiichi in Japan, the total volume of tweets about nuclear energy unmistakably increased. Additionally, the amount of nuclear energy-related tweets that linked to outside information (by inserting external links in tweets) far

outnumbered the tweets that did not contain an external link up until the first quarter of 2012. In terms of the sentiment expressed about nuclear energy in the world of Twitter, results indicate that pessimism about nuclear energy was the predominant tone in tweets about the controversial technology over the time period sampled.

Before I discuss my findings in more detail, I should acknowledge some limitations of this study. First, since I used a computer-aided, predetermined categorical (i.e., optimistic, pessimistic, and neutral) analysis, the tweets that were analyzed in my sample were limited to the categories of sentiments I selected. That is, as the content analysis was run only within the pre-designated categories, I may have missed opportunities for finding some more revealing insights had the sample not been limited to these categories. Also, because the ten individuals who participated in the process of coding resolved any conflicts over how sentiments in any tweets were coded through group discussion, we are unable to report calculated inter-coder reliability, which is usually provided in a content analysis. However, because all the tweets were classified into their respective categories based on the agreement of all the coders, this chapter assumes higher confidence in reliability in the process of content analysis.

Despite these limitations, conclusions based on the enumeration-oriented content analysis and the sentiments of the census of nuclear energy-related tweets over the time period studied are worth reporting. Previous research has found that the dominant expressed sentiment about controversial technologies on Twitter does not always mirror the tone of news coverage toward a specific scientific issue (e.g., Anderson et al., 2010.) Specifically, risk information about nanotechnology tends to dominate discussions in the online realm (Anderson et al., 2010; Runge, et al., 2013), while news coverage of

nanotechnology tends to present a balance of benefits and risks associated with the technology (Cacciatore et al., 2012; Dudo et al., 2011). Considering the presented dominant sentiment could work as a role in judging the public attitudes or public opinions toward the issue, what sentiment about controversial issue is dominantly expressed among social media users on social media platform is worthy of being studied.

Before highlighting the implications of the research presented in this chapter, I should also mention that on Twitter, users can distribute news or opinions in two different ways. First, as I explored in my analysis, people can share information by inserting web links to external sites in their tweets. By doing so, others can reach the information by clicking the link shared. Furthermore, by providing outside information (i.e., inserting an external web link) in their tweets, people are likely to be perceived as endorsing the information; their opinions are given heightened credibility, and their arguments are bolstered by evidence. Second, people can share others' tweets with their followers by using the retweet (RT) or modified tweet (MT) function. In this case, many other Twitterians (known as twitter users) can also see these re-tweeted or modified tweets in their feed. Since I put more focus on investigating how social media users share external information by linking to the online content from the third-party sites in their own posts, I did not pose a separate hypothesis about these functions (RT or MT) in this chapter. I however found a distinct volume and proportional trends for nuclear energy-related original tweets and shared tweets that used the retweet (RT) or modified tweet (MT) function. Nevertheless, whether tweets were original or shared, the total volume of tweets about nuclear energy rose dramatically after the 2011 Fukushima Daiichi nuclear power plant disaster. Interestingly, before the Fukushima accident, the proportion of

original tweets was about three times greater than the proportion of shared tweets; however, the volume of nuclear-related tweets shared by Twitter users (using the RT or MT function) sharply increased after the Fukushima event. Overall, in the months following the disaster the ratio of original tweets and shared tweets was nearly equal over the sampling period, while before the incident the larger proportion of tweets were original.

With these considerations in mind, I believe that this chapter provides significant insights into the understanding the role social media play in information dissemination process. Firstly, according to the findings of this chapter, the volume of tweets about nuclear energy has dramatically increased just after the Fukushima accident, gradually decreased as time passed. This pattern of an increase in attention followed by a gradual decrease of attention is also common in traditional media (Lazic, 2013). However, after quite some time had passed since the disaster, the volume of tweets about nuclear energy increased again (e.g., there were about 730,000 tweets were wrote in the third quarter of 2011, and about 2,100,000 tweets about nuclear were posted in the second quarter of 2013). This spike in content expressed about nuclear energy on Twitter might be related to news articles in traditional media discussing more the effects of the nuclear disaster. For instance, a report on the predicted radiation effects of the Fukushima nuclear disaster was published by the World Health Organization in February 2013, and many news agencies reported on the findings. In terms of the level of attention to certain issue (irrespective of sentiment expressed in social media though), it seems that the volume of content shared on social media, including on Twitter, is consistent with the stream of coverage of the issue in mass media. It is indeed not surprising that the main issues

discussed on social media parallel those of mass media's agenda. Based on the one of the most famous media effects models, agenda setting (McCombs & Shaw, 1972), people usually perceive that a particular issue is more important if mass media cover the item frequently. Because salient topics covered by news media influence the public agenda, the issues shared in social media also naturally follow the agenda of mass media.

As discussed, people today share their opinions about particular issues or share useful information with others using social media, and this chapter analyzes the volume and proportional trends of information shared via social media of one specific issue. This chapter also empirically demonstrates the flow of opinions on a controversial technology in the world of social media. In addition to volume and proportional trend data, this chapter reveals the expression of the sentiments on Twitter of optimism, pessimism, and neutrality about nuclear energy. Based on the findings in this chapter, pessimism is the predominant sentiment expressed about nuclear energy in Twitter posts, followed by neutrality and optimism.

Concerning the role of social media as a space for public discourse about societal issues and the role of social media users as information deliverers, with this project I aim to understand how two types of tweets (i.e., tweets that contain an external link vs. tweets without a link) take different views toward nuclear energy. Rather than demonstrating what is a predominant sentiment toward the technology among overall tweets, I evaluate the sentiments expressed distinctly between tweets with an external link and tweets without a link. I find that between these two types of Twitter posts, the predominance of sentiments was somewhat different. Specifically, after the Fukushima accident, among tweets with an external link, pessimism was the predominant sentiment expressed about

nuclear energy, followed by optimism and neutrality. Unlike tweets with links, however, for tweets without an external link, pessimism was still the major tone expressed about nuclear energy, followed by neutrality and then optimism. Given these findings, it seems that when people wrote tweets about nuclear energy and included an external link, they tended to express a more slanted opinion (either positive or negative) on the issue.

In sum, based on the results of this study, after the disaster at the Fukushima Daiichi power plant in Japan in March 2011, a vast number of Twitterians shared information about nuclear energy with others on Twitter. Using the case of nuclear energy, this chapter has to some degree verified the role of social media as a place for issue distribution, and has shown the potential social media users have for being influential when it comes to expressing opinions and sharing information about complex technical issues. Specifically, in respect that engaging people can contribute to social cues in inferring others' attitudes toward given issues by sharing an external link with an expressing sentiment toward a specific issue, the findings of this chapter help us to expand our understanding of the dynamic of media users' engagement with online content in interactive communication.

CHAPTER 3. EXPLORING THE INFLUENCES OF NORMATIVE SOCIAL CUES IN ONLINE COMMUNICATION (MAIN STUDY, STUDY B)

As I discussed in previous chapters, people can easily get involved in societal issues by seeking and sharing information on social media and exchanging opinions by posting commentaries online (Kushin & Yamamoto, 2010; Marwick & Boyd, 2011; Palen, Starbird, Vieweg, & Hughes, 2010). In the dynamic new media environment, people can be news distributors as well as news consumers (Nisbet & Kotcher, 2009), active participants in societal issues (Rosenblatt, 2007), potential public agenda setters (Benkler, 2006; Goode, 2009), and opinion influencers (e.g., Bakshy, Hofman, Mason, & Watts, 2011). Despite the surprising opportunities new communication technologies offer individuals for sharing and participating in public discourse, the benefits of such participation are not available if people do not choose to use new communication technologies. In other words, even though the development of new media enables us to have our own voice in societal issues, there is no actual profit if they do not engage in democratic deliberation. Hence, it is valuable to consider why people voluntarily participate in online discourses.

The reasons why people engage in online information sharing undoubtedly vary among users. Previous researchers have investigated individuals' participation in information disseminating behavior, with a focus on users' inner motivational dispositions (e.g., "altruistic" in Hsu and Lin, 2008; "community interest," "moral obligations," and "self-interest" in Ardichvili, Page, and Wentling, 2003; "social rewards" in Wasco and Faraj, 2000). This approach gives us an understanding of individuals'

intentions for participating in discourse about societal issues online. Although these personal attributes and motivations can help predict users' behavioral intentions (e.g., the intention to share news in an online community), in general, such research is limited from considering the practical guidelines in a particular situation. That is, by considering people's motivations for sharing information and expressing opinions online, we can infer that users have many opportunities to participate in information sharing behavior. However, it is difficult to predict why users share certain information because we cannot presume how others in their network evaluate the information. Thus, we should also consider attributes of a given message in news media or social media when attempting to predict media users' reactions to information shared about an issue online.

Although a significant amount of research has studied what factors play a role in audiences' evaluation and engagement with the news (e.g., Ma, Sian Lee, & Hoe-Lian Goh, 2014; Zillmann & Bryant, 2013), studies on normative social cues, e.g., "like" button in Facebook, conveyed in news messages are still relatively scarce because such cues have only recently appeared as technical functions in the new media environment. Hence, in this chapter of this dissertation, I explore the role of normative social cues in the process of online news processing and engagement. More specifically, I use an experiment-embedded survey to explore the direct and moderated effects of normative social cues within online news on (1) news processing (i.e., respondents' news consumption intention, presumed different levels of others' engagement with news content, and news evaluation etc.) and (2) intention to engage with news content (i.e., sharing or endorsing the news).

Normative Social Cues in Online

People tend to rely on peripheral mechanisms in addition to cognitive processing of information when they respond to and form attitudes about messages (Eagly & Chaiken, 1993; Petty, Briñol, & Priester, 2009). However, individuals tend to be cognitive misers when they are less familiar with an issue, using a minimum of cognitive effort to consider and make a judgment about a complex issue (Fiske & Taylor, 1991; Popkin, 1991). Considering that previous research has found that heuristic and peripheral cues influence information processing (e.g., Eagly & Chaiken, 1993; Petty, Briñol, & Priester, 2009), I propose here that peripheral cues, in the form of normative social cues expressed through the content in social plugins[2], play significant roles in how individuals form attitudes and judge the content of messages.

As I discussed in Chapter 1, since humans are social beings who need close relationships with others, people tend to adapt their behaviors to fit in with or be accepted by their reference groups (Bandura, 2001; Festinger, 1954; Sundar, 2008). In online settings, these normative behavioral responses are no exception. Specifically, people can deduce social customs and expectations related to particular issues through perceived normative social cues conveyed in online contexts (Spartz, Su, Brossard, Dunwoody, & Griffin, 2012). For instance, by seeing the number of views or clicks of a website is a normative social cue, people can (a) infer others' beliefs or opinions about controversial issues (Spartz, Su, Brossard, Dunwoody, & Griffin, 2012), (b) evaluate the content of the given information and related issues (Knobloch-Westerwick, Sharma, Hansen, & Alter

[2] With social plugins (or social buttons), according to one famous social media site, Facebook, media users can see "what others have liked, commented on or shared on sites across the web." Social plugins include the "like" button, "send" or "share" button, "comments" button, etc. (see, http://developers.facebook.com/docs/plugins/)

2005; Sundar, Oeldorf-Hirsch, & Xu, 2008; Sundar, Xu, & Oeldorf-Hirsch, 2009), and (c) decide on their own attitudes and behaviors in connection with the issues (Fu & Sim, 2011; Knobloch-Westerwick, Sharma, Hansen, & Alter 2005).

Therefore, in this study, I predict that normative social cues present in the content of social media will directly affect media users' information processing, including the evaluation of the message itself.

Varying Influences of Normative Social Cues in Different Levels of Risk

As discussed in the first chapter, in order to understand individuals' processing of risk information, past studies have proposed dual information processing models, including the elaboration likelihood model (ELM) and the heuristic-systematic model (HSM) (Frewer, Howard, Hedderley, & Shepherd, 1997; Khalor, Dunwoody, Griffin, Neuwirth, & Giese, 2003). According to the ELM model, two different routes, the central and peripheral routes, are used in persuasion. With the central route, people cognitively and carefully process messages or information they are given. On the other hand, with the peripheral route, people rely more on peripheral cues when they are processing the arguments in a message (Petty, Briñol, & Priester, 2009; Petty & Cacioppo, 1986). Similarly, with the HSM, scholars suggest dual-information channels are used. In the systematic processing mode, people process information with use an elaborative form of cognition. In the heuristic mode, people use alternative decision rules, e.g., mental shortcuts, to make judgments about given information (Chaiken, 1980; Eagly & Chaiken, 1993). (More discussion about information processing models are included in the first chapter of this dissertation. For more information about these approaches, see Chapter 1.)

Reliance on either type of mode in information processing is not fixed. Depending on individuals' traits, e.g., their motivation and ability to process information, and characteristics or qualities of the information, people may use either type of information processing mode (or even both types of processing, at times). Thus, I am interested in the circumstantial factors that affect personal information and decision-making processes.

Heuristic versus Cognitive Processing in Risk Communication

People tend to rely more on cognitive heuristic cues when processing unfamiliar information because this mode requires less time and cognitive energy than systematic processing (see, Kim, Yeo, Brossard, Scheufele, & Xenos, 2014). Specifically, people are more likely to depend on heuristic cues than using the systematic mode when processing complex information, including complicated technologies like nanotechnology (Scheufele & Lewenstein, 2005). Understanding complex information processing, however, is never that simple. For instance, according to Kim and her colleagues' study (2014), people rely more on elaborative processing than heuristic processing when making decisions about risks and their perceptions of risks. Interestingly, past studies have found that people are more likely to cognitively process information when they feel worry or fear (Batra & Stayman, 1990; Turner, Rimal, Morrison, & Kim, 2006), and people tend to consider the information more carefully if it contains negative information, e.g., if it is risk-related (Fiske, 1980; Meffert, Chung, Joiner, Waks, & Garst, 2006). Thus, in her study, Kim (2012) proposes that more cognitive effort is required to process risk information.

Keeping all the considerations discussed above in mind, before formulating the hypotheses in this section, here I pose an assumption of the different impacts of

peripheral cues (i.e., normative social cues in this project) on engagement with online content that depict different levels of risk. I apply this premise to the first set of hypotheses posed in this study.

> ***Premise of this study:*** Compared to the context of a story that depicts high risks associated with nuclear energy, normative social cues shown in online news play more powerful roles in engagement in the online context of a story that depicts low risks associated with nuclear energy setting.

Normative Social Cues from the News Consumers' Perspective

As I discussed above, by observing the social cues of the number of clicks, shares, and likes people can infer the influence of the shared news. Taking into account the effect of media users' reaction to certain news, many researchers (e.g., Jin, Wang, Luo, Yu, & Han, 2011) assert that normative social cues, such as the 'like' or 'share' button, can function as an accurate indicator of users' interests.

Normative Cues as Influential Heuristics

It is widely known that people tend to choose certain information from the array of information they are exposed to (e.g., Kahneman, 1973; Hwang, 2010). In the current media environment, people can only pay attention to particular news stories among the countless messages they are exposed to online (Norris, 2001), making it worthwhile to explore the role of social cues in the process of news selection and consumption.

It is important to consider the influence of normative social cues in news processing because perceived group feedback potentially works as an indicator for how individuals judge the quality of the information (Chaiken, 1980, 1987; Petty & Cacioppo,

1986). For instance, the estimated reach of a message is one of the cues that can be used to estimate the impact of news on public opinion (Gunther & Schmitt, 2004). According to Gunther and colleagues' (2001), people tend to believe that media coverage is more influential on public opinion when a news message achieves a lot of exposure (see also Namkoong & Kim, 2008). According to the influence of presumed influence model, people tend to gauge the influence of the message on others, and will respond to the message based on their perception of how others will react to the message (Gunther & Storey, 2006). In online settings, if a certain news article receives more "likes" or "shares" by social media users, it could be an indication to readers that many people have read the article and probably approve of it (sees, Oeldorf-Hirsch, 2011).

Based on these considerations, using an example of a truncated article about the potential risks of nuclear energy posted on the widely use social media site, Facebook, here I posit the following hypothesis:

> ***Hypothesis 1:*** Compared to those who are exposed to a news story on Facebook with a low number of likes or shares (normative social cues), those who are exposed to a post with a high number of likes and shares are more likely to believe that other social media users have already highly engaged with the news story.

In the reality of the online news environment, some people choose to click a link to read the entire news article while others only read the truncated version of the story shown in social media. Hence, I am particularly interested in whether or not people,

without reading the full content of a news message, process an article by relying on peripheral cues (i.e., normative social cues within the online content).

> ***Hypothesis 2a:*** Those who are exposed to a news story posted on Facebook with a high number of likes and shares (normative social cues) are more likely to read the full news story than those who are exposed to a news story on Facebook with a low number of likes or shares.
>
> ***Hypothesis 2b:*** Those who are exposed to a news story posted on Facebook with a high number of likes and shares (normative social cues) are more likely to believe that others are willing to read the full news story than those who are exposed to a news story on Facebook with a low number of likes or shares.

Previous studies have found that people infer others' beliefs or opinions about controversial issues based on the data depicting normative social cues in online content (e.g., the number of views of a YouTube video) and that individuals' levels of concern about an issue could be influenced by displayed normative social cues (e.g., Spartz, Su, Brossard, Dunwoody, & Griffin, 2012). Sundar (2008) uses the concept of the "bandwagon heuristic" to explain why people could be affected by media social cues. According to his explanation, because people tend to believe that they should conform to others' opinions or behaviors related to social matters, social cues like sharing or endorsing content contribute how they make decisions about what to think or how to behave.

People usually believe that a certain opinion is correct if they perceive it is what others believe (Chaiken, 1980) and they tend to comply with others' decisions (Bonabeau, 2004). Considering this, Lee and Sundar (2013) suggest that readers use normative social cues (conceptualized as bandwagon cues in their study) to evaluate the quality of information online. Based on these findings, the following hypotheses on news assessment outcomes are put forth (with the remainder of the hypotheses in this chapter to be tested in the context of people reading a complete news story about the riskiness of nuclear energy):

> ***Hypothesis 3a:*** Compared to those who are exposed to a news story with a low number of likes or shares (normative social cues), those who are exposed to an article with a high number of likes and shares are more likely to perceive that the news story had in giving people's agendas.
>
> ***Hypothesis 3b:*** Compared to those who are exposed to a news story with a low number of likes or shares (normative social cues), those who are exposed to an article with a high number of likes and shares are more likely to perceive that the news article covered an important issue.
>
> ***Hypothesis 3c:*** Compared to those who are exposed to a news story with a low number of likes or shares (normative social cues), those who are exposed to an article with a high number of likes and shares are more likely to feel more normative pressure to approve of the news article.

Many scholars have stated that individuals' propensity for elaborative processing (i.e., a personal inclination for in-depth cognitive processing of information, see Kim,

Yeo, Brossard, Scheufele, & Xenos, 2013) could affect how they are influenced by that information (Eveland, Shan & Kwak, 2003; Ho, Scheufele, & Corley, 2011). Because heuristic and systematic processes are two concurrent modes of information processing, each mode can affect another type of mode when an individual encounters new information. Thus, it is important to consider that the channels of message processing can occur simultaneously. Hence, this study notes that people can be influenced by different factors concurrently when processing information (see Eagly and Chaiken, 1993). In this study, I examine whether the normative social cues and a personal inclination for elaborative processing simultaneously affect news processing, and I pose the following hypotheses:

> ***Hypothesis 4a:*** Compared to those who have higher personal inclinations for elaborative processing, those who show lower personal inclinations for elaborative processing are more likely, when assessing a new story's influence on others, to be influenced by perceived normative social cues (i.e., the number of likes or shares of a news article).
>
> ***Hypothesis 4b:*** Compared to those who have higher personal inclinations for elaborative processing, those who have lower personal inclinations for elaborative processing are more likely, when determining the perceived importance of the news article, to be influenced by perceived normative social cues (i.e., the number of likes or shares of a news article).

Hypothesis 4c: Compared to those who have higher personal inclinations for elaborative processing, those who have lower personal inclinations for elaborative processing are more likely, when estimating the normative pressure individuals' felt after seeing the article, to be influenced by perceived normative social cues (i.e., the number of likes or shares of a news article).

Normative Social Cues from the News Gatekeepers' Perspective

Recent studies have emphasized the important of the Internet as a new medium for individuals, including potential opinion leaders or influential, to interact with others and share and discuss media stories. As I have discussed, the paradigm of media message production or distribution has undergone a transformation. In the traditional media system, the responsibility of transmitting information from the media to others falls on a small number of opinion leaders (Katz & Lazasfeld, 2006; 1955). On the Internet however, anyone, professionals and amateurs alike, can participate in the process of news making and news consumption (Gane & Beer, 2008). By being newsmakers, online media users can also act as news gatekeepers in online communication (Oeldorf-Hirsch, 2011).

Despite the development of these new tools in the new media environment, individuals must engage in the processes of opinion exchange in online communication to receive the considerable benefits that such participation can offer. That is, the level of the effects of participating in news consumption and news engagement on the Internet is dependent on people's participating in democratized deliberation online.

Engaging Users in the Running of News in Online

The Internet has the potential to play a powerful, positive role in developing a new media paradigm, including new opportunities for information exchange and information promotion. In terms of information sharing, some people use social networking sites, including Twitter, to seek out and share information (Marwick & Boyd, 2011; Palen, Starbird, Vieweg, & Hughes, 2010). As highlighted previously in this dissertation, many people have indeed participated in news delivery related processes by sending or posting a news link on social networking sites (Baresch, Knight, Harp, & Yaschur, 2011).

The ease with which information engagement can occur via social media allows any single individual to be influential to his or her peer groups. People can also play an influential role in issue expansion through engagement with online information (e.g., information sharing and opinion exchange), contributing to collective intelligence about a given topic. Many scholars agree on the potential roles of the influential in online communication. Bakshy and colleagues (2011) pointed out that every individual could, to a certain degree, attain the status of the influential by using online tools, like social media. Therefore, the role of the influential in the process of information engagement online is significant because it may expand the notion of the opinion leader or influential to range from minority special groups to unspecified individuals, i.e., a broader group of people.

There is undoubtedly a range of reasons why people share information online. For instance, in Hsu and his colleagues' study (2007), knowledge-sharing behavior is influenced by perceived self-efficacy even though there is less incentive for knowledge sharers to share information online. According to Ardichvili, Page, and Wentling (2003),

people are more likely to share their knowledge when they believe there is a moral obligation, community interest, or a personal interest to do so, while they are less likely to share knowledge if it is of little importance to others. As Thelwall suggests (2009), users may share information for networking purposes (which offers bonding or bridging capital), for socializing purposes (such as finding amusement), or for the function of navigation, i.e., to explore information or resources. Others may habitually share information with no particular motivation.

Based on social exchange theory (Blau, 1964), people may share their knowledge with others in order to reap expected social rewards such as approval and respect in their communities. By participating in the news engagement process in online, e.g., sharing external content with others, people may consider themselves as a news agency or as an influential in information distribution. That is, even though they are not the original source of the news content, they can still attain a status of one who provides information to their friends (Kim & Sundar, 2014).

Bandwagon Effects on Online News Engagement

In the online world, people who are socially motivated will participate in online activities to feel a sense of social fellowship (LaRose & Eastin, 2004; Park, Kee, & Valenzuela, 2009). This suggests that socializing could be a key factor in understanding media consumption online (Howard & Corkindale, 2008). Many people indeed share knowledge to be acknowledged by their peer groups (Hew & Hara, 2007). Hence, perceived social norms could play an important role in the decision-making process for knowledge-sharing behavior (Hwang & Kim, 2007).

Normative social cues within online content could work as indicators of whether or not individuals will engage with the information. For example, if many media users indicate that certain information shared online is trustworthy, people will consider others' trust in the source when they evaluate the information. Furthermore, if media users perceive that information they encounter online is a hot issue among other users, they may be more willing to engage with the information themselves (Oeldorf-Hirsch, 2011). Hence, when the normative social cues displayed with an online news article show that many users have liked, shared, or recommended it, an individual may believe that news is important because others consider it so. According to Ardichvili, Page, and Wentling (2003), people are less likely to share certain information that is of little importance to others. Hence, we can assume that if people perceive that an issue covered in a media message is important to their peer groups, they are more likely to get involved in the news.

Prior to considering individuals' online news engagement as an outcome variable in this study, I should point out that there are multiple ways of engaging with news online. If media users want to disseminate a particular news story they can do so by posting, inserting the news link, or clicking a "share" button. However, if they want to endorse the news story, users can write positive comments beneath the news article or click "like" button to show their approval.

Therefore, I opt to separate those two different ways of news engagement and endorsement as outcomes in my dissertation. Based on these considerations, the following hypotheses on engagement with online news are put forth:

Hypothesis 5a: Compared to those who are exposed to a news story with a low number of likes or shares (normative social cues), those who are exposed to an article with a high number of likes and shares are more likely to share the news article with others.

Hypothesis 5b: Compared to those who are exposed to a news story with a low number of likes or shares (normative social cues), those who are exposed to an article with a high number of likes and shares are more likely to endorse the news article.

Regarding the role of normative social cues in online news engagement, it would be worthy to consider the effect of social cues on stories that depict different levels of risk associated with an issue. For instance, in the event of a disaster, regardless of whether it is communicated using traditional media or online media, communication about the crisis tends to be more active in terms of conveying useful information related to the event (Maxwell, 2010). Further, individuals will not only seek out more information about a high-risk event but they will also share more related information in order to help others (Hughes, Palen, Sutton, Liu & Vieweg, 2008). However, in the context of discourses related to risk, individuals seem to be more affected by negative information, e.g., focusing on their fear about the severity and the susceptibility of their health (Witte, 1992).

Previous research suggests that people tend to make more rational decisions when they are processing information about risks (Friedman, Gorney, Egolf, 1987; Rossow & Dunwoody, 1991), and many studies have indeed demonstrated that there is a positive relationship between perceived risk and cognitive processing behavior. For instance,

Mitra and colleagues (1999) suggest that perceptions of high risk can increase information seeking behavior, and people are more likely to cognitively process information when they encounter personally threatening information (Kunda, 1987; 1990). As is known, negative information is often more powerful than positive information for influencing people's attitudes—including cognition and behavior (Bizer & Petty, 2005). Hence, if people are presented with information about potential risks, e.g., loss framing, that information will be more effective in influencing individuals' behaviors, as has been tested in clinical settings (Edwards, Elwyn, Covey, Matthews, & Pill, 2001). Based on findings from extant research, we can assume that individuals are more influenced by high-risk information conveyed in messages.

As discussed earlier, people tend to use cognitive and heuristic modes concurrently to process certain information. Considering that individuals are likely to put more cognitive effort into processing risk information that arouses fear or concerns (Batra & Stayman, 1990; Fiske, 1980; Meffert, Chung, Joiner, Waks, & Garst, 2006; Turner, Rimal, Morrison, & Kim, 2006), this study expects the influence of normative social cues on media users' engagement with online news behaviors would be moderated by different levels of risk depicted in a message. Thus, here I posit following hypotheses on engaging users in risk news participation:

> ***Hypothesis 6a:*** Compared to those who read a news story highlighting high risks, those who read a news story reporting low risks are more likely to be influenced by normative social cues when deciding to share the news article with others.

Hypothesis 6b: Compared to those who read a news story highlighting high risks, those who read a news story reporting low risks are more likely to be influenced by normative social cues when deciding to endorse the news article.

Interestingly, studies suggest that people's subjective feeling of familiarity with a particular issue (e.g., Arkes, Boehm, & Xu, 1991; Kim, 2012) and individual expertise (Wasko & Faraj, 2000) could also be significant predictors of their information processing or information engagement behavior. Based on the role of preexisting position on news processing of certain issues, the following hypotheses are put forth:

Hypothesis 7a: Compared to those who are more familiar with an issue, those are less familiar are more likely, when determining their willingness to share the news article with others, to be influenced by normative social cues (i.e., the number of likes or shares of a news article).

Hypothesis 7b: Compared to those who are more familiar with an issue, those less so are more likely, when determining their willingness to endorse the news article with others, to be influenced by normative social cues (i.e., the number of likes or shares of a news article).

Moreover, individuals' position of centrality in their network could also be a predictor of people's news sharing behavior (Wasko & Faraj, 2005). According to Engel and colleagues (1990), individuals become opinion leaders when others ask for their advice on particular issue. That is, opinion leaders achieve their status as influential because there are opinion seekers in their social group (Flynn, Goldsmith, & Eastman,

1996). Hence, individuals' personal impact on others' opinions about social matters is an important factor in predicting news engagement.

> ***Hypothesis 8a:*** Compared to those who are exposed to a news story having a high number of likes or shares (normative social cues), those who are exposed to one having a low number of likes and shares are more likely, when showing individuals' intention to share the news article with others, to be influenced by perceived self-influence on others' opinion.
>
> ***Hypothesis 8b:*** Compared to those who are exposed to a news story with a high number of likes or shares (normative social cues), those exposed to one having a low number of likes and shares are more likely, when showing individuals' intention to endorse the news article, to be influenced by perceived self-influence on others' opinion.

Keeping all the considerations discussed above in mind, I am also interested in how these concepts are interconnected in their impact on participating in news engagement.

> ***Research Question 1:*** In the context of online communication, how do normative social cues, different levels of risk depicted in messages, and personal traits (i.e., perceived issue familiarity, and perceived self-influence on others' opinion), simultaneously affect how users engage in news participation?

In sum, this study tests 8 hypotheses related to the effect of normative social cues on news consumers (in the process of news processing) and news gatekeepers (in the process of news engagement). The following figure summarizes these hypotheses.

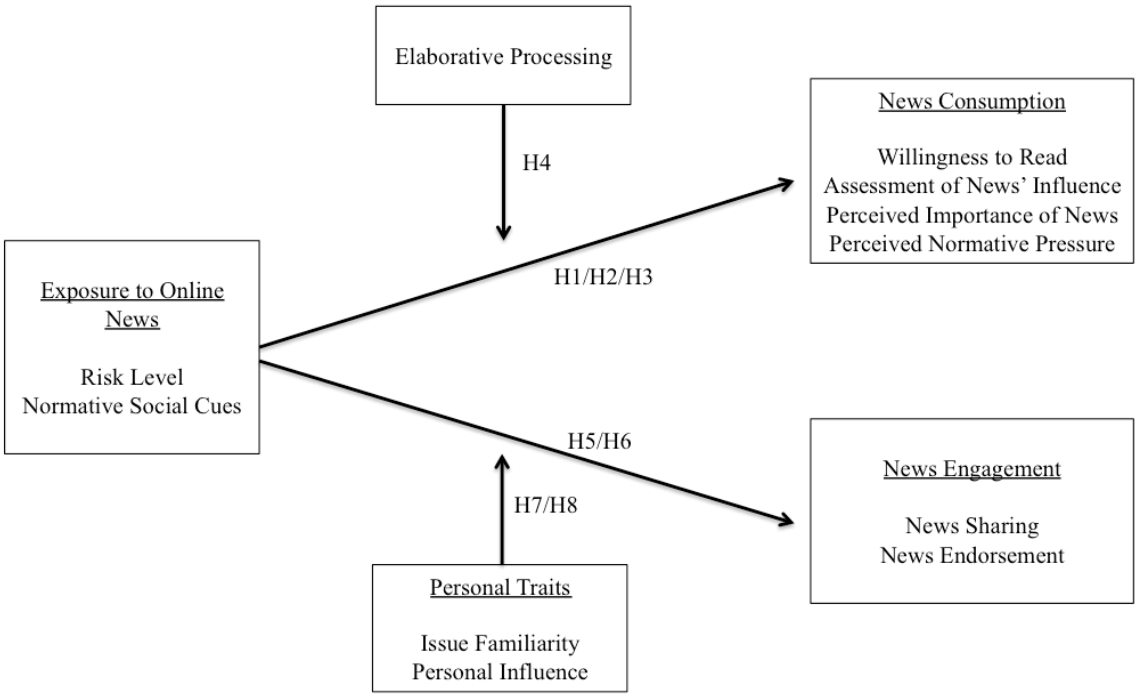


Figure 3.1: Hypothetical model for this study

CHAPTER 4. METHODS FOR MAIN STUDY (STUDY B)

Experimental Design

In this dissertation, in addition to exploring how individuals share information about nuclear energy using social media, I am also interested in why media users are more engaging with certain online articles than other contents. In other words, to deepen my understanding of public involvement in online news engagement, I aim to evaluate messages' internal and external attributes and how these affect public intention to engage with online news. To analyze the impact of characteristics of media messages, I relied on an experiment that uses a 2x2 design, (high vs. low risk levels and high vs. low numbers of normative social cues), which were presented in an online setting.

Rationale of Experimental Design 1: Framing Risk

According to Entman (1993), media frames are created by the selection and salience of the information. Among the various perspectives that explore framing, Gamson and Modigliani (1987; 1989) and Chong and Druckman (2007) suggest that in communication, the term "frame" refers to the presented style, e.g., words, images, and phrases, used to deliver information about particular issues. Especially, Gamson and Modigliani (1987) define a media frame as "a central organizing idea or story line that provides meaning to an unfolding strip of events… The frame suggests what the controversy is about, the essence of the issue" (p. 143). Scheufele (1999) suggests that with frame-setting, the accessibility and salience of an issue contributes significantly to people's perceptions of an issue.

Not surprisingly, we know that media can misrepresent issues by its intentionally or unintentionally using news frames, which can influence people's perception of the issues (Dahlstrom, Dudo, & Brossard, 2012). Scheufele (2000) also states that framing affects media audiences' interpretation of issues and situations. For example, public perception of an emerging technology (nanotechnology, in his study) was significantly linked to a positive frame highlighting health benefits and to a negative frame underscoring the health risks of the technology (Cobb, 2005).

As discussed in chapter 1 and 3, in influencing people's attitudes—including cognition and behavior—negative information is often more powerful than positive information (Bizer & Petty, 2005). Hence, in this dissertation, I manipulated news stories highlighting the different risk levels of nuclear energy (using content that portrays nuclear energy as high or low risk nuclear) as posted on Facebook

Rationale of Experimental Design 2: Normative Social Cues

As discussed in the introductory chapter, individuals now have more of an opportunity than ever to be involved in issues via their social network. People can easily share information or exchange their opinion by posting to online platforms, e.g., clicking the "share" button on Facebook, as well as sending a link (or attaching a file) in an e-mail (Barensch, Knight, Harp, & Yaschur, 2011), or sharing information on Twitter. Indeed, throughout Barensch and his colleagues' research period (2011), nearly half the users of social networking sites (SNS) posted links. By doing so, peoples can be active participants in a social issue, such as an election (Kushin & Yamamoto, 2010).

With the information displayed through social plugins on Facebook, media users can observe normative social cues in that they see "what others have liked, commented

on or shared on sites across the web," in the form of a counter of other users' activities (Facebook.com). Other types of normative social cues (e.g., liking, sharing, and commenting) from social media sites are also displayed on other websites, such as social media platforms, blogs, online news websites, etc., which allows people to observe what others are interested in or thinking about particular issues. In this way, social plugins enable us to gauge other people's interests and to promote certain information more effectively (Jin, Wang, Luo, Yu, & Han, 2011). Considering the role of normative social cues in online communication, previous studies suggest that these social cues could be seen as new types of hyperlinks (Gerlitz & Helmond, 2011), as new standard of measuring social dynamics, and possibly a way to experience a more social web environment (Haugen, 2010).

Undoubtedly, research on the influence of social cues on publics' engagement with an online content in an online setting is merited. Previous research has shown that the estimated reach of a message is one way to manipulate social cues and estimate the impact on public opinion. For instance, readers have conveyed a contrasting response to an issue based on when they are in a low-reach condition and when they are in a high-reach condition, which then impacts public opinion (Gunther & Schmitt, 2004). According to Gunther, Christen, Liebhart and Chia (2001), people usually infer public opinion on a particular issue from their perceptions of media coverage on that issue because they believe that the news story will impact others' opinion.

To seek why online users engage with some media stories more than others, in this dissertation, I apply this logic by examining the difference in the perceived influence between a widely read news story (i.e., normative social cues conveyed by a counter that

indicates a high number of "like", "share"" and "comment") and a less read story (i.e., normative social cues conveying a low number of "like", "share", and "comment") on online news engagement.

Design

I test my hypotheses using data collected through an online experiment that dealt with the issue used as context of enquiry in this dissertation: nuclear energy. The study's instructions and questionnaire were hosted on the survey platform Qualtrics (http://www.qualtrics.com). First, participants were asked to respond to a series of pre-test items, including pre-existing attitudes toward nuclear energy, media use habits, and whether they engage in social media (either Facebook or Twitter). Following this, participants were randomly assigned to read one of two truncated news articles that discussed the risks of nuclear energy (either describing high risks or low risks associated with nuclear energy) shared on Facebook (see Table 4.1 for summary of stimulus material headlines; Appendix C for the screenshot of the news article on Facebook).

Table 4.1: Stimulus material headlines.

High Risk	Low Risk
Red Alert: Higher Cancer Risks from the Fukushima Accident	Fret not: Minimal Cancer Risks from the Fukushima Accident

I propose that by using a news article posted on Facebook, I can assess how normative social cues associated with certain news content affect the decision-making process related to a given issue (nuclear energy). I chose Facebook for several reasons. The social media site had about 1.23 billion monthly active users in 2013 (Facebook, 2014), has become one of the leading sites for referring Internet users to news and media

sites (Hopkins, 2010), and enables people to engage in content distribution by offering the option to "share" content (Nisbet & Kotcher, 2009).

Within each condition, participants were randomly given one of two manipulations (high vs. low numbers of normative social cues), each showing a different number in a counter of social plugins associated with the article. Each news article contained three normative social cues (displayed by manipulating the social plugins), including how many people "liked" the article, left a comment about it, and shared it. In order to avoid any potentially identifying features, such as the gender of the Facebook user, gender neutral and common names were used in the manipulation.

After reading the article, respondents were asked to answer some manipulation-related questions, including their willingness to read the full text of the article. Later, all participants were assigned to read the full version of the article on an online news website with similarly manipulated normative social cues (see Appendix D for the screenshots of the news excerpt). They were also asked to respond to a number of post-test questions including their attitude about the news article, their intention to engage with online news by sharing or endorsing the news article, and other questions. Demographic questions were also asked. In order to enhance data quality, I added attention filters (trick questions unrelated to the survey questions, e.g., "please select the number 7 for this line") in the experimentally designed questionnaire to prevent "straight-line" responses (See Figure 4.1).

The news articles about nuclear energy were created based on information gathered from existing news stories on the topic. Both of the news articles discussed the

risks of nuclear energy, i.e., harmful effects from a nuclear plant disaster, but conveyed a different degree of riskiness associated with nuclear energy.

Several rounds of manipulation checks were conducted with four colleagues to ensure that the interface of the manipulation and the social plugins depicting how many users had liked, shared, or commented, were realistic and valid.

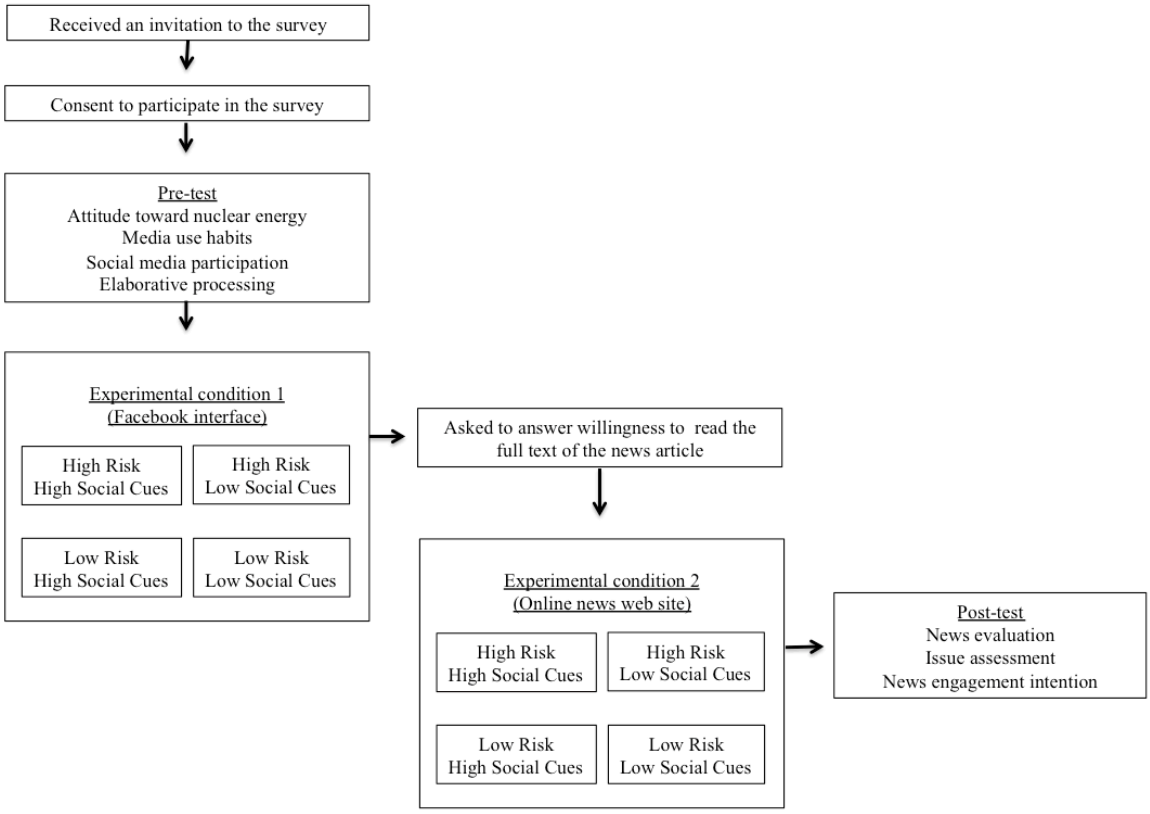


Figure 4.1: Present the procedure followed for the experiment

Participants

A random sample of 1,731 Qualtrics panel members (U.S. citizens 18 years of age and older) among the pool of four million unique panelists received an invitation to my online experiment. Of the 1,731 panel members, 706 people clicked through to the survey and a total of 406 people completed the experiment, resulting in a 57.5% completion rate.

The experiment was fielded from February 20 to 26, 2014, and took approximately 15 minutes to complete.

Manipulation Checks

First, to confirm that the participants in the high risk condition perceived that the news story highlighted more risk than those in the low risk condition, I asked participants to rate their agreement with the statement "the news story highlighted the risks of nuclear power" on a 10-point Likert-type scale where 1 meant "do not agree at all" and 10 meant "agree very much." As expected, participants in the condition depicting high risks answered that the risk of nuclear power was more emphasized in the news story (M=6.52, SD=2.36) than participants in the low risk condition (M=5.25, SD=2.73), (F=25.21, $p<.001$). Three manipulation check questions were posed to check whether participants in the condition with higher counts of social cues perceived the news story had received a lot of attention and whether respondents in the condition with few counts for the social cues perceived the article had received little attention from media users. Specifically, participants were asked to rate how much they agreed with the statements, "A large number of social media users have probably already read this news story," "A large number of social media users have been interested in this news story," and "A large number of social media users have probably liked/recommended the news story." Each item was measured on a 10-point Likert-type scale where 1 meant "do not agree at all" and 10 meant "agree very much." Participants in the condition with higher counters for the social plugins perceived the article to be a more widely read news story (M=6.64, SD=2.11) than participants in the condition with lower counters for the social plugins (M=6.02, SD=2.29) (F=8.08, $p<.01$).

Measurement of Variables

In the present study, potential confounding effects of respondents' dispositions were controlled in the ANCOVA and regression models for examining the role of normative social cues on engaging users' news processing.

Nuclear energy support was measured by asking respondents to indicate how much they agree with the statements, "Overall, I support the use of nuclear power", and "overall, I support federal funding for nuclear power" on a 10-point scale ranging from 1-'do not agree at all' to 10-'agree very much' (M=5.61; SD=2.49; Pearson's R=.89).

Socio-demographic variables were used to control potential demographic influences on my outcome variables. These controls included *age*, which was categorized into a 5-point scale (1=18-29; 2=30-39; 3=40-49; 4=50-64; 5=65 or over; M=2.04, SD=0.91), *gender* (50.5% female), and *education*, which was an ordinal variable measured with 8categories (1=less than high school; 2=high school/GED; 3=some college; 4=2-Year College Degree (Associates); 5=4-Year College Degree (BA, BS); 6=Master's Degree; 7=Doctoral Degree; 8=Professional Degree (MD, JD); M=3.65, SD=1.52).

Interpersonal communication about scientific issues was measured with a 5-point scale (1=none; 5=a lot) statement: "How often you have personal conversation with family, friends, or co-workers about stories related to science and technology" (M=3.11; SD=1.09).

Seeking for normative social cues was measured with a statement using a 10-point scale (1=not at all; 10=very much): "Thinking back to the material you just read, when

you read the material, did you try to find social plugin information belonging to the news story?" (M=4.97; SD=2.75).

Lastly, *personal elaborative process* was measured using an averaged index of two items measured on 10-point scales (1 = do not agree at all; 10 agree very much) that asked respondents their level of agreement with the following statements: "I try to make sense of what I encounter in the media by comparing it to my own experiences", and "Often when I've learned about something in the news, I'll recall it later and think about it" (M=7.10; SD=1.77, Pearson's R=.61).

Dependent Variables

The first purpose of this study was to examine the role of normative social cues on news processing (i.e., respondents' news consumption intention, presumed different levels of others' engagement with news content, and evaluation of the news articles etc. were included).

Presumed news engagement by others was measured with a mean index of three items measured on 10-point scale (1=never; 10=a lot) that asked to answer the following statements: "How many people do you suppose have shared this news article?", "How many people do you suppose have clicked the "like" or "recommend" button for this news article?" and "How many people do you suppose have commented on the news article?" (M=6.49; SD=2.15; Cronbach's alpha=.92).

Willingness to read the full news story was measured with a statement using a 10-point scale (1=not at all likely; 10=very likely): "Thinking back at the Facebook post you just read, how likely would you be to read the full news story if you came across the post on Facebook?" (M=6.31; SD=2.66).

Believed other's willingness to read was measured with a statement using a 10-point scale (1=not at all likely; 10=very likely): "Thinking back at the Facebook post you just read, how likely do you think others would be to read the full news article if they came across it on Facebook?" (M=6.08; SD=2.28).

Assessment of the news' influence on others (i.e., the news story had in giving people's agendas) was measured with a mean index of two items measured on 10-point scale (1=no influence at all; 10=very much influence) that asked to answer the following statements: "Thinking back at the news article you just read, how much influence would you say the news story had in giving other people's ideas to think about", and "how much influence would you say the news story had in giving other people's ideas to talk about" (M=6.31; SD=2.25; Pearson's R=.90).

Perceived importance of news article was an averaged index of two items measured on 10-point scales (1=do not agree at all; 10=agree very much) that asked how much respondents agree with the following statements: "This news story covered a very important issue for me", and "The news article provided useful information" (M=6.39; SD=2.12; Pearson's R=.58).

To measure normative pressure to approve the news article, this dissertation relies on descriptive norms, i.e. the perception of the performed behavior of others (Cialdini, 2003). *Perception of normative pressure to approve the news article* was measured with a mean index of two items measured on 10-point scale (1=do not agree at all; 10=agree very much) that asked how much respondents agree with the following statements: "Most people who are important to me would think that I should read a news article such as the

story I just read", and "Most people connected to me would enjoy reading the news story I just read" (M=5.70; SD=2.37; Pearson's R=.80).

As a second step, this study explored the direct and moderate effect of normative social cues on engagement with the news article, i.e., (1) intention to share certain news story and (2) intention to endorse the news story in online space.

News sharing intention was an averaged index of three items measured on 10-point scales (1= not at all likely; 10=very likely) that asked to answer the following statements: "How likely would you have been to share the news story on social media such as Facebook or Twitter", "how likely would you have been to share the news story with your family, friends, or co-workers via e-mail", and "how likely would you have been to share the news story on an Internet message board or forum?" (M=4.73; SD=2.87; Cronbach's alpha=.93).

News endorsement intention was measured with a mean index of two items measured on 10-point scale (1= not at all likely; 10=very likely) that asked to answer the following statements: "How likely would you have been to click a "like" or "recommend" button for the news story", and "how likely would you have been to add your supportive comments to the article" (M=4.99; SD=2.94; Pearson's R=.80).

Independent Variables

Participants in this experiment were randomly assigned into each two by two experimental design group, i.e., two different levels of risks (high vs. low risk) and two different levels of normative social cues (a high number of "likes", "comments" and "shares" vs. a low number of "likes", "comments" and "shares"). To examine the influence of normative social cues on news processing, a categorical variable was the

experimental manipulation given to each respondent in this study. I coded individuals who received the news with a high number of normative social cues including "likes", "comments", and "shares" highlighting high riskiness of nuclear energy as '1', those who read the high-risk news with a low number of normative social cues as '2', those who exposed low-risk news with a high number of normative social cues as '3', and those respondents who read the low-risk news with a low number of normative social cues as '4'.

To verify the first set of hypotheses, i.e., the moderated effect of normative social cues and personal elaborative processing in news process, *personal inclination of elaborative processing* was measured using an averaged index of two items measured on 10-point scales (1 = do not agree at all; 10 agree very much) that asked respondents their level of agreement with the following statements: "I try to make sense of what I encounter in the media by comparing it to my own experiences", and "Often when I've learned about something in the news, I'll recall it later and think about it" (M=7.10; SD=1.77, Pearson's R=.61). Since I used this variable in analysis of variance for the first set of hypothesis, it was dichotomized (48.3% High-elaborative processing group).

To test the second set of hypotheses and research question, i.e., the direct and interact effect of normative social cues in engagement with online news, I ran a hierarchical ordinary least squares (OLS) regression model. Since the designs of experiment, i.e., risk conditions and normative social cues conditions, are nominal variables, in this study, I dealt with these variables as dummy variables. Each of *the level of risk* and *the level of normative social cues* condition were dichotomized (50.2% high risk; 50% high normative social cues).

To analyze the moderate influences of personal traits between normative social cues and news participation, *Self-perceived issue familiarity* was measured an averaged index of two items measured on 10-point scales (1=not informed at all; 10=very well informed) that asked to indicate the following statements: "how well informed you feel you are about nuclear energy", and "how well informed you feel you are about the 2011 Fukushima Daiichi nuclear power plant accident in Japan" (M=5.85; SD=2.49; Pearson's R=.73).

In addition, *perceived self-influence on other's opinion* was measured using an averaged index of two items measured on 10-point scales (1 = do not agree at all; 10 agree very much) that asked respondents their level of agreement with the following statements: "I often convince others of my opinion", and "My friends, family, and co-workers make a decision based on what I have told them" (M=5.75; SD=2.12; Pearson's R=.76).

Analytical Techniques

For analyzing a first set of hypotheses (related to the role of normative social cues on news processing) , I ran Univariate Analysis of Covariance (ANCOVA) tests to determine mean differences between the conditions on all variables of interest.

The test the second set of hypotheses and research question (related to the direct and moderate effect of normative social cues on engagement with the news article), I used hierarchical ordinary least squares (OLS) regression models. Especially, to find the predictors' relative explanatory variances for the final model, I entered the independent variables into blocks based on their assumed causal order. In these models, interaction terms were developed in order to assess the degree of moderators' influences on (1)

media user's news processing and (2) engaging users participation in online news. To avoid potential issues of multi-collinearity between an interaction term and its component, each of the interaction terms was constructed by multiplying the standardized value of its components.

CHAPTER 5. RESULTS & DISCUSSION (MAIN STUDY B)

Descriptive Results

Sample Characteristics

The final sample consisted of 406 American participants over the age of 18 with 50.5% being female. Fifty-one percent of the samples were heavy users of Facebook (i.e., using several times a day), about 41% were general users of Facebook (i.e., using Facebook from every few weeks to once a day), and about 8% were nonusers of Facebook (i.e., never use Facebook). In terms of Twitter use, about eleven percent of the participants were heavy users of Twitter, 41% were general users, and 48% were non-users of Twitter.

Table 5.1: Participants' characteristics.

		N	%
Age	18-29	136	33.5%
	30-39	136	33.5%
	40-49	120	29.6%
	50-64	10	2.5%
	65 or over	4	1.0%
Gender	Male	201	49.5%
	Female	205	50.5%
Facebook use	Heavy user (Several times a day)	207	51.0%
	General user (1-2 days a week to once a day)	165	40.6%
	Non-user (never use Facebook)	34	8.4%
Twitter use	Heavy user (Several times a day)	45	11.1%
	General user (1-2 days a week to once a day)	166	40.9%
	Non-user (never use Facebook)	195	48.0%
Total		406	100%

The experimental groups were comparable in size. Specifically, among those in participants of this experiment, 25.4% of the sample was assigned to high risk-high normative social cues setting, 24.9% was in high risk-low normative social cues group, 24.6% was in low risk-high normative social cues group, and 25.1% was assigned to low risk-low normative social cue setting.

Social Media Activity

Participants who used social media (either Facebook or Twitter) were mostly active users in Facebook (M=6.40 on 1-10 scale of usage, SD=2.61), but were relatively passive users of Twitter (M=5.33; SD=2.83). Participant who used social media (either Facebook or Twitter) were asked to rate how often (1=never; 10=very much) they engaged in various activities when using social media. As Table 5.2 shows, social media users seemed to consume news on Facebook (M=6.51; SD=2.86), and shared certain news via Facebook (M=6.01; SD=3.15). See Table 5.2 for all results.

Table 5.2: Frequency of participation in various social media activities.

	Social Media Activity (1=never; 10=very much)	M	SD
Facebook	Interact with others via sharing photographs or video, or posting on someone's wall (including own)	6.41	3.02
	Comment on other people's status, wall posts or photographs.	6.68	2.84
	Read news stories or news headlines posted by other people or media outlets, such as the NY Times or Fox.	6.51	2.86
	Share/re-share a news story, headline or story link you have read or seen on other websites or ones that were originally posted to Facebook by other people.	6.01	3.15
Twitter	Monitor Twitter feeds I subscribe to	5.85	3.01
	Re-tweet someone else's content	4.80	3.27
	Write my own Tweet	5.35	3.39

Preexisting Stands on Nuclear Energy

As shown in Table 5.3, participants in this study seem to take a neutral position on nuclear energy (for nuclear support, M = 5.61; SD = 2.49, on 1-10 scale of support level; approximately 46.8% of the respondents that answered 6 to 10 of support level showing their support for nuclear energy), and they do not think that they are very well informed to nuclear-related issues (for nuclear familiarity, M=5.85; SD=2.52; for Fukushima accident familiarity, M=5.85; SD=2.83 on 1-10 scale of familiarity).

Table 5.3: Preexisting stands on nuclear energy.

	M	SD
Support for nuclear energy	5.61	2.49
Familiar to nuclear energy	5.85	2.52
Familiar to the 2011 Fukushima Daiichi nuclear power plant accident in Japan	5.85	2.83

Hypothesis Testing

Examining the Influences of Normative Social Cues on News Processing

My first hypothesis states how the normative social cues affect peoples' presumption of other media users' engagement levels with online news article. As shown in Table 5.4, I found a significant main effect of normative social cues on perception of others' news engagement ($F(1, 402) = 6.72$, $p \leq .01$; see Table 5.4 and Figure 5.1). That is, those who were exposed to a low number of likes or shares (normative social cues) within the online news are significantly less likely to perceive others' participating in certain news engagement (in high risk, M=6.57; in low risk, M=5.86) than those who are

exposed to a high number of likes or shares (in high risk, M=6.78; in low risk, M=6.74). Hence, hypothesis 1 was supported.

Table 5.4: Univariate ANOVA Analysis of effects of normative social cues on presumed others' engagement with news story.

	df	*F*	η^2	*P*
Experiment Conditions (Risk)	(1, 402)	3.15	.01	n.s
Experiment Conditions (Normative Social Cues)	(1, 402)	6.72	.02	.010
Risk * Normative Social Cues	(1, 402)	2.61	.01	n.s

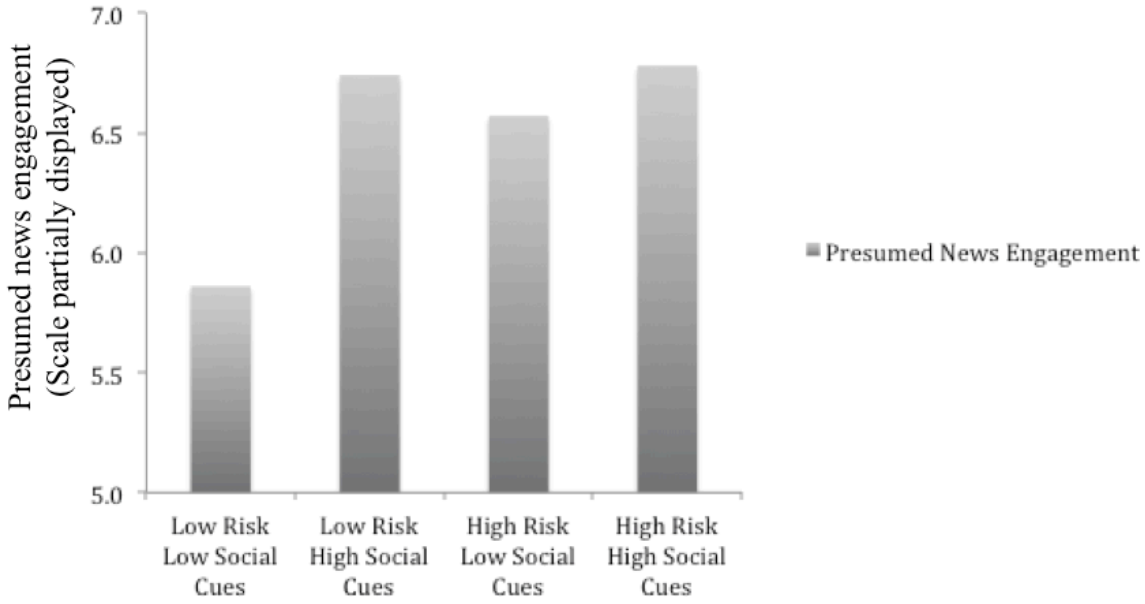


Figure 5.1: Effect of normative social cues on presumed others' news engagement.

As the next step, my study sought to analyze the role of normative social cues in intentions to read the full news story. My hypothesis stated that among people exposed to a truncated news article about riskiness of nuclear energy in Facebook, people who read the news story with a high number of likes or shares (normative social cues) are more

likely to read more the rest of full news story than those who are exposed to the news with a low number of likes or shares.

As expected, there was a significant direct effect of normative social cues on news reading intention ($F(3, 400) = 3.06$, $p \leq .05$, see table 5.5). That is, those who were exposed to high normative social cues were significantly more likely to read the full news story (in high risk, M=6.67; in low risk, M=6.55) than those who were exposed to low normative social cues (in high risk, M=6.31; in low risk, M=5.72). Hence, hypothesis 2a was supported (see, Table 5.5; Figure 5.2).

Table 5.5: Univariate ANCOVA analysis of effects of normative social cues on intention to read the full news story.

	df	*F*	η^2	*P*
Control:				
Elaborative process	(1, 400)	23.31	.06	.000
Nuclear Support	(1, 400)	17.28	.04	.000
Test:				
Experiment Conditions (Normative social cues & Risk)	(3, 400)	3.06	.02	.028
		R^2=14.5%		

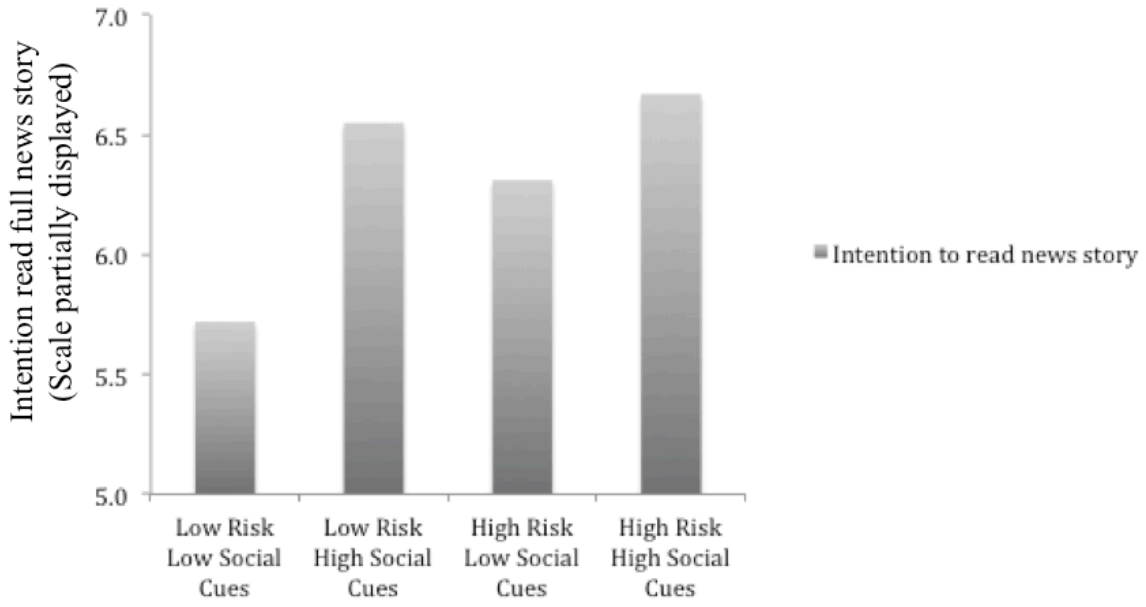


Figure 5.2: Effect of normative social cues on read full news story intention.

I then examine the effect of normative social cues in conjecture of others' intention to read the full news story. I hypothesized that when people are exposed to a truncated news article about riskiness of nuclear energy on Facebook, people who read the news story with higher counts of normative social cues would be more likely to believe that others would be more willing to read the rest of story than those who read the news with lower counts of normative social cues (hypothesis 2b). Findings indicated that there was a significant main effect of normative social cues on presumed others' intention to read the full news story, $F(3, 400) = 3.53$, $p \leq .05$ (see Table 5.6). Those who were exposed to a high number of normative social cues were more likely to believe that others would be more willing to read news story (in high risk, M=6.37; in low risk, M=6.18) than those who were exposed to a low number of normative social cues (in high risk, M=6.26; in low risk, M=5.51). Thus, hypothesis 2b was also supported.

Table 5.6: Univariate ANCOVA analysis of effects of normative social cues on presumed others' intention to read the full news story.

	df	*F*	η^2	*P*
Control:				
Elaborative process	(1, 400)	23.68	.06	.000
Nuclear Support	(1, 400)	10.45	.03	.001
Test:				
Experiment Conditions (Normative social cues & Risk)	(3, 400)	3.53	.03	.015
		R^2=12.8%		

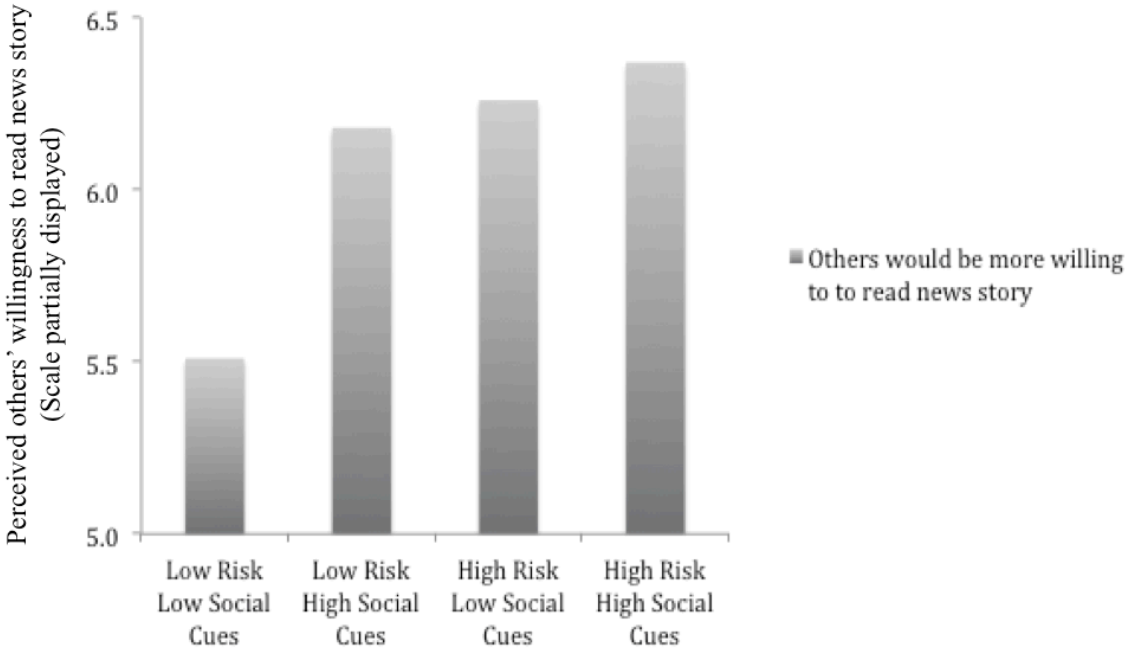


Figure 5.3: Effect of normative social cues on conjecture of others' intention to read the full news story.

I expected that when people read a news article about riskiness of nuclear power plant accident in online, people who read the news story with a high number of normative social cues are more likely to believe that this news story influences others' agendas

(Hypothesis 3a). As can be seen in Table 5.7, I found a significant role of normative social cues on perceived news influences on others' agendas ($F(3, 397) = 2.64$, $p \leq .05$). That is, those who were exposed to a high number of normative social cues were significantly more likely to perceive more news influences on others' agendas (in high risk, M=6.76; in low risk, M=6.14) than those who were exposed to a low number of normative social cues (in high risk, M=6.20; in low risk, M=6.14). Hence, hypothesis 3a was supported.

Table 5.7: Univariate ANCOVA analysis of effects of normative social cues on presumed news effect on others' agendas.

	df	*F*	η^2	*P*
Control:				
Nuclear Support	(1, 397)	8.26	.02	.004
Test:				
Experiment Conditions (Normative social cues & Risk)	(3, 397)	2.64	.02	.049
Elaborative process	(1, 397)	38.52	.09	.000
News*Elaborative	(3, 397)	0.05	.00	n.s
		R^2=14.9%		

However, contrary to my assumption that normative social cues within the online news play more powerful roles in news engagement in the context of a low-risk setting than in the context of a high-risk setting, my data indicated that normative social cues played a role in the high risk condition. However, no significant difference was found in the low risk setting (See Figure 5.4).

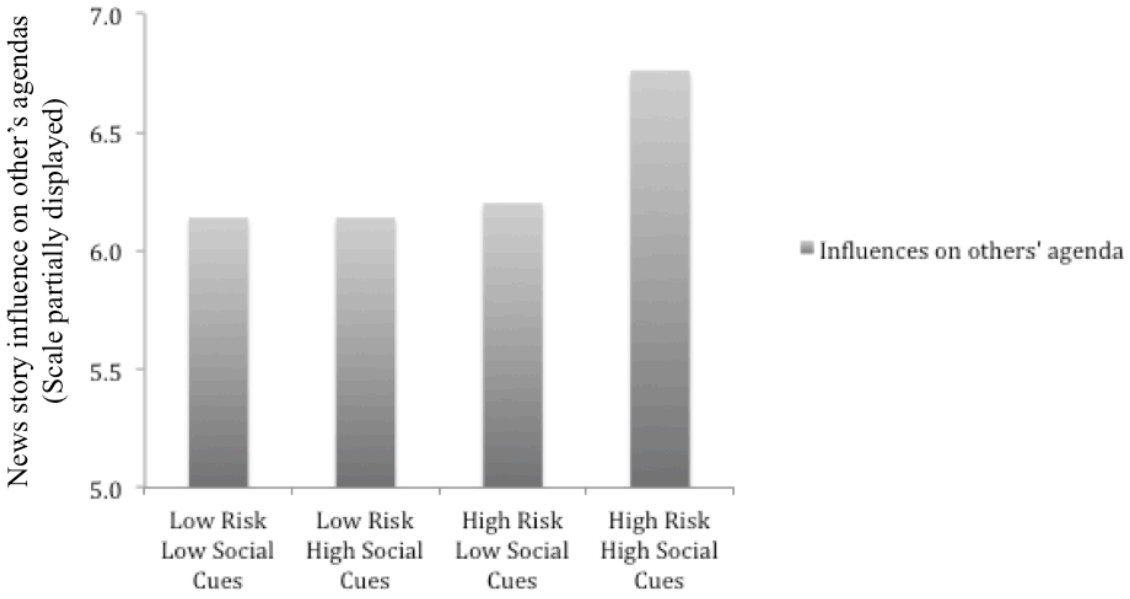


Figure 5.4: Effect of normative social cues on perceived news influence on others' agendas.

Meanwhile, considering the significant effect of personal elaborative processing on his or her information processing (cognitive vs. heuristic processing), in this study I hypothesized a moderated role of elaborative processing in the influence of perceived normative social cues on news leverage on peoples' agendas (Hypothesis 4a). However, as shown in Table 5.7, my finding failed to show a significant moderating effect of elaborative processing ($F(3, 397)=0.05$, p=n.s), while they showed a significant main effect in prediction of news influences on others' agendas ($F(1, 397) = 38.52$, $p \leq .001$). Thus, hypothesis 4a was not supported.

As I expected, there was a significant main effect of normative social cues on perceived importance of the news article ($F(3, 397) = 3.15$, $p \leq .05$). That is, those who were exposed to a high number of normative social cues within the online news are significantly more likely to perceive higher importance of news article (in high risk, M=6.54; in low risk, M=6.51) than those who are exposed to a low number of normative

social cues (in high risk, M=6.59; in low risk, M=5.91). Hence, hypothesis 3b was supported (see Table 5.8; Figure 5.5).

Table 5.8: Univariate ANCOVA analysis of effects of normative social cues on perceived importance of the news article.

	df	*F*	η^2	*P*
Control:				
Nuclear Support	(1, 397)	3.27	.01	.071
Test:				
Experiment Conditions (Normative social cues & Risk)	(3, 397)	3.15	.02	.025
Elaborative process	(1, 397)	38.04	.09	.000
News*Elaborative	(3, 397)	1.71	.01	n.s
		R^2=14.3%		

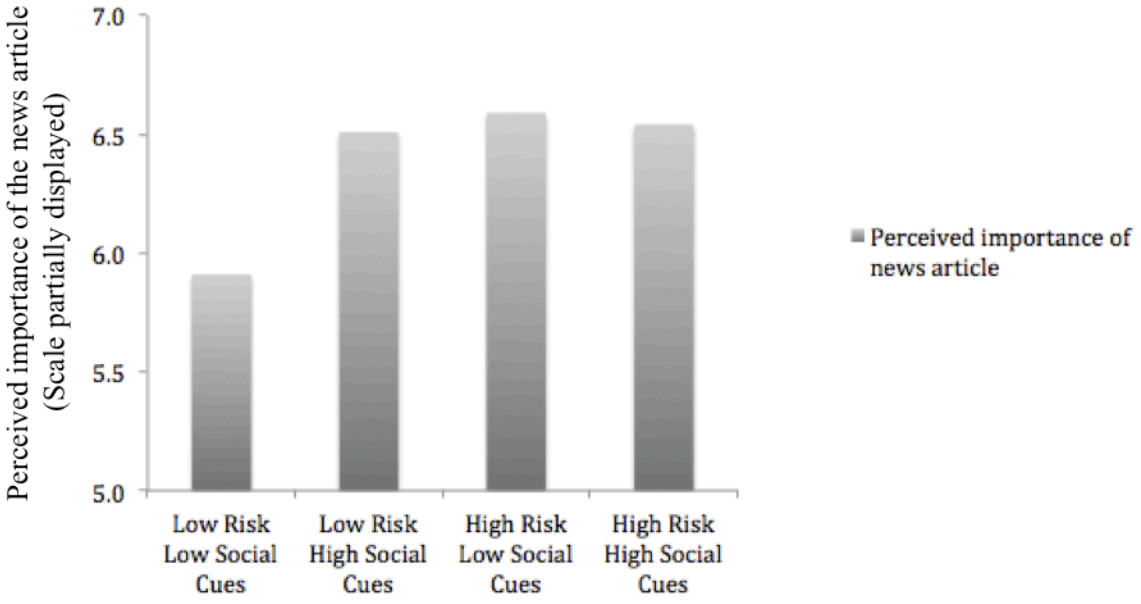


Figure 5.5: Effect of normative social cues on perceived importance of the news story.

However, I failed to find a significant moderating role of elaborative processing in the effect of normative social cues on perceived importance of news article at the

statistical level, (F(3, 397)=1.71, p=n.s), while results showed significant direct effect in news story importance perception, (F(1, 397) = 38.04, p ≤ .001). Thus, hypothesis 4b was rejected.

For the last analysis for the first set of hypotheses, I tested the role of normative social cues on perceived normative pressure from the news story. Based on existing literature review, I expected that when people read a news article about riskiness of nuclear power plant accident in online, people who read the news story with a high number of normative social cues are more likely to perceive more a favorable normative pressure to approve of the news story than those who read a low number of normative social cues.

Table 5.9: Univariate ANCOVA analysis of effects of normative social cues on perceived normative pressure to approve of the news article.

	df	*F*	η^2	*P*
Control:				
Nuclear Support	(1, 397)	14.69	.04	.000
Test:				
Experiment Conditions (Normative social cues & Risk)	(3, 397)	0.86	.01	n.s
Elaborative process	(1, 397)	26.46	.06	.000
News*Elaborative	(3, 397)	2.60	.02	.052
		R^2=14.6%		

As Table 5.9 shows, my finding failed to show a significant direct effect of the normative social cues (F(3, 397)=0.86, p=n.s.). That is, based on my finding, there is no difference between the higher normative social cued group and the lower cued group. Hence, hypothesis 3c was not supported.

Interestingly, however, the significant role of normative social cues on normative pressure perception was shown only in the low elaborative processing group. Indeed, considering the effect of personal elaborative processing on information processing, in this study, I expected a moderated role of elaborative processing in prediction of perceived normative pressure depending on different level of normative social cues. As expected, I found a moderating effect of the elaborative processing at the marginally significant statistical level, $F(3, 397)=2.60$, $p\leq.10$. Namely, it seems that there is no difference effect of normative social cues in perception of normative pressure in high elaborative group (for high risk-high social cues, M=7.42; for high risk-low social cues, M=7.40; for low risk-high social cues, M=7.50; for low risk-low social cues, M=7.20). Unlike in high elaborative group, those people who are in low elaborative group, given normative social cues within online news story significantly worked as role in prediction of normative pressure (for high risk-high social cues, M=6.35; for high risk-low social cues, M=6.39; for low risk-high social cues, M=6.18; for low risk-low social cues, M=5.29). Thus, hypothesis 4c was marginally supported[3]. (See Figure 5.6)

[3] Considering the sample size used in this analysis, I believe it is reasonable to interpret the significant results at the marginal statistical level, i.e., $p<.10$.

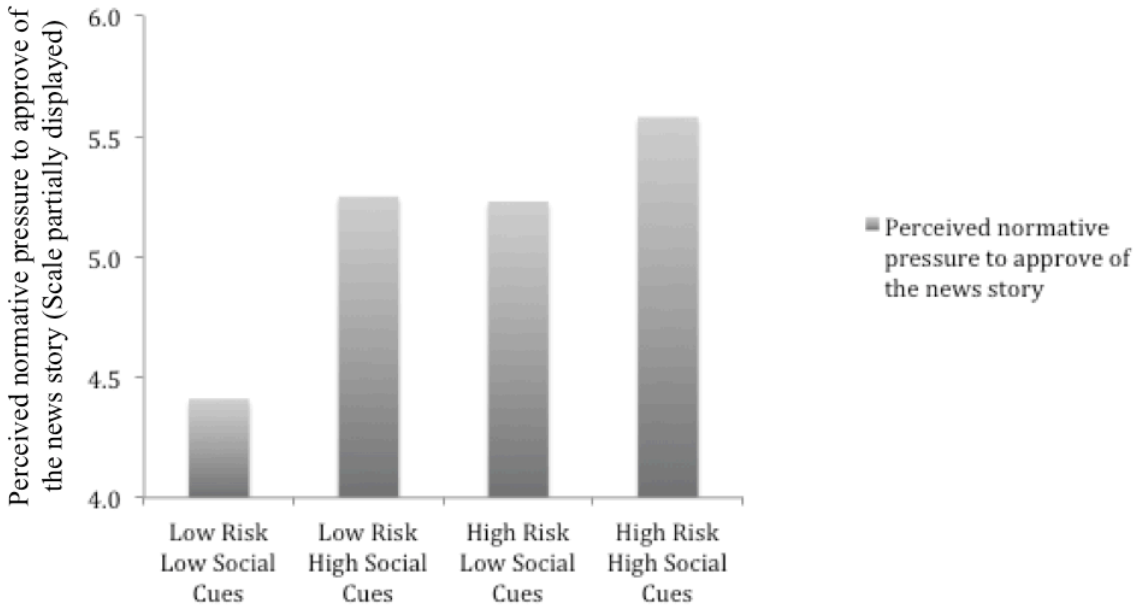


Figure 5.6: Effect of normative social cues on perceived normative pressure to approve of the news story in the low elaborative processing group.

Examining the Influences of Normative Social Cues on Engagement with News

In the second set of hypotheses, I focus on how normative social cues play a role in media users' engagement with the online news. In this study, I separate news engagement into two different types—participating in news sharing and news endorsement behaviors.

I am first interested in how normative social cues affect individuals' intentions to share certain pieces of online news (Hypothesis 5a) and their intention to endorse a news article (Hypothesis 5b). Our analyses find no evidence that given normative social cues have a main effect on individuals' news engagement intention (for intention to share, $\beta = -.01$, $p = n.s$; for intention to endorse, $\beta = -.05$, $p = n.s$). Hence, Hypotheses 5a and 5b were not supported. (See Table 5.10)

Table 5.10: Regression predicting intentions to engage with online news (N=406)

	Intention to share (β)	Intention to endorse (β)
Block 1: **Experiment Conditions**		
Risk	.03	.05
Normative social cues	-.01	-.05
Social cues * Risk	-.01	-.00
Incremental R^2 (%) (ΔF)	0.8	0.5
	(1.04)	(0.73)
Block 2: **Demographic**		
Age	-.03	.03
Gender[a]	.03	-.04
Education	-.11**	-.14***
Personal Traits		
Interpersonal Communication: Scientific issue	.19***	.15**
Seeking for normative social cues	.48***	.47***
Personal inclination of elaborative processing	.00	.05
Incremental R^2 (%) (ΔF)[b]	39.3***	39.6***
	(43.25)	(43.66)
Block 3: **Moderators**		
Issue Familiarity	.17***	.18***
Perceived self-influence	.06	.06
Incremental R^2 (%) (ΔF)	2.3***	2.6**
	(8.00)	(8.86)
Block 4: **Interactions**		
Social cues * Issue familiarity	-.02	-.04
Social cues * Self-influence	-.10*	-.10*
Social cues * Risk * Issue familiarity	-.06+	-.08*
Social cues * Risk * Self-influence	-.01	.01
Incremental R^2 (%) (ΔF)	1.4	1.7*
	(2.37)	(3.07)
Total R^2 (%)	43.8***	44.5***

Note: Cell entries are final standardized regression coefficients for blocks 1, 2, and 3 in which all independent variables have been included while cell entries for block 4 are before-entry standardized regression coefficients that control for variables entered in the previous block but not for interactions entered in the same block.
+p < 0.10; *p < 0.05; **p < 0.01; ***p < 0.001
a) The variable gender was coded 0 = male, 1 = female.
b) ΔF = F change value.

If the news contains risk-related information, individuals tend to process it cautiously and cognitively. Hence, in the relationship between normative social cues and

news participation intention I expected to find a moderating role of different risk levels. As shown in Table 5.10, however, risk level in this study failed to show a significant moderating effect (for intention to share, $\beta = .03$, p = n.s; for intention to endorse, $\beta = .05$, p = n.s). Thus, Hypotheses 6a and 6b were not supported either.

This study sought next to analyze the moderating role of perceived issue familiarity in the relationship between normative social cues within online news and intention to engage with a news story. In detail, I hypothesized the moderating role of issue familiarity in the influence of normative social cues on news-sharing intention (Hypothesis 7a) and news endorsement intention (Hypothesis 7b). However, as shown in Table 5.10, the study failed to produce significant evidence of a moderating effect of perceived issue familiarity (for intention to share, $\beta = -.02$, p = n.s, for intention to endorse, $\beta = -.04$, p = n.s), though a significant direct effect was found in the prediction of news engagement participation (for intention to share, $\beta = .17$, $p < .001$; for intention to endorse, $\beta = .18$, $p < .001$). Hence, hypothesis 7a and 7b were not supported.

I am also interested in how perceived influence on others' opinion affects the relationship between normative social cues and individuals' intention to engage with online news, i.e., intention to share certain online news (Hypothesis 8a) and to endorse the news article (Hypothesis 8b). As expected, there was a significant moderating effect of perceived influence on others in the link between normative social cues and news engagement intention (for intention to share, $\beta = -.10$, $p < .05$; for intention to endorse, $\beta = -.10$, $p < .05$). That is, the effects of normative social cues on news engagement intention vary for individuals' different levels of perceived influence on others' opinions. Thus, at a statistical level Hypotheses 8a and 8b were supported.

As can be seen in Figure 5.7, individuals perceiving higher influence on others' opinion are much more likely to share a low-normative social cued news article with others than they are a news story with a high number of normative social cues. In contrast, people who perceive themselves to have little influence on others' opinions tend to show higher intention to share a news story with a high number of normative social cues than they are one with a low number of normative social cues.

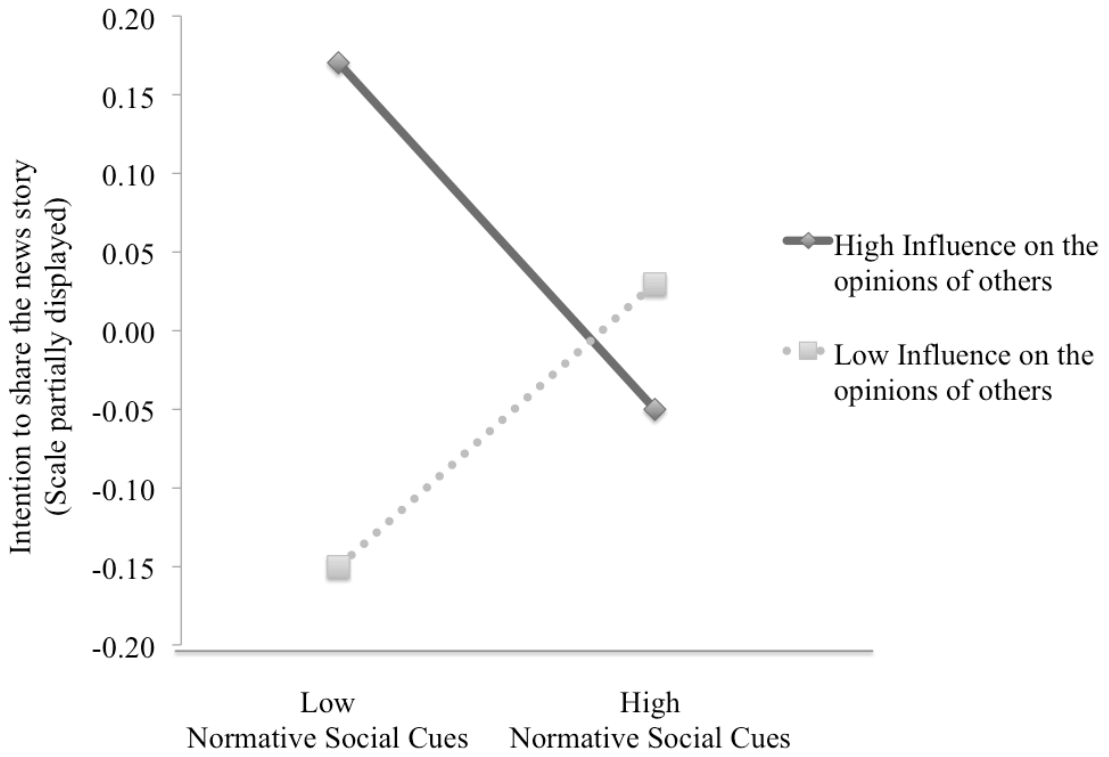


Figure 5.7: Relationship between normative social cues within online news and intention to share the news story, which is moderated by perceived influence on others' opinion.

As can be seen in Figure 5.8, normative social cues seem to influence more people who perceive higher influence on others' opinion. People who perceive themselves to have a higher influence on the opinions of others are more likely to endorse

a news story if few others have participated in it. People who perceive themselves to have little influence on the opinions of others are less likely to endorse a news story if it contains a low number of social cues.

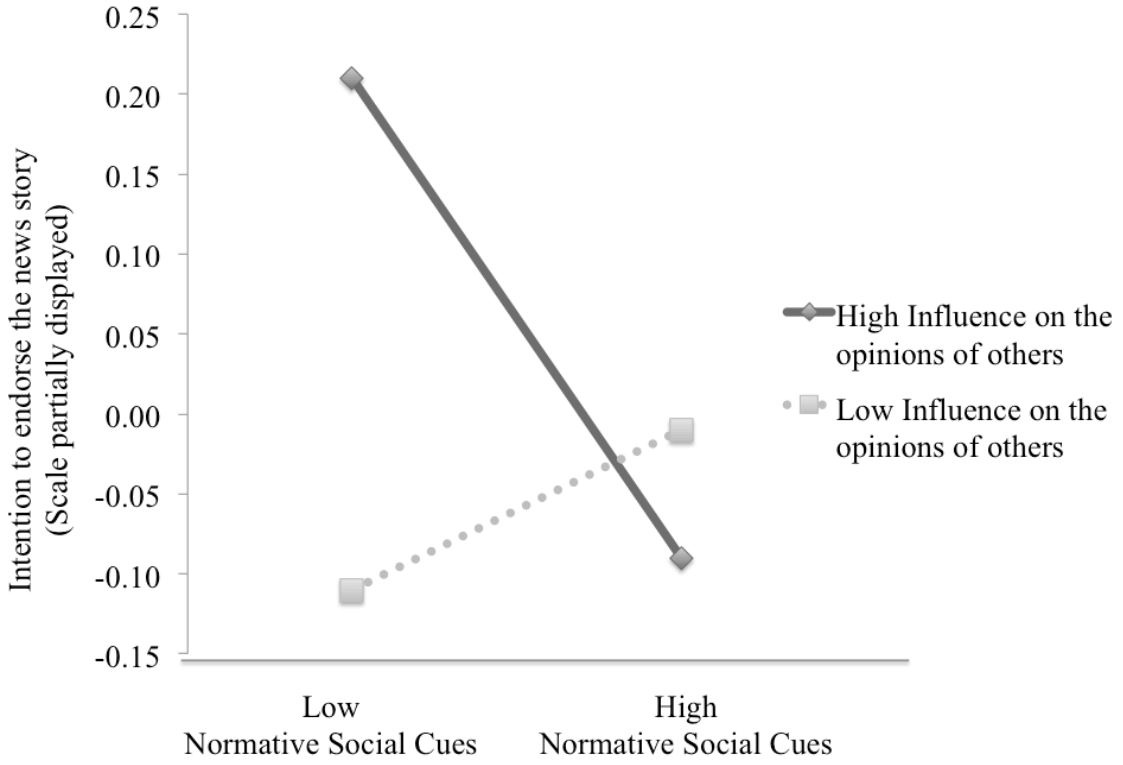


Figure 5.8: Relationship between normative social cues within online news and intention to endorse the news story, which is moderated by perceived influence on others' opinions.

Lastly, I am, in this study, interested in how the normative social cues, different risk level highlighted in a news story, and personal traits (i.e., preexisting attitude toward certain issues, perceived issue familiarity, and perceived self-influence on others' opinion), simultaneously factor into online news engagement (RQ1).

I found no significant evidence of perceived issue familiarity serving as a moderating role in the relationship between normative social cues and news engagement (i.e., two-way interaction condition). I did find, however, that issue familiarity played a

significant role in a three-way interaction after considering the different risk-level presented in a news story (for intention to share, $\beta = -.06$, $p<.10$; for intention to endorse, $\beta = -.08$, $p<.05$).

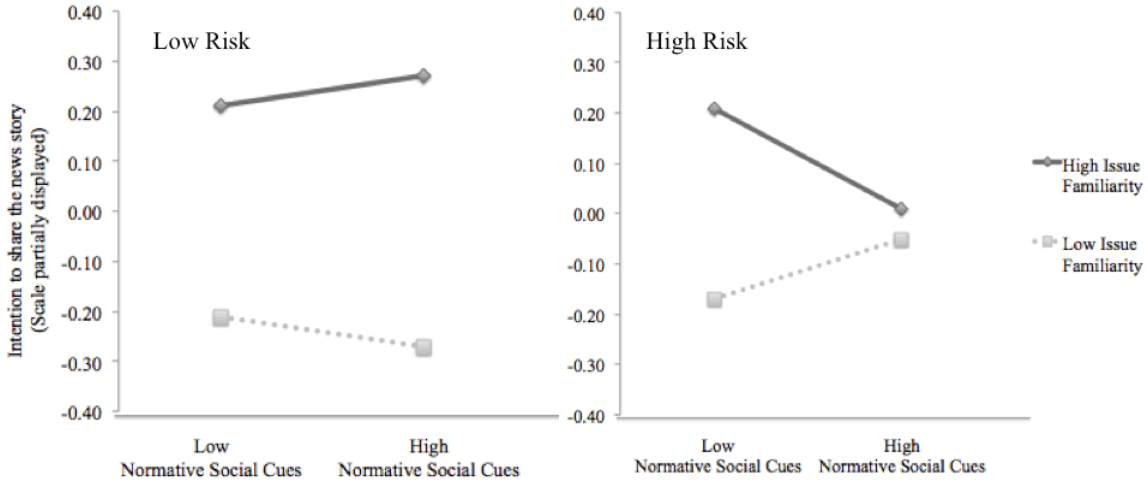


Figure 5.9: Three-way interaction effect of normative social cues within online news, different levels of risk presented in a news article, and perceived issue familiarity on individuals' news-sharing intentions.

Based on this study's findings, presented normative social cues seem to have a greater impact on individuals' news-sharing intention after reading a news story highlighting higher the risks of nuclear disaster compared to one that discusses minimal risk of nuclear accident. After read the news story discussing the high risk of nuclear accident, individuals who read the news story with a high number of normative social cues tended to be less influenced by their perceived issue familiarity in the formation of news-sharing intention. However, when people read a certain news story with a low number of normative social cues, those who perceived a higher familiarity with nuclear energy expressed much more their willingness to share the news story than those who perceived less familiarity with the issue ($\beta = -.06$, $p < .10$). See Figure 5.9.

Similarly, in predicting news endorsement intention, there is significant three-way interaction between normative social cues, perceived issue familiarity, and different risk level in a news story. That is, as shown in Figure 5.10, in the high-risk news story condition, the influence of normative social cues on news endorsement intention was affected much more by respondents' perceived issue familiarity. In particular, compared to people who read the news story with a high number of normative social cues, people who perceive higher familiarity with the issue tended to show more willingness to endorse the news story when they read it with a low number of normative social cues ($\beta = -.08$, $p < .05$).

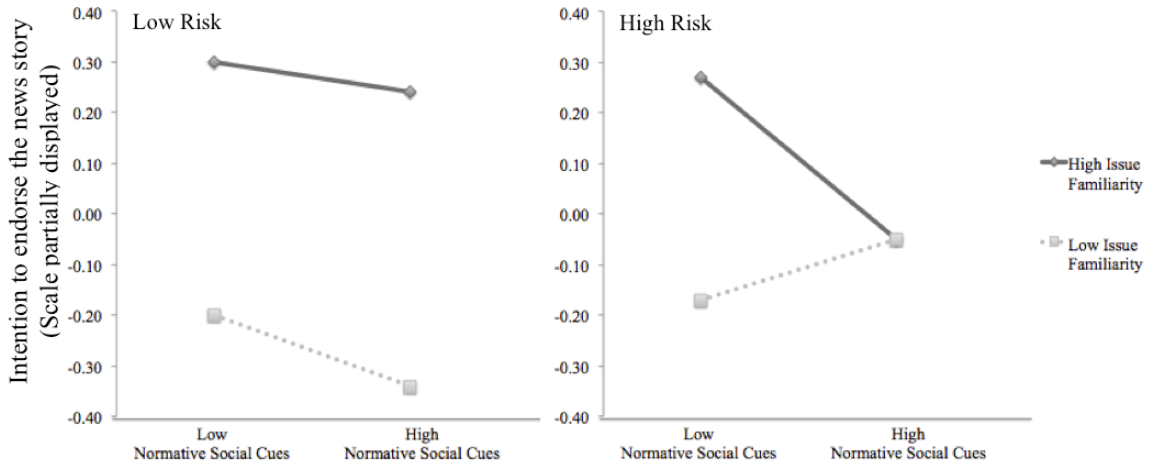


Figure 5.10: Three-way interaction effect of normative social cues within online news, different levels of risk presented in the news article, and perceived issue familiarity on individuals' news endorsement intentions.

DISCUSSION

More and more the public is engaging with online news and getting involved in societal issues by exchanging opinions on certain issues (see Marwick & Boyd, 2011; Pale, Starbird, Vieweg, & Hughes, 2010). It is thus increasingly important to understand

what makes people engage with online news and why some news stories engage more media users than other do stories. Considering the critical role of engaging news in online communication, in this study, I am especially concerned with, in the process of news engagement, the direct and moderate effects of normative social cues within online content. The study presented in Chapter 3, Chapter 4 and Chapter 5 had the two-fold goal of demonstrating the role of normative social cues in 1) news processing and (2) engagement with online news. For this, I used an experiment-embedded survey to assess the degree to which levels of normative social cues help forecast media users' roles as news consumers and news gatekeepers.

I found a direct and positive effect of normative social cues in online communication. In the first part of this study, I tested hypotheses positing the influences of normative social cues on news processing (e.g., news consumption, news evaluation, etc.) using analysis of covariance. As expected, online content with a high number of normative social cues showed significant direct and interactive effects on respondents' news consumption intention (e.g., intention to read more or the rest of a full news story), presumed different levels of others' news engagement (i.e., believe that other social media users have highly engaged with the news story), and news evaluation (i.e., presumed news influences on others' agenda to concern, perceived importance toward the given article, and perceived more normative pressure to approve of the news story). In the second part of the study, based on results of regression analyses, I also found a significant role played by normative social cues in online news engagement intention (e.g., the moderating effect of perceived influence on others' opinions in the relationship between normative social cues and news engagement).

Before discussing my findings in detail, I should address a few limitations of this research. First, many researchers suggest using multiple scales and combining questions to measure the variables for reliable predictions of a study. For some of the variables used in this study, however, I relied on a single item, which may limit the findings. Even though those single items were asked quite straightforwardly, future research might need more solid measurements to test the influences I demonstrate here. Secondly, the comparatively small number of respondents in the sample could generate a Type II error. To overcome the potential drawback, I also present the statistical results with a 0.1 marginal significance level along with a .05, a .01 and a .001 level when testing all my hypotheses. Also, in order to predict media users' decision behavior toward engaging with certain news in online settings, I had to ask respondents' intention to engage with the given online news (i.e., intention to share the news story, and intention to endorse certain news story). Such measurements are still appropriate ways to predict levels of engagement, yet they leave some gap in accurately tracking respondents' actual behaviors. If future study can track the experiment's participants' real actions toward the particular news engagement, it would help to more powerfully support the results of this study. Furthermore, since I am mainly concerned with each role of normative social cues in news processing and news engagement, this study did not test the indirect effects of normative social cues on active news engagement via the mediator (i.e., news evaluation). It would be great if researchers could conduct follow-up studies to find unexplored facets of this study. Lastly, analyses revealed small effect sizes which should not be a concern since the findings related to the role of normative social cues in the

processing of online news are, independent of the size of the effects, important in themselves.

These shortcomings notwithstanding, this study provides crucial insights that contribute to an understanding of the role of normative social cues in a variety and complex situations of online information processing. First, I tested the effect of normative social cues on information processing for different levels of risk contexts present in an online story. That is, based on previous findings (e.g., Batra & Stayman, 1990; Kim, 2012; Meffert, Chung, Joiner, Waks, & Garst, 2006; Turner, Rimal, Morrison, & Kim, 2006), I proposed the basic premise that the role of normative social cues in online news processing would play out differently depending on the different degrees of risks presented in a news story. Particularly, I assumed that the normative social cues would have greater influences with media users in the process of online news when media users are faced with cues presented in a news story that downplays the risk than with cues presented in a story highlight the risk. Most of the hypotheses in my study upheld the assumed premise. Noticeably, however, an opposite result was found for Hypothesis 3a—the expected role of normative social norms in the presumption of news effects on others' agendas. Namely, normative social cues play a significant role in the high-risk condition rather than the low-risk one in predicting the news effect on others' agenda. It probably arises from the fact that people tend to comparatively devalue (or paid little attention to) the importance or effect of certain news stories when they read the news discussing the slight risk of a complicated issue, irrespective of the level of normative social cues. In contrast, in the high-risk condition, the normative social cues play a large role in news processing because it amplifies peoples' responses to the given news article.

In terms of policy implications of this study, it is important to consider that individuals' intention to engage with an online news story will not directly depend on levels of normative social cues, but will depend more on interactive effects between normative social cues, news attributes, and personal traits. In this project, I seek to demonstrate direct as well as interactive effects of normative social cues in online communication. Namely, based on previous findings, this study tried to find how potential moderators (e.g., different levels of risk, personal elaborative processing, perceived issue familiarity, and perceived influence on others) factor into the relationship between normative social cues and online news processing. For instance, this study showed that proposed normative social cues do play a significant role in shaping intention to engage in online news, although the role does not seem to have a direct effect on news engagement intention. Specifically, in predicting news engagement intention, normative social cues within online news did interact with (a) perceived influence on others' opinions, and (b) different risk-level and perceived issue familiarity. My findings therefore suggest that normative social cues surely can play a role in the process of online news, but that the influence can differ depending on individual circumstances or attributes of the message itself.

In the high-normative social cues setting, the influences of perceived influence on others' opinions seem to be low. That is, one's perceived influence on others has little effect on news processing when people read the news with a high number of normative social cues. However, in the low-normative social cued condition, one's perceived influence on others plays a great role in news engagement intention. This finding could be related to individuals' self-efficacy. Those media users who perceive themselves to

have little influence on others' opinions are less likely to share or endorse a news story when they read an online news story that few others have participated in. However, people who perceive themselves to have a high influence on others are much more likely to share or endorse the same news story in online space. This may be because such people expect a relatively high valuation of their roles with the related news when they see that others have yet to exert their influence on the news.

Furthermore, in the interaction effect of normative social cues, different risk-level, and perceived issue familiarity on intention to engage with news story, my data shows that there is only an unnoted influence of normative social cues on news engagement intention in low-risk settings. The link between normative social cues and news engagement intention was significantly weaker for the low-risk news condition than it was for the high-risk news setting. Especially in the high familiarity group, the minimum effect of normative social cues within low-risk news might result from the ceiling effect. That is, the intention level of news content engagement is already presented at the end of the higher scale among overall media users when they read a news story discussing low-risk, there are only a few chances to be affected by normative social cues. Unlike the findings in low-risk news, after reading a news story highlighting the great risk of a nuclear accident, people with higher familiarity with the issue were much more likely to share or endorse the news when other media users seemed to be less engaged by it. For higher issue familiarity respondents, their strong confidence in the issue might help to amplify intention to contribute the news in online setting while others have yet to engage with the news.

More importantly, while this study empirically examine the role of normative social cues in online communication, it also contributes to providing a practical implication for how a certain issue can be expected to be on the public agenda among the great number of societal issues in online discourses. Considering many people tend to choose and attend only to certain news from the deluge of information (Hwang, 2010; Norris, 2001), from a news producers' point of view, it is indeed worth exploring the positive determinants of news selection and evaluation. Overall, in the context of complicated issues, people seem to undervalue a particular news story within a low number of normative social cues especially when it discusses an issue that poses little risk people. However, findings of my study also show that the online news with a high number of normative social cues enhance peoples' intention to consume the particular news story. Thus, communication practitioners and policymakers who utilize online media sources to distribute their news or messages should bear in mind the role of engaging social media users as influencers in online communication. Although policymakers or communicators cannot simply devalue something newsworthy depending on the risk level it poses, they still have a chance to promote certain news in the early stages of news dissemination by seeking ways to promote media users' news engagement.

CHAPTER 6. DISCUSSION AND CONCLUSIONS

In this chapter, I provide a brief overview of this dissertation, summarize the results of the preliminary and main studies and suggest directions for future research (developed from a consideration of this project's limitations). Furthermore, I discuss the theoretical, methodological, and practical implications of this dissertation. I close with my conclusions.

Overview of This Dissertation

Hindmann (2009) asserted that we need to remember "the Internet has had only modest success in displacing traditional media sources.… where the strongest case can be made that the Internet has stolen some audience (or at least some revenue) from traditional outlets" (p. 92). I have argued, however, that the Internet, along with powerful traditional media, has indeed played a key role in communicating a wide scope of societal issues. It is a simple fact that nearly limitless describes the Internet's potential influence on the new media environment. The Internet has contributed to building a better network-based community that is overcoming geographic limitations (Wellman, 2001). The Internet enables people to communicate easily with many people over a long distance (DiMaggio et al., 2001). In addition, the Internet has changed "the rules for traditional media outlets" (Hindman, 2009, p. 89). For instance, according to Hindman (2009), in online settings, local papers have overcome geographic limits, earning the chance to compete with other papers (including major national papers) from other states and countries.

Furthermore, advanced Internet technology enables ordinary individuals, if they so choose, to engage people with societal issues. Indeed, this form of interactive media permits nearly every individual to participate in a conversation, giving people a chance to influence if not set the public agenda (Benkler, 2006), and to discuss issues raised in the news (Hardy & Scheufele, 2005). This process could lead to a democratized Internet (Delli Carpini, 2000). By engaging with certain issues in online communication, individuals can play significant roles in disseminating information and forming public opinion. That is, the ease with which information distribution can occur through online spaces—including social media—may empower any single individual to be influential in his or her peer groups.

Some online users are more willing to participate in online discourses than others; also, some online messages engage more media users than do other messages. Thus, in this dissertation I have sought to find the determinants of online news engagement, particularly examining the role of normative social cues in online communication. In detail, I explore the influences of normative social cues within online content in predicting news consumption and news engagement in online environment. I consider the role of normative social cues in online communication on the basis of the fact that the displayed statistics for "sharing" or "liking" appearing beside online news content is usually regarded as indicators of peoples' approval and recommendation of the news.

To demonstrate my research questions and hypotheses, I conducted a preliminary study and a main study. In the preliminary study, I explored how much the online media users were getting involved in the process of news sharing in a social media setting for the complex technological issue of nuclear energy. Furthermore, I explored the

sentiments toward certain issues expressed by people in online discourses. Through the main study, I analyzed the role of normative social cues within online content in news processing or news engagement that was my primary concern in risk communication.

Summary

In this section, I briefly address the key findings for both the preliminary and main studies presented in this dissertation.

Based on the findings in Chapter 2, I empirically demonstrated that in the specific online platform Twitter, people indeed share their opinions about certain issues with others. Online media users tend to write more posts about a particular issue just after a big event (e.g., the Fukushima disaster, for this study) related to the issue, but tend to less put their concerns as time passed. In the second part of Chapter 2, I sought out public opinions on the issue. Interestingly, in the context of nuclear energy, which I used as a case study for this project, I found that when people "tweeted" about technology and included an external link, they tended to express a more slanted opinion (either positive or negative). In sum, I believe that Chapter 2 shows the expected role of social media as being influential to some degree when it comes to delivering information and expressing one's own opinions about societal issues.

In the main study (i.e., Chapters 3, 4, and 5), I am interested in the direct and moderated effects of normative social cues within online content in online communication, being aware that the public is more and more engaging with online news and getting involved in societal issues by exchanging opinions on certain issues (Marwick & Boyd, 2011; Pale, Starbird, Vieweg, & Hughes, 2010). Here I used experiment-embedded survey data to examine the roles of normative social cues in the

process of news consumption and news engagement in online spaces. Data showed significant direct and interactive effects of normative social cues on news processing (e.g., news consumption, news evaluation) in a positive way. Also, in the second part of the study, based on the data I used, I found that given normative social cues within online news story do play a significant role in forming news engagement intention. The role, however, seems to have no direct effect on the intention to engage with the news. That is, individuals' intentions to engage in an online news story do not simply rely on levels of normative social cues. Rather, they depend more on interactive effects between normative social cues, news attributes (i.e., different risk level presented in the news story), and personal traits (e.g., perceived issue familiarity, and presumed influence of others' opinion).

Limitations and Directions for Future Research

The current study has a number of limitations that could be overcome in future research. First, by content analysis, in Chapter 2, I demonstrated the extent to which media users had engaged in public discourses on certain issues through the channel of Twitter, even though my experimental design for the main study was developed on the assumption that the manipulated news story was shown on the Facebook interface (i.e., Chapter 3, 4, and 5). It was rather than the second-best for Chapter 2 I chose Twitter instead of Facebook. In Facebook, users can decide whether they open their posts to the public or restrict them to friends only. To protect Facebook users' privacy and safeguard their rights, Facebook limits what can be done in content analysis targeting entire posts about certain issues in Facebook. Although I chosen a Twitter channel instead of Facebook for Chapter 2 due to unavoidable circumstance, I believe that it was still an

appropriate decision to gauge media users' engagement in public discourses through this platform considering its contribution to issue engagement by connecting and enabling users to participate in collective action and information exchange (Runge et al., 2013).

Second, I specifically focused on the influence of normative social cues on news processing and news engagement in online setting. This meant that I could not help but lose opportunities to find other diverse influence factors on online news engagement intention. Indeed, besides the attributes of online message (i.e., normative social cues within online content), many other elements (e.g., personal characteristics) can affect peoples' intention to engage with online news content. In other words, although the normative social cues within an online message can help in predicting individuals' general intention to news engagement, it still leaves room for questions that could advance practical suggestions. By testing the hypotheses, I did find a significant role being played by messages' attributes (i.e., normative social cues in different risk-level context) in online news processing. Hence, a future study ought to find the key attributes of engaging users in the prediction of online news engagement. As part of efforts to seek the practical suggestions in online communication, useful options for anticipating media users' engagement in online news could be behavior change theories such as theory of reasoned action (TRA) and theory of planned behavior (TPB). Indeed, established studies have already used these behavior change theories to predict individuals' knowledge-sharing behavior (e.g., Hsu & Lin, 2008; Hsu, Ju, Yen, & Chang, 2007; Reychav & Weisberg, 2010; So & Bolloju, 2005). Therefore, in order to provide more practical but concrete suggestions for engagement with online news, it is important for future research to expand the theoretical approaches from the basis of existing behavioral change theories.

Third, in this study I tested the role of normative social cues in online communication with U.S. citizens only. However, the cultural differences and geographical proximity may be factors accounting for risk perceptions and public engagement with online content processes on social media, especially in the context of a nuclear power plant accident. Thus, a future study would be merited if it continued to conduct a comparative study between the United States and different countries (e.g., Japan, China, or South Korea) to explore how the cultural differences as well as geographical proximity affects public engagement processes in online communication.

Lastly, for the main study (i.e., Chapter 3, 4, and 5), while pretending the experimental condition was realistic, I manipulated the experiment's stimuli, i.e., social plugins that may be expressed in an online news story, based on an existing platform, Facebook. Consequently, I provided only certain information as positively cued toward the news content (i.e., normative social cues including how many people have shared the particular news, how many users have clicked "like" button for the news, and how many people have commented on the news). However, I was unable to present negatively cued clues (i.e., normative social cues such as how many people have clicked "dislike" or "disagree" button for the news story). If we could seek the influence of negative social cues on news processing in an experimental setting, we would gather, in a practical way, a more accurate idea on the role of normative social cues. If a future study manipulates a mixed condition with conflicting social cues to gauge the effect of normative social cues on news processing, it would greatly help to broaden and deepen our academic and practical understanding of the dynamic roles of normative social cues in online communication.

I should mention a theory known as the spiral of silence. The theory of the spiral of silence and the role of normative social cues in online communication are interrelated in view of the fact that the willingness of individuals to state opinions is conditioned by their perceptions of others' opinions. According to the theory (i.e., the spiral of silence in Noelle-Neumann, 1974; 1993), because of their fear of isolation, individuals continually track public opinion on certain issues, and if they perceive themselves to hold a minority view on an issue, they are more likely to remain silent instead of speaking their views on the issue. In this process, media plays an important role in establishing one opinion as the perceived dominant idea (also see, Scheufele, Shanahan, & Lee, 2001). In a social environment, however, the estimated superiority of public opinion may not always reflect reality (Scheufele, 2007). Hence, if in a future study we could bring negative sentiment into the normative social cues, it would enable us to discover a new approach to the theory of spiral of silence and the influences of media on perceived public opinion.

Implications of This Dissertation

Regarding online news processing, the current study has focused on the intersection between normative social cues that may be presented in different risk-level manipulated news stories and personal traits (e.g., perceived issue familiarity, presumed self-influential, inclination of elaborative processing etc.). I should highlight that the current study, by having such a focus, has made several important theoretical, methodological, and practical contributions to the field of online communication and risk communication. This is especially true for the context of interpreting online news and engaging with online news.

Theoretical Implications

As I expected, findings from the preliminary study, Chapter 2, empirically assessed (a) the flow of controversial information in the real world of social media and (b) the existence of individuals' role as influential in online space. By expressing opinions and sharing information about societal issues, social media users have indeed showed great promise at being influential in the online world. Namely, by showing social media users' actual participation in news engagement in social media platform, this study seems to revisit the role of influence in the world of new media environments. Specifically, in the context of controversial technology, i.e., nuclear energy, people play, in online communication, two separate roles—those of information creators (e.g., writing tweets about nuclear energy without external links) and information deliverers (writing tweets that contain external links to nuclear energy-related information).

Through the main study (Chapters 3, 4, and 5), I revealed important implications for theoretical work on the dynamic of news engagement in online space. One key theoretical contribution that this dissertation has made is that the "normative social cues" show different degrees of influence on "different risk levels of news" conditions, while the link between normative social cues and information process could also be moderated by personal traits. By choosing "nuclear energy" as a case study, I was able to examine the roles of normative social cues in complicated contexts. In designing the experimental stimuli, I considered the facts that hazardous events such as a nuclear disaster could be prone to the social amplification of the perceived risks because of the dread and seriousness that attend such topics (Kasperson, 2012) while people tend to rely more on cognitive approaches to process information if they feel worry or fear (Batra & Stayman,

1990; Turner, Rimal, Morrison, & Kim, 2006). Within the context of different risk manipulated news conditions, I tested the different influences of normative social cues on personal processing of information. And on the whole, the normative social cues within online news shows more powerfully influence individuals' information processing in low-risk settings. In addition, the current study provides empirical evidence of the moderating role of normative social cues and personal traits in online news processing.

Moreover, with this dissertation I aim to demonstrate the two separate roles of normative social cues in online communication. First, from a news consumer's perspective, I seek a role of normative social cues playing as bandwagon cues in news processing (including news consumption and news evaluation). Depending on the given normative social cues, respondents presumed differently the levels of news engagement by other social media. Furthermore, the given normative social cues seem to also influence peoples' intention to read more of the full news story, their evaluation of the news story, and their perceived normative pressure from the news story. This dissertation has sought not only a role of normative social cues in news processing, but has also explored the role of social cues from the news gatekeepers' perspective. Not surprisingly, the current study has shown the potential role of normative social cues as being a bridge that connects engaging media users and other social media users for communicating information in online spaces. In detail, by engaging in normative social cues (i.e., clicking the "share" button, or "like" button) within certain online news story with the minimum amount of effort, people seem to be feasibly considered an influencer on a societal issue.

Last but not least, this dissertation not only revisits existing information-processing approaches to predicting the public's processing of news and intention to engage with it, but also contributes theoretically to bridging the information model and social comparison model by considering, in online communication, both internal and external influences (e.g., perceived status of news story inferring from normative social cues, and presumed normative social pressure from the news article). In this dissertation, I found that normative social cues can lead media users in both cognitive (e.g., read the rest of a full news story) and heuristic (e.g., perceived importance toward news article and normative pressure) ways.

Methodological Implications

I should particularly highlight the methodological contribution on computer-aided content analysis used for Chapter 2. In the human-coded content analysis setting, researchers usually submit their findings from a representative sample of content documents because of some potential physical limitations, including human coders time and resources. The beauty of a complete enumeration-oriented computer-aided content analysis adds to both validity and reliability; this study can extend the range of contents for certain issues in my analyses. Specifically, systematically programmed computer-aided content analytic technique allows us to conduct analyses on the complete posts of all available documents pulled. This can be done using the keywords provided by the researcher in a certain online platform (Twitter for this study) without needing to be concerned about a sampling margin of error. In addition, it enables a researcher to analyze online content in real time after applying their coding rules to the particular coding query (Hopkins & King, 2010). Lastly, computer sentiment analysis, as Anderson

(2012) also discussed, facilitates assessing the meaning of posts online rather than counting the word frequencies.

Practical Implications

In this dissertation, I have addressed a number of academic and practical implications of digital media for a variety of democratic communication processes, including processes of information sharing. This helps having a better understanding of intended (and unintended, at times) media users' engagement with online news content in online communication. From a practical perspective, the findings of this study provide empirical evidence that media users are indeed influenced by presented normative social cues within online content in decision-making process. And these findings suggest practical ideas for policy makers, risk communicators, and news producers. For instance, the proven influence of normative social cues could contribute to their ideas for "how a certain issue could be selected to be on the public agenda among the great number of societal issues in online discourses." From a news agency's point of view, it is very much worth looking for ways to improve their readership among the plethora of online information. In this case, normative social cues are certainly worth consideration. Indeed, as Roosendaal (2011) described, after implementing the social plug-ins from Facebook in the third-party sites, a great deal more online users have visited the websites and they have spent more time reading more articles on those sites. Furthermore, from positions of communication practitioners and policy makers, it would probably be a wise choice to consider the role of social participation in online communication. In doing so, they still have a chance to promote their agenda as public agenda by encouraging engaging users to participate in their agenda.

Conclusions

Many scholars agree about the recent view of the influence of online communication. For instance, Bakshy and colleagues (2011) pointed out that ordinary individuals could, to a certain degree, attain the status of the influential. While interactive media shows great potential for bringing about a positive relationship between online information use and civic engagement (Xenos & Moy, 2007), one potential question that could be raised here is why do some media users engage more in online information than others. And we may be able to answer this question by considering the aforementioned complementary deliberation—the individuals' characteristics as well as external social factors.

In closing, in my dissertation, I especially focus on what attributes of digital media technology encourage individuals to participate in the news engagement process. Taking the controversial scientific issue (and potentially a political one) of nuclear energy as a case study, I found direct and interactive influences of normative social cues within online message in the process of news engagement. Such influences were due to the fact that people tend to presume normative pressure toward certain issue by inferring from given cues such as social plugins in social media and discussions in online comments (see Thelwall, 2007).

I would also like to stress the contribution of a theory-driven approach for developing a practical model that could influence the predicting of how normative social cues within online content factor into the process of news engagement. I developed my research idea for this dissertation from established theoretical models such as social comparison model and information processing approaches. I applied this idea to the

understanding of online communication. I would suggest that a future study should continue to put more concerns on (a) what is the internal and external determinants of influence in online communication, (b) what is the influencer's role as opinion leader, and further (c) what is the function of news engagement in the world, e.g., individuals inserting themselves into a social group so that policymakers and communicators can establish more effective communication strategies to encourage individuals to influence public issues.

References

Abbot, E. (2000). *Media coverage of GMOs in the US and the UK: Who's quoted and what's said.* Paper presented at "Informing the Dialogue" conference, Ithaca, NY.

Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl &J. Bechmann (Eds.), *Action Control: From Cognition to Behavior* (pp. 11–39). New York: Springer-Verlag.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior & Human Decision Processes, 50(2),* 179–211.

Anderson, A. A. (2012). *The Social Context of Online News: How Incivility in Online Comments Impacts Public Perceptions of and Public Engagement with Science.* (Doctoral dissertation, The University of Wisconsin-Madison).

Anderson, A. A., Brossard, D., & Scheufele, D. A. (2013). News coverage of controversial emerging technologies: Evidence for the issue attention cycle in print and online media. *Politics and the Life Sciences, 31*(1-2), 87-96.

Anderson, A. A., Brossard, D., & Scheufele, D. A. (2010). The changing information environment for nanotechnology: Online audiences and content. *Journal of Nanoparticle Research, 12*(4), 1083-1094.

Anderson, R. H., Bikson, T. K., Law, S. A., & Mitchell, B. M. (1995). *Universal Access to E-Mail-Feasability and Societal implications.* Santa Monica, CA: RAND

Ardichvili, A., Page, V., & Wentling, T. (2003). Motivation and barriers to participation in virtual knowledge-sharing communities of practice. *Journal of Knowledge Management, 7(1),* 64-77.

Arkes, J. R., Boehm, L. E., & Xu, G. (1991). Determinants of judged validity. *Journal of Experimental Social Psychology, 27,* 576-605.

Bakshy, E., Hofman, J., Mason, W., & Watts, D. J. (2011). *Everyone's an influencer: Quantifying influence on twitter.* Paper presented at the In Proceedings of WSDM.

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52,* 1-26.

Baresch, B., Knight, L., Harp, D., & Yaschur, C. (2011, April). *Friends who choose your news: An analysis of content links on Facebook.* Paper presented at the International Symposium on Online Journalism, Austin, TX.

Batra, R., & Stayman, D. M. (1990). The role of mood in advertising effectiveness. *Journal of Consumer Research, 17,* 203-214.

Becker, A. B., Dalrymple, K. E., Brossard, D., Scheufele, D. A., & Gunther, A. C. (2010). Getting citizens involved: How controversial policy debates stimulate issue participation during a political campaign. *International Journal of Public Opinion Research, 22(2),* 181-203.

Benkler, Y. (2006). *The Wealth of Networks: How Social Production Transforms Markets and Freedom.* Yale University Press.

Besley, J. C., & Shanahan, J. (2005). Media attention and exposure in relation to support for agricultural biotechnology. *Science Communication, 26(4),* 347-367.

Bimber, B. (2003). *Information and American Democracy: Technology in the Evolution of Political Power.* Cambridge University Press.

Binder, A. R. (2010). Routes to attention or shortcuts to apathy? Exploring domain specific communication pathways and their implications for public perceptions of controversial science. *Science Communication, 32(3),* 383-411.

Bizer, G. Y., & Petty, R. E. (2005). How we conceptualize our attitudes matters: The effects of valence framing on the resistance of political attitudes. *Political Psychology*, *26*(4), 553-568.

Blau, P. M. (1964). *Exchange and Power in Social Life Wiley,* New York.

Bohner, G., & Apostolidou, W. (1994). Mood and persuasion: Independent effects of affect before and after message processing. *The Journal of Social Psychology, 134,* 707-709.

Bonabeau, E. (2004). The perils of the imitation age. *Harvard Business Review, 82,* 99–104.

Boyd, D. (2007). Why youth (heart) social network sites: The role of networked publics in teenage social life. *MacArthur foundation series on digital learning–Youth, identity, and digital media volume*, 119-142.

Boyd, d., Golder, S., & Lotan, G. (2010). Tweet, tweet, retweet: Conversational aspects of retweeting on Twitter. *Proceedings of HICSS-42*.

Brook, Barry W., & Ian Lowe. (2010). *Why vs why: Nuclear power.* Seaforth, NSW: Pantera Press.

Brandtzæg, P. B. H., J. (2009). Why people use social networking sites. In A. A. Z. Ozok, P. (Ed.), *Online Communities and Social Computing* (pp. 143–152). Berlin: Springer.

Brossard, D., & Nisbet, M. C. (2007). Deference to scientific authority among a low information public: Understanding U.S. opinion on agricultural biotechnology. *International Journal of Public Opinion Research, 19,* 24-52.

Brosius, H.-B., B., & Weimann, G. (1996). Who Sets the Agenda: Agenda-Setting as a Two-Step Flow. *Communication Research, 23,* 561-580.

Brossard, D., Scheufele, D. A., Kim, E., & Lewenstein, B. V. (2009). Religiosity as a perceptual filter: examining processes of opinion formation about nanotechnology. *Public Understanding of Science, 18(5),* 546–568.

Brossard, D., & Shanahan, J. (2003). Do citizens want to have their say? Media, agricultural biotechnology, and authoritarian views of democratic processes in science. *Mass Communication and Society, 6,* 291-312.

Burt, R. S. (1999). The Social Capital of Opinion Leaders. *Annals, 566,* 37-54.

Cacciatore, M. A. (2013). *Differentiating the applicability of constructs from their accessibility: Returning to a narrow conceptualization of framing effects in communication research.* (Doctoral dissertation, The University of Wisconsin-Madison).

Cacciatore, M. A., Scheufele, D. A., & Corley, E. A. (2011). From enabling technology to applications: The evolution of risk perceptions about nanotechnology. *Public Understanding of Science, 20(3),* 385-404.

Cacciatore*, M. A., Yeo*, S. K., Brossard, D., Scheufele, D. A., Runge, K., Su, Y. F., Kim, J., Xenos, M., & Corley, E. A. (under review). Partisan amplification of risk: American perceptions of nuclear energy risk in the wake of the Fukushima Daiichi disaster. *Energy Policy.*

Cappella, J. N. (2006). Integrating message effects and behavior change theories: Organizing comments and unanswered questions. *Journal of Communication, 56*, S265-S279.

Chaiken, S. (1980). Heuristic versus systematic information processing and the use of source versus message cues in persuasion. *Journal of Personality and Social Psychology, 39*, 752-756.

Chaiken, S., & Eagly, A. (1989). Heuristic and Systematic Information Processing Within and Beyond the Persuasion Context. In J. S. U. J. A. Bargh (Ed.), *Unintended Thought*. New York: The Guilford Press.

Chong, D., & Druckman, J. N. (2007). A theory of framing and opinion formation in competitive elite environments. *Journal of Communication, 57,* 99-118.

Chung, D. (2008). Interactive features of online newspapers: Identifying patterns and predicting use of engaged readers. *Journal of Computer Mediated Communication, 13(3),* 658–679.

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current directions in psychological science*, *12*(4), 105-109.

Codd, M. D. (2005). Framing effects on public opinion about nanotechnology. *Science Communication, 27(2),* 221-239.

Constant, D., Sproull, L., & Kiesler, S. (1996). The kindness of strangers: The usefulness of electronic weak ties for technical advice, *Organization Science 7(2),* 119-135.

Dahlstrom, M. F., Dudo, A., & Brossard, D. (2012). Precision of information, sensational information, and self-efficacy information as message-level variables affecting risk perception. *Risk Analysis, 32(1),* 155-166.

Delli Carpini, M. X. (2000). Gen. com: Youth, civic engagement, and the new information environment. *Political communication*, *17*(4), 341-349.

DiMaggio, P., Hargittai, E., Neuman, W. R., & Robinson, J. P. (2001). Social implications of the Internet. *Annual Review of Sociology, 27,* 307-336.

Donsbach, W., & Mothes, C. (2012). The dissonant self: Contributions from dissonance theory to a new agenda in studying political communication. *Communication Yearbook (Vol. 36)*. Newbury Park, CA: Sage.

Dudo, A., Dunwoody, S., & Scheufele, D.A. (2011). The emergence of nano news: Tracking thematic trends and changes in media coverage of nanotechnology. *Journalism & Mass Communication Quarterly, 88,* 55-75.

Eagly A., & Chaiken, S. (1993). *The Psychology of Attitudes*. Forth Worth, TX: Harcourt Brace Jovanovich College Publishers.

Edwards, A., Elwyn, G., Covey, J., Matthews, E., & Pill, R. (2001). Presenting risk information a review of the effects of framing and other manipulations on patient outcomes. *Journal of health communication*, *6*(1), 61-82.

Ellison, N. B., Steinfield, C., & Lampe, C. (2007). The benefits of facebook ‘‘friends:’’ Social capital and college students’ use of online social network sites. *Journal of Computer-Mediated Communication, 12,* 1143-1168.

Engel, J. F., Blackwell, R. D., & Miniard, P. W. (1990). *Consumer Behavior, (6Eds)*. Chicago: Dryden.

Eveland, W. P., Shah, D. V., & Kwak, N. (2003). Assessing Causality in the Cognitive Mediation Model A Panel Study of Motivations, Information Processing, and Learning During Campaign 2000. *Communication Research*, *30*(4), 359-386.

Facebook. (2014). Press room: Statistics. Retrieved from http://www.facebook.com/press/info.php?statistics

Facebook. (2011). Most Shared Articles on Facebook in 2011. Available at: https://www.facebook.com/notes/facebook-media/most-shared-articles-on-facebook-in-2011/283221585046671, Accessed on January 27, 2014.

Ferree, M. M., Gamsom, W. A., Gerhards, J., & Rucht, J. (2002). *Shaping abortion discourse: Democracy and the public sphere in Germany and the United States.* Cambridge University Press, New York, USA.

Festinger (1954). A theory of social comparison processes. *Human Relations, 7,* 117–140

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention and behavior: An introduction to theory and research.* Boston: Addison-Wesley.

Fishbein, M., & Cappella, J. N. (2006). The role of theory in developing effective health communicates. *Journal of Communication, 56*, S1-S17.

Fisher, H. W. (2008). *Response to Disaster: Fact Versus Fiction and its Perpetuation.* University Press of America.

Fiske, S. T. (1980). Attention and weight in person perception: The impact of negative and extreme behavior. *Journal of Personality and Social Psychology*, *38*(6), 889.

Fiske, S. T., & Taylor, S. E. (1991). *Social Cognition,* 2nd edn. New York: McGraw-Hill.

Flynn, L. R., Goldsmith, R. E., & Eastman, J. K. (1996). Opinion leaders and opinion seekers: Two new measurement scales. *Journal of the Academy of Marketing Science, 24(2),* 137-147.

Frewer, L. J., Howard, C., Hedderley, D., & Shepherd, R. (1997). The Elaboration Likelihood Model and Communication About Food Risks, *Risk Analysis, 17,* 759-770.

Friedman, S. M. (2011). Three Mile Island, Chernobyl, and Fukushima: An analysis of traditional and new media coverage of nuclear accidents and radiation. *Bulletin of the atomic scientists*, *67*(5), 55-65.

Friedman, S. M., & Egolf, B. P. (2005). Nanotechnology risks and the media. *IEEE Technology and Society Magazine, 24,* 5-11.

Friedman, S, M., Gorney, J, & Egolf, B. P (1987). Reporting on radiation: A content analysis of Chernobyl coverage. *Journal of Communication,15(4),* 449–458.

Fu, W. W., & Sim, C. C. (2011). Aggregate bandwagon effect on online videos' viewership: Value uncertainty, popularity cues, and heuristics. *Journal of the American Society for Information Science and Technology*, *62*(12), 2382-2395.

Gane, N., & Beer, D. (2008). *New media: Key concepts.* New York: Berg.

Gerlitz, C., & Helmond, A. (2013). The Like economy: Social buttons and the data-intensive web. *New Media & Society*. doi: 10.1177/1461444812472322

Gerlitz, C., & Helmond, A. (2011, January). Hit, Link, Like and Share. Organizing the social and the fabric of the web in a Like economy. In Paper presented at the DMI mini-conference (Vol. 24, p. 25).

Gibbert, M., & Krause, H. (2002). Practice exchange in a best practice marketplace. In Davenport, T. H., and Probst, G. J. B. (Eds.). *Knowledge Management Case Book: Siemens Best Practices.* pp. 89-105. Publicis Corporate Publishing, Erlangen, Germany.

Goode, L. (2009). Social news, citizen journalism and democracy. *New Media & Society, 11(8),* 1287–1305.

Graf, J., & Aday, S. (2008). Selective attention to online political information. *Journal of Broadcasting & Electronic Media*, *52*(1), 86-100.

Grewal, R., Mehta, R., & Karders, F. R. (2000). The role of the social-identity function of attitudes in consumer innovativeness and opinion leadership. *Journal of Economic Psychology, 21,* 233-252.

Gunther, A. C., Christenm C. T., Liebhart, J., & Chia, S. (2001). Congenial public, contrary press and biased estimates of the climate of opinion, *Public Opinion Quarterly, 65.* 295-320.

Gunther, A. C., & Storey, J. D. (2006). The influence of presumed influence. *Journal of Communication*, *53*(2), 199-215.

Gunther, A. C., & Schmitt, K. (2004). Mapping Boundaries of the Hostile Media Effect. *Journal of Communication. 54(1).* 55-70.

Ha, S., & Ahn, J. (2011). Why are you sharing others' Tweets?: The impact of argument quality and source credibility on information sharing behavior. *ICIS 2011 Proceedings. Paper 4.* Retrieved from *http://aisel.aisnet.org/icis2011/proceedings/humanbehavior/4, 2011.*

Hardy, B. W., & Scheufele, D. A. (2005). Examining differential gains from Internet use: Comparing the moderating role of talk and online interactions. *Journal of Communication Monographs, 55(1),* 71-84.

Hart, W., Albarracin, D., Eagly, A. H., Brechan, I., Lindberg, M. J., & Merrill, L. (2009). Feeling validated versus being correct: A meta-analysis of selective exposure to information. *Psychological Bulletin, 135(4),* 555-588.

Haugen, A. (2010). Answers To Your Questions On Personalized Web Tools, Available at the Facebook Blog: http://blog.facebook.com/blog.php?post=384733792130, Accessed on February 5, 2014.

Hendriks, P. (1999). Why share knowledge? The influence of ICT on the motivation for knowledge sharing. *Knowledge and Process Management, 6(2),* 91-100.

Hew, K. F., & Hara, N. (2007). Knowledge sharing in online environments: A qualitative case study. *Journal of the American Society for Information Science and Technology*, *58*(14), 2310-2324.

Hindman, M. (2009). *The Myth of Digital Democracy.* Princeton University Press.

Ho, S. S., Brossard, D., & Scheufele, D. A. (2008). Effects of value predispositions, mass media use, and knowledge on public attitudes toward embryonic stem cell research. *International Journal of Public Opinion Research, 20(2),* 171-192.

Ho, S. S., Scheufele, D. A., & Corley, E. A. (2011). Value predispositions, mass media, and attitudes toward nanotechnology: The interplay of public and experts. *Science Communication, 33(2),* 167-200.

Hopkins, H. (2010, February 3). Facebook largest news reader? Retrieved from http://weblogs.hitwise.com/usheatherhopkins/2010/02/facebook_largest_news_reader_1.html

Howard, Y., & Corkindale, D. (2008). Towards an understanding of the behavioral intention to use online news services. *Internet Research, 18(3),* 286–312.

Hsu, C.-L., & Lin, J. C-C. (2008). Acceptance of blog usage: The roles of technology acceptance, social influence and knowledge sharing motivation. *Information & Management, 45,* 65-74.

Hsu, M.-H., Ju, T. L., Yen, C-H., & Chang, C-M. (2007). Knowledge sharing behavior in virtual communities: The relationship between trust, self-efficacy, and outcome expectations. *International Journal of Human Computer Studies, 65,* 153-169.

Hughes, A. L., Palen, L., Sutton, J., Liu, S. B., & Vieweg, S. (2008, May). "*Sight-seeing" in disaster: An examination of online social convergence.* Proceedings of the Information Systems for Crisis Response and Management Conference (ISCRAM 2008), Washington DC.

Hull, S. J. (2012). Perceived risk as a moderator of the effectiveness of framed HIV-test promotion messages among women: A randomized controlled trial. *Health Psychology, 31(1),* 114-121. doi: 10.1037/a0024702

Hwang, Y. (2010). Selective exposure and selective perception of anti-tobacco campaign messages: The impacts of campaign exposure on selective perception. *Health Communication Research, 25,* 182-190.

Hwang, Y., & Kim, D. J. (2007). Understanding affective commitment, collectivist culture, and social influence in relation to knowledge sharing in technology mediated learning. *IEEE Transactions on Professional Communication, 50(3),* 232-248.

Iyengar, S., & Hahn, K. S. (2009). Red media, blue media: Evidence of ideological selectivity in media use. *Journal of Communication*, *59*(1), 19-39.

Iyengar, R., Van den Bulte, C., Eichert, J., West, B., & Valente, T. W. (2011). How social networks and opinion leaders affect the adoption of new products. *New Theories, 3(1),* 16-25.

Jensen, E. (2012). Mediating subpolitics in US and UK science news. *Public Understanding of Science, 21(1),* 68-83.

Ji, Y. G., Hwangbo, H., Yi, J. S., & Rau, P. L. P. (2010). The influence of cultural differences on the use of social network services and the formation of social capital. *International Journal of Human Computer Interaction, 26(11-12),* 1100-1121.

Jin, X., Wang, C., Luo, J., Yu, X., & Han, J. (2011, August). Likeminer: A system for mining the power of 'like' in social media networks. In *Proceedings of the 17th ACM SIGKDD international conference on Knowledge discovery and data mining, KDD* (Vol. 11, pp. 753-756).

Johnson, T. J., Bichard, S. L., & Zhang, W. (2009). Communication communities or "CyberGhettos?": A path analysis model examining factors that explain selective exposure to blogs. *Journal of Computer-Mediated Communication, 15,* 60–82.

Kahlor, L., Dunwoody, S., Griffin, R. J., Neuwirth, K., & Giese, J. (2003) Studying heuristic-systematic processing of risk communication, *Risk Analysis, 23,* 355-368.

Kahneman, D. (1973). *Attention and Effort, Englewood Cliffs,* NJ: Prentice-Hall.

Kasperson, R. E. (2012). The social amplification of risk and low-level radiation. *Bulletin of the Atomic Scientists, 68(3),* 59-66.

Katz, E., & Lazarsfeld, P. F. (1955). *Personal Influence.* Glencoe, IL: Free Press.

Keller, E. D., & Berry, J. (2003), *The Influentials: One American in Ten Tells the Other Nine How to Vote, Where to Eat, and What to Buy,* New York: Free Press.

Kim, H. S., & Shyam Sundar, S. (2014). Can online buddies and bandwagon cues enhance user participation in online health communities?. *Computers in Human Behavior*, *37*, 319-333.

Kim, J. (2012). *Selective attention, primed-encoding and the role of language in mediated scientific messages processing.* Paper presented at the Midwest Association for Public Opinion Research in Chicago.

Kim, J. (2011). *How Information Processing can Influence Public Attitudes toward an Emerging Technology.* Presented at the Annual Meeting of the Midwest Association for Public Opinion Research, Chicago, IL.

Kim, J., Yeo, S. K., Brossard, D., Scheufele, D. A., & Xenos, M. A. (2014). Disentangling the Influence of Value Predispositions and Risk/Benefit Perceptions on Support for Nanotechnology Among the American Public. *Risk Analysis*, *34*(5), 965-980.

Knobloch-Westerwick, S., Sharma, N., Hansen, D. L., & Alter, S. (2005). Impact of popularity indications on readers' selective exposure to online news. *Journal of Broadcasting and Electronic Media, 49(3),* 296–313.

Kuo, F.-Y., Young, M-L. (2008). A study of the intention-action gap in knowledge sharing practices. *Journal of the American Society for Information Science and Tehcnology, 59(8),* 1224-1237.

Kushin, M. J., Yamamoto, M. (2010). Did social media really matter? College students' use of online media and political decision making in the 2008 election. *Mass Communication and Society, 13,* 608-630.

Kwon, K. (2011). *A network approach to Web 2.0 social influence: The influentials, word-of-mouth (WOM) effect, and the emergence of social network on Facebook*. State University of New York at Buffalo.

Ladwig, P., Anderson, A. A., Brossard, D., Scheufele, D. A., & Shaw, B. (2010). Narrowing the nano discourse? *Materials Today, 13(5),* 52-54.

Ladwig, P, Choi, D. H., Anderson, A. A., Cacciatore, M., Liang, X., Brossard, D, et al. (2011). *Coverage of Emerging Technologies: A Comparison Between Print and Online Media.* Paper presented at the International Communication Association.

Lampe, C., Ellison, N., & Steinfield, C. (2006, November). A Face (book) in the crowd: Social searching vs. social browsing. In *Proceedings of the 2006 20th anniversary conference on Computer supported cooperative work* (pp. 167-170). ACM.

LaRose, R., & Eastin, M. S. (2004). A social cognitive theory of Internet uses and gratifications: Toward a new model of media attendance. *Journal of Broadcasting & Electronic Media, 48(3),* 358–377.

Lazarsfeld, P. F., Berelson, B. R., & Gaudet, H. (1948). *The People's Choice: How The Voter Makes Up His Mind in a Presidential Campaign.* New York: Duell, Sloan & Pierce.

Lazic, D. (2013). News analysis of the Fukushima accident: lack of information disclosure, radiation fears and accountability issues. *Journal of Contemporary Eastern Asia*, *12*(2), 19-34.

Lee, C-J., Scheufele, D. A. (2006). The influence of knowledge and deference toward scientific authority: A media effects model for public attitudes toward nanotechnology. *Journalism & Mass Communication Quarterly, 83(4),* 819-834.

Lee, C. S., & Ma, L. (2012). News sharing in social media: The effect of gratifications and prior experience. *Computers in Human Behavior*, *28*(2), 331-339.

Lee, J. Y., & Sundar, S. S. (2013). To Tweet or to reTweet? That is the question for health professionals on Twitter. *Health communication*, *28*(5), 509–524.

Lemyre, L., Lee, J. E. C., Mercier, P., Bouchard, L., & Krewski, D. (2006). The structure of Canadians' health risk perceptions: Environmental, therapeutic and social ealth risks. *Health, Risk & Society, 8 (2),* 185-195.

Lichter, S.R., & Rothman, S. (1999). *Environmental Cancer: A Political Disease?*. New Haven, CT: Yale University Press.

Liere, D. V. (2010). *How far does a tweet travel?: Information brokers in the twitterverse.* Paper presented at the Proceedings of the International Workshop on Modeling Social Media, Toronto, Ontario, Canada.

Liska, A. E. (1984). A critical examination of the causal structure of the Fishbein/Ajzen attitude-behavior model. *Social Psychology Quarterly, 47(1),* 61-74.

Lotan, G., Graeff, E., Ananny, M., Gaffeney, D., Pearce, I., & Boyd, D. (2011). The revolutions were tweeted: Information flows during the 2011 Tunisian and Egyptian revolutions. *International Journal of Communication, 5,* 1375-1405.

Ma, L., Sian Lee, C., & Hoe-Lian Goh, D. (2014). Understanding news sharing in social media: An explanation from the diffusion of innovations theory. *Online Information Review*, *38*(5), 598-615.

Marwick, A., & boyd, d. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media and Society, 13,* 96–113.

Maxwell, E. M. (2012). *Motivations to tweet: A uses and gratifications perspective of Twitter use during a natural disaster* (Doctoral dissertation, The University of Alabama TUSCALOOSA).

McCombs, M. E., & Shaw, D. L. (1972). The agenda-setting function of mass media. *Public opinion quarterly*, *36*(2), 176-187.

McGuire, WJ. (1968a). Personality and attitude change" An information-processing theory. In Greenwald, AG., Brock, TC., & Ostrom, TM. (Eds.), *Psychological foundations of attitudes (pp.171-196).* San Diego, CA: Academic Press.

McGuire, WJ. (1968b). Personality and susceptibility to social influence. In Borgatta, EF., & Lambert, WW. (Eds.), *Handbook of personality theory and research.* (pp.1130-1187). Chicago: Rand McNally.

McGuire, WJ. (1972). Attitude change: The information-processing paradigm. In McClintock, CG. (Ed.), *Experimental social psychology* (pp. 108-141). New York: Holt, Rinehart & Winston.

Meffert, M. F., Chung, S., Joiner, A. J., Waks, L., & Garst, J. (2006). The effects of negativity and motivated information processing during a political campaign. *Journal of Communication, 56(1),* 27-51.

Mitra, K., Reiss, M. C., & Capella, L. M. (1999). An examination of perceived risk, information search and behavioral intentions in search, experience and credence services. *Journal of Services Marketing*, *13*(3), 208-228.

Mythen, G. (2010). Reframing risk? Citizen journalism and the transformation of news. *Journal of Risk Research, 13(1),* 45-58.

Namkoong, K., & Kim, J. (2008). *User created contents (UCC) in political campaign: Third person perception about the effect of political UCC and official campaign advertisements.* Paper presented in Midwest Association for Public Opinion Research (MAPOR) Conference in Chicago, IL.

Nelkin, D. (1995). *Selling Science: How the Press Covers Science and Technology.* W.H. Freeman, New York.

Nisbet, E. C. (2005). The engagement model of opinion leadership: Testing validity within a European context. *International Journal of Public Opinion Research, 18*(1), 1-27.

Nisbet, M. C. (2009). Framing science: A new paradigm in public engagement. *Understanding science: New agendas in science communication*, 40-67.

Nisbet, M. C., Brossard, D., & Kroepsch, A. (2003). Framing science: The stem cell controversy in an age of press/politics. *Harvard International Journal of Press/Politics, 8(2),* 36-70.

Nisbet, M. C., & Goidel, R. K. (2007). Understanding citizen perceptions of science controversy: Bridging the ethnographic-survey research divide. *Public Understanding of Science, 16,* 421-440.

Nisbet, M. C., & Huge, M. (2006). Attention cycles and frames in the plant biotechnology debate - Managing power and participation through the press/policy connection. *Harvard International Journal of Press-Politics, 11(2),* 3-40.

Nisbet, M. C., & Kotcher, J. E. (2009). A two-step flow of influence?: Opinion-leader campaigns on climate change. *Science Communication, 30(3),* 328-354.

Nisbet, M. C., & Lewenstein, B. V. (2002). Biotechnology and the American media: The policy process and the elite press, 1970 to 1999. *Science Communication, 23(4),* 359-384.

Nisbet, M. C., & Scheufele, D. A. (2009). What's next for science communication? Promising directions and lingering distractions. *American Journal of Botany, 96(10),* 1767-1778.

Nisbet, M. C., Scheufele, D. A., Shanahan, J., Moy, P., Brossard, D., & Lewenstein, B.V. (2002). Knowledge, reservations, or promise?: A media effects model for public perceptions of science and technology. *Communication Research, 29(5),* 584-608.

Noelle-Neumann, E. (1974). The spiral of silence a theory of public opinion. *Journal of communication*, *24*(2), 43-51.

Noelle-Neumann, E. (1993). *The spiral of silence: Public opinion, our social skin* (2nd ed., p. 200). Chicago: University of Chicago Press.

Norris, P. (2001). *Digital Divide? Civic Engagement, Information Poverty and the Internet in Democratic Societies.* New York: Cambridge Univ. Press.

Oeldorf-Hirsch, A. (2011). *Engagement with news content in online social networks* (Doctoral dissertation, The Pennsylvania State University).

Palen, L., Starbird, K., Vieweg, S., & Hughes, A. (2010). Twitter-based information distribution during the 2009 red river valley flood threat. *Bulletin of the American Society for Information Science and Technology, 36(5),* 13-17.

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.

Parkhill, K. A., Pidgeon, N. F., Henwood, K. L., Simmons, P., & Venables, D. (2010). From the familiar to the extraordinary: local residents‘ perceptions of risk when living with nuclear power in the UK. *Transactions of the Institute of British Geographers, 35(1),* 39-58.

Petty, R. E., Briñol, P., & Priester, J. R. (2009) Mass media attitude change: Implications of the elaboration likelihood model of persuasion, In Bryant, J., & Oliver, M. B. (Eds.), *Media Effects: Advances in Theory and Research* (Chapter 7). New Yor: NY. Routledge.

Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. *Advances in experimental social psychology*, *19*, 123-205.

Poortinga, W., & Pidgeon, N. F. (2003). Exploring the dimensionality of trust in risk regulation. *Risk Analysis, 23(5),* 961-972.

Popkin, S. (1991). *The Reasoning Voter: Communication and Persuasion in Presidential Campaigns.* Chicago: University of Chicago Press.

Pralle, S., & Boscarino, J. (2011). Framing trade-offs: The politics of nuclear power and wind energy in the age of global climate change. *Review of Policy Research, 28(4),* 323-346.

Project on Emerging Nanotechnologies (2011). An inventry of nanotechnology-based consumer products currently on the market. Available at: http://www.nanotechproject.org/inventories/consumer/, Accessed on March 28, 2011.

Purcell, K., Rainie, L., Mitchell, A., Rosenstiel, T., & Olmstead, K. (2010). Understanding the participatory news consumer. *Pew Internet & American Life Project.* Retrieved from http://www.pewinternet.org/Reports/2010/Online-News.aspx.

Rao, L. (2010, October 31). Twitter added 30 million users in the past two months. Tech Crunch. Retrieved from http://techcrunch.com/2010/10/31/twitter-users

Reychav, I., & Weisberg, J. (2010). Bridging intention and behavior of knowledge sharing. *Journal of Knowledge Management, 14(2),* 285-300.

Roger, E. M., & Cartano, D. G. (1962). Methods of measuring opinion leadership. *Public Opinion Quarterly, 26,* 435-441.

Romero, D. M., Meeder, B., & Kleinberg, J. (2011, March). Differences in the mechanics of information diffusion across topics: idioms, political hashtags, and complex contagion on twitter. In *Proceedings of the 20th international conference on World wide web* (pp. 695-704). ACM.

Rosen, D., Barnett, G. A., & Kim, J. H. (2011). Social networks and online environments: When science and practice co-evolve. *Social Network Analysis and Mining, 1(1),* 27–42.

Rosenblatt, A. (2007). In C. Darr & J. Graff (Eds.), *Poli-influentials: The new political kingmakers.* Report by the Graduate School of Political Management, George Washington University, Washington, DC.

Roosendaal, A. (2011). Facebook tracks and traces everyone: Like this!. *Tilburg Law School Legal Studies Research Paper Series*, (03).

Rossow, M. D, & Dunwoody, S. (1991). Inclusion of useful detail in newspaper coverage of a high-level nuclear waste siting controversy. *Journalism Quarterly, 68(1–2),* 87–100.

Runge, K. K., Yeo, S. K., Cacciatore, M., Scheufele, D. A., Brossard, D., Xenos, M.,Anderson, A. A., Choi, D.-H., Kim, J., Li, N., Liang, X., Stubbings, M., Su, L. Y.-F. (2013). Tweeting nano: How public discourse about nanotechnology develop in social media environments. *Journal of Nanoparticle Research, 15*, 1381.

Ryu, S., Ho, S. H., & Han, I. (2003), Knowledge-sharing behavior of physicians in hospitals, *Expert Systems with Applications, 25,* 113-22.

Schäfer, M. S. (2009). From public understanding to public engagement: An empirical assessment of changes in science coverage. *Science Communication, 30(4),* 475-505.

Scheufele, D. A. (2007). Opinion climates, spirals of silence and biotechnology: public opinion as a heuristic for scientific decision-making. *The Media, the Public and Agricultural Biotechnology. Edited by D. Brossard, J. Shanahan and TC Nesbitt. CAB International, United Kingdom*, 231-244.

Scheufele, D. A. (1999). Framing as a theory of media effects. *Journal of Communication*, *49*(1), 103-122.

Scheufele, D. A., & Lewenstein, B. V. (2005). The public and nanotechnology: How citizens make sense of emerging technologies. *Journal of Nanoparticle Research, 7,* 659-667.

Scheufele, D. A., & Nisbet, M. C. (2012). Online news and the demise of political debate. In C. T. Salmon (Ed.), *Communication Yearbook (Vol. 36, pp. 45-53).* Newbury Park, CA: Sage.

Scheufele, D. A., & Nisbet, M. C. (2002). Being a Citizen Online New Opportunities and Dead Ends. *The Harvard International Journal of Press/Politics*, *7*(3), 55-75.

Scheufele, D. A., Shanahan, J., & Lee, E. (2001). Real Talk Manipulating the Dependent Variable in Spiral of Silence Research. *Communication research*, *28*(3), 304-324.

Shah, D. V., Cho, J., Eveland, W. P., & Kwak, N. (2005). Information and expression in a digital age modeling Internet effects on civic participation. *Communication Research*, *32*(5), 531-565.

Shah, D. V., & Scheufele, D. A. (2006). Explicating opinion leadership: Nonpolitical dispositions, information consumption, and civic participation. *Political Communication 23,* 1-22.

Shanahan, J., Scheufele, D., & Lee, E. (2001). Attitudes about agricultural biotechnology and genetically modified organisms. *The Public Opinion Quarterly, 65(2),* 267-281.

Signorielli, N. (1993). *Mass Media Images and the Impact on Health: A Sourcebook.* Westport, CT: Greenwood Press.

Smith, A., & Rainie, L. (2008). *The Internet and the 2008 election.* Washington, DC: Pew Internet & American Life Project.

Smith, J. T. (2007). Are passive smoking, air pollution and obesity a greater mortality risk than major radiation incidents? *BMC public health, 7 (1),* 49.

So, J. C. F., & Bolloju, N. (2005). Explaining the intentions to share and reuse knowledge in the context of IT service operations. *Journal of Knowledge Management, 9(6),* 30-41.

Spartz, J. T., Su, L. Y., Brossard, D., Dunwoody, S., & Griffin, R. J. (2012, November). *Influence of Social Norms on Perceived Salience of Climate Change in a New Media Environment.* Paper presented at the Annual Conference of the Midwest Association for Public Opinion Research, Chicago, IL.

Stelter, B. (2008, March 27). Finding political news online, the young pass it on. *The New York Times.* Retrieved from http://www.nytimes.com/2008/03/27/us/politics/27voters.html. Accessed on September 4, 2014.

Stroud, N. J. (2007). Media effects, selective exposure, and farenheit 9/11. *Political Communication Research, 24(4),* 415-432.

Sundar, S. S. (2008). The MAIN model: A heuristic approach to understanding technology effects on credibility. In M. J. Metzger & A. J. Flanagin (Eds.), *Digital media, youth, and credibility (pp. 72–100).* Cambridge, MA: The MIT Press.

Sundar, S. S., Oeldorf-Hirsch, A., & Xu, Q. (2008). *The bandwagon effect of collaborative filtering technology.* Proceedings of the annual Conference on Human Factors in Computing Systems (ACM SIGCHI), Florence, Italy: ACM.

Sundar, S. S., Xu, Q., & Oeldorf-Hirsch, A. (2009). *Authority vs. Peer: How Interface Cues Influence Users.* Proceedings of the annual Conference on Human Factors in Computing Systems (ACM SIGCHI), Boston, MA: ACM.

Sutton, J. N. (2010). *Twittering Tennessee: distributed networks and collaboration following a technological disaster*. ISCRAM.

Sutton, J., Palen, L., & Shklovski, I. (2008, May). Backchannels on the front lines: Emergent uses of social media in the 2007 southern California wildfires. In *Proceedings of the 5th International ISCRAM Conference* (pp. 624-632). Washington, DC.

Szabo, G., & Huberman, B. A. (2010). Predicting the popularity of online content. *Communications of the ACM, 53(8),* 80–88.

The Pew Research Center For The People and The Press (2012). *Those Aware of Fracking Favor its Use: As Gas Prices Pinch, Support for Oil and Gas Production Grows.* Available at: http://www.people-press.org/files/legacy-pdf/3-19-12%20Energy%20release.pdf, Accessed on January 30, 2014.

Thelwall, M. (2009). Social network sites: Users and uses. In M. Zelkowitz (Ed.), *Advances in computers* (pp. 19–73). Amsterdam: Elsevier.

Thelwall, M. (2007). Blog searching: The first general-purpose source of retrospective public opinion in the social sciences? *Online Information Review, 31(3),* 277–289.

Tonkin, E., Pfeiffer, H. D., & Tourte, G. (2012). Twitter, Information sharing and the London riots? *Bulletin of the American Society for Information Science and Technology, 38(2),* 49-57.

Turner, M. ., Rimal, R. N., Morrison, D., & Kim, H. (2006). The role of anxiety in seeking and retaining risk information: Testing the risk perception attitude framework in two studies. *Human Communication Research, 32,* 130-156.

Velve, D., & Zlateva, P. (2012). Use of social media in natural disaster management. *Intl. Proc. of Economic Development and Research*, *39*, 4145.

Wasko, M. M., & Faraj, S. (2005). Why should I share? Examining social capital and knowledge contribution in electronic networks of practice. *MIS quarterly*, 35-57.

Wasko, M., & Faraj, S. (2000). "It is what one does": Why people participate and help others in electronic communities of practice. *Journal of Information System, 9,* 155-173.

Watts, D. J., Dodds, P. S. (2007). Influentials, networks, and public opinion formation. *Journal of Consumer Research, 34(4),* 441-458.

Weaver, D. A., Lively, E., & Bimber, B. (2009). Searching for a frame. News media tell the story of technological progress, risk, and regulation, *Science Communication, 31(2),* 139–166.

Wellman, B. (2001). Physical place and cyber place: Changing portals and the rise of networked individualism. *International Journal of Urban and Regional Research, 25(2),* 227-252.

Whitfield, S. C., Rosa, E. A., Dan, A., & Dietz, T. (2009). The future of nuclear power: Value orientations and risk perception. *Risk Analysis, 29(3),* 425-437.

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communications Monographs*, *59*(4), 329-349.

Xenos, M., & Moy, P. (2007). Direct and differential effects of the Internet on political and civic engagement. *Journal of Communication*, *57(4),* 704-718.

Yeo, S. K., Cacciatore, M. A., Brossard, D., Scheufele, D. A., Runge, K., Su, L. Y., ... & Corley, E. A. (2014). Partisan amplification of risk: American perceptions of nuclear energy risk in the wake of the Fukushima Daiichi disaster. *Energy Policy*, *67*, 727-736.

Yoo, Y., & Torrey, B. (2002) National culture and knowledge management in a global learning organization. In C. W. Choo and N. Bontis (Eds.), *Strategic Management of Intellectual Capital and Organizational Knowledge,* Oxford University Press, Oxford, England, pp.421-434.

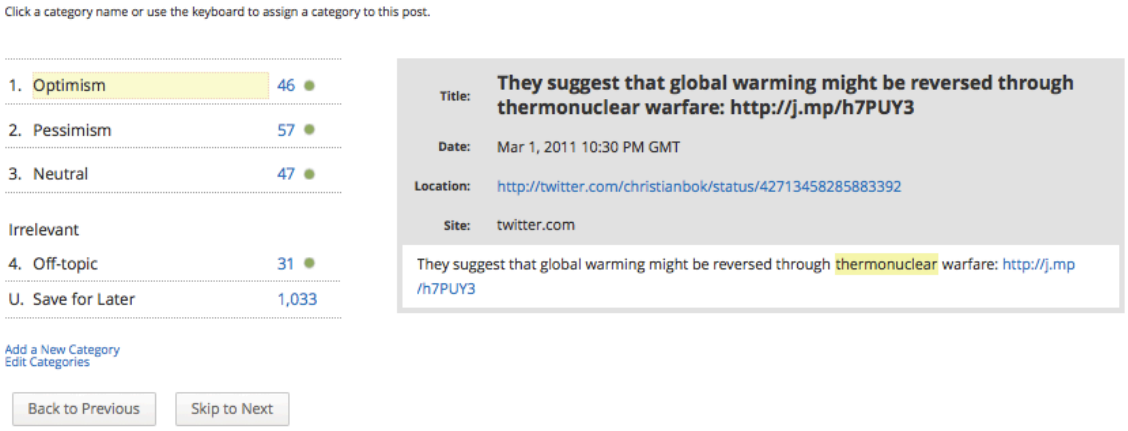
Zillmann, D., & Bryant, J. (Eds.). (2013). *Selective Exposure to Communication*. Routledge.

Appendices

Appendix A: Content analysis search string for study A

Monitor on nuclear energy including external link to an external site	(nuclear OR "atomic energy" OR plutonium OR thermonuclear OR "fissile atom" OR "fissile atoms" OR "atomic power" OR nucleonics OR "cold fusion" OR plutonium OR radioactive OR "containment vessels" OR "containment vessel" OR "control rods" OR "control rod" OR "fuel rod" OR "fuel rods" OR fission OR fissions OR atomic OR atomics OR atomistics OR "enriched uranium" OR "depleted uranium" OR "uranium 235" OR "u 235" OR radioactive OR radiation OR fukushima OR "three mile island" OR chernobyl OR "heavy water" OR nuke OR "fast breeder reactor" OR "fast breeder reactors" OR iaea OR "fusion power" OR "yucca mountain") AND -"nuclear family" AND -microwave AND http
Monitor on nuclear energy with no external link	(nuclear OR "atomic energy" OR plutonium OR thermonuclear OR "fissile atom" OR "fissile atoms" OR "atomic power" OR nucleonics OR "cold fusion" OR plutonium OR radioactive OR "containment vessels" OR "containment vessel" OR "control rods" OR "control rod" OR "fuel rod" OR "fuel rods" OR fission OR fissions OR atomic OR atomics OR atomistics OR "enriched uranium" OR "depleted uranium" OR "uranium 235" OR "u 235" OR radioactive OR radiation OR fukushima OR "three mile island" OR chernobyl OR "heavy water" OR nuke OR "fast breeder reactor" OR "fast breeder reactors" OR iaea OR "fusion power" OR "yucca mountain") AND -"nuclear family" AND -microwave AND -http

Appendix B: A screenshot of the software in the process of classification for study A



Appendix C: Screenshots of the news article on Facebook for study B

In high risk, high social plug-ins setting,

In high risk, low social plug-ins,

In low risk, high social plug-ins,

In low risk, low social plug-ins,

Appendix D: Screenshots of the news excerpt for study B

In high risk, high social plug-ins setting,

thenewMontreal

News:

Science Space Technology Environment Health Life Opinion

Red Alert: Higher Cancer Risks from the Fukushima Accident

By Owen Moeurs @owenmoeurs | March 01, 2013 | 394 Comments

Share 1,842 Like 2,763 Tweet 337

A new report assessing the health risks associated with the 2011 Fukushima Daiichi nuclear power plant accident in Japan is out, and the results are troubling.

International experts of the World Health Organization (WHO) assessed the potential health risks from the nuclear accident and concluded that excess doses of radiation emitted by the accident will have a substantial influence on the lifetime risk of cancer for individuals living in or near Japan.

"For the most part, our report indicates there is a striking increase in the chance of contracting cancer from radiation caused by the Fukushima Daiichi accident," said Dr. Jamie Miller, director of WHO public health.

[MORE: Health Risk Assessment from the nuclear accident after the 2011 Great East Japan Earthquake and Tsunami based on preliminary dose estimation]

Appendix D (Cont.): Screenshots of the news excerpt for study B

In high risk, low social plug-ins setting,

thenewMontreal

News:

Science Space Technology Environment Health Life Opinion

Red Alert: Higher Cancer Risks from the Fukushima Accident

By Owen Moeurs @owenmoeurs | March 01, 2013 | 3 Comments

Share 1 Like 2 Tweet 0

A new report assessing the health risks associated with the 2011 Fukushima Daiichi nuclear power plant accident in Japan is out, and the results are troubling.

International experts of the World Health Organization (WHO) assessed the potential health risks from the nuclear accident and concluded that excess doses of radiation emitted by the accident will have a substantial influence on the lifetime risk of cancer for individuals living in or near Japan.

"For the most part, our report indicates there is a striking increase in the chance of contracting cancer from radiation caused by the Fukushima Daiichi accident," said Dr. Jamie Miller, director of WHO public health.

[MORE: Health Risk Assessment from the nuclear accident after the 2011 Great East Japan Earthquake and Tsunami based on preliminary dose estimation]

Appendix D (Cont.): Screenshots of the news excerpt for study B

In low risk, high social plug-ins setting,

thenewMontreal

News:

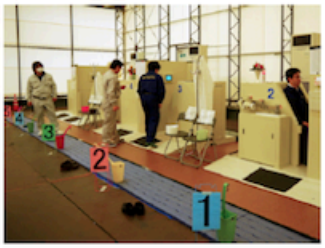
Science Space Technology Environment Health Life Opinion

Fret not: Minimal Cancer Risks from the Fukushima Accident

By Owen Moeurs @owenmoeurs | March 01, 2013 | 394 Comments

Share 1,842 Like 2,763 Tweet 337

A new report assessing the health risks associated with the 2011 Fukushima Daiichi nuclear power plant accident in Japan is out, and the results are reassuring.



International experts of the World Health Organization (WHO) assessed the potential health risks from the nuclear accident and concluded that excess doses of radiation emitted by the accident will have only minimal influence on the lifetime risk of cancer for individuals living in or near Japan.

"For the most part, our report indicates there is almost no chance of contracting cancer from radiation caused by the Fukushima Daiichi accident," said Dr. Jamie Miller, director of WHO public health.

[MORE: Health Risk Assessment from the nuclear accident after the 2011 Great East Japan Earthquake and Tsunami based on preliminary dose estimation]

Appendix D (Cont.): Screenshots of the news excerpt for study B

In low risk, low social plug-ins setting,

thenewMontreal

News:

Science Space Technology Environment Health Life Opinion

Fret not: Minimal Cancer Risks from the Fukushima Accident

By Owen Moeurs @owenmoeurs | March 01, 2013 | 3 Comments

Share 1 Like 2 Tweet 0

A new report assessing the health risks associated with the 2011 Fukushima Daiichi nuclear power plant accident in Japan is out, and the results are reassuring.

International experts of the World Health Organization (WHO) assessed the potential health risks from the nuclear accident and concluded that excess doses of radiation emitted by the accident will have only minimal influence on the lifetime risk of cancer for individuals living in or near Japan.

"For the most part, our report indicates there is almost no chance of contracting cancer from radiation caused by the Fukushima Daiichi accident," said Dr. Jamie Miller, director of WHO public health.

[MORE: Health Risk Assessment from the nuclear accident after the 2011 Great East Japan Earthquake and Tsunami based on preliminary dose estimation]