

A Click Away: News Choice on the Internet

by

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Dedication

To my father

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Abstract

This dissertation examines the technological shifts that influence the dynamics of information consumption and their implications for democratic citizenship. I focus on two factors that drive selective news exposure: attitude consistency and personal issue importance. First, by drawing from the research on selective exposure, I investigate how people seek out and avoid news messages based on their predispositions. To increase the generalizability of research findings, both political and science news stories are considered. In addition, I explore how multitasking activities influence selective exposure. Behavior tracking software is used to observe media selection behavior. Second, using two national data from the Kaiser Family Foundation's health tracking survey and 2008 American National Election Data, I examine how people who rely on the Internet as a primary source of information tend to engage in selective learning and become issue specialists. I contextualized the results within the understanding of media and audience evolution. I also discuss the political implications of the findings and suggest future directions for research.

Chapter 1

Introduction

The question of what happens after media exposure, so-called media effects research, has dominated the field of mass communication over the past 80 years. Most effects studies have assumed that the media exposure is the initial stage of media processes, treating it as an independent variable in the analysis (Hovland, 1959; McGuire, 1981). On the other hand, what drives media exposure and how media users select information is less understood. Of course, there has been a user-based approach that attempts to highlight pre-media exposure and to understand how and why people use media (Katz & Blumler, 1974). However, as many critics claim, uses and gratifications approach, despite its broad influence on audience research, has largely served as a grand theory that emphasizes the motivational perspectives rather than a full-fledged theory that provides scientific predictability (McDonald, 1990; McQuail, 2010). In addition, the uses and gratifications framework has suffered from its varying typologies and descriptive nature (Lee, 2013).

Rather, media selection processes have been often considered as a concept that represents minimal media effects (Klapper, 1960; Stroud, 2011). For instance, the notion of selective exposure functions as a key mechanism that explains the minimal media effects on people's attitudes. As early voting research has originally illustrated, partisan voters tend to reinforce their existing attitudes through more frequent exposure to their

own party campaigns rather than opposing party campaigns (Lazarsfeld, Berelson, & Gaudet, 1944). The premise is that if people are surrounded by like-minded people, and if they encounter only information that supports their existing beliefs, noticeable media effects, such as attitude changes, are less likely to occur in the first place. Thus, historically, at least prior to the digital age, the field of mass communication has paid relatively limited attention to the studies of media attention and selection.

Over the past decade, however, the rise of new media has led to a renewed interest in research on media selection and attention. Although some scholars (Bennett & Iyengar, 2008) have expressed concerns that digital revolution may cause a return to a "new era" of minimal effects, much research (including this dissertation) may see the technological changes as an invitation to study media attention and selection in a more nuanced manner. Before describing the specific goals of this dissertation presented in each chapter, the following review will provide theoretical background justifying the need to study media selection.

Motivations of Dissertation: Why Now?

Both the selective nature of emerging media technologies and methodological advances that better capture audience selectivity motivate the research on media selection. The rapid development of media environment has attracted much scholarly attention. Consequently, many researchers have examined the social implications of this development. In addition, these technological advances also provide researchers with sophisticated methodological devices that can measure the moment of selective consumption of information in a less biased way. The following paragraphs will

document the details of these two motivations.

Technological Changes and Audience Evolution

All changes in the information environment, including the growing prominence of the Internet and social networking sites as a primary source of information, the development of portable media devices, and media users' increased capability to select, control, and disseminate information at their discretion, have contributed to the significant transformation of the media processes. Through observing these reconfigurations of the relationship between the media and their users, Philip Napoli (2011) identified two fairly broad overarching phenomena that represent the key shifts taking place in the changing media environment: fragmentation and audience autonomy. Fragmentation describes how digital media with a wide range of available content and expanded transmission capacity disintegrate the traditional notion of the "mass" (Neuman, 1991). Audience autonomy is the extent to which audiences gain control over the flow of information and their media choices. Although these two concepts are not completely independent from each other, they provide a useful framework for contextualizing this research project within the media and audience evolution.

Fragmentation. One of the most widely cited consequences of the emerging media environment is audience fragmentation (Webster & Ksiazek, 2012). As media technologies continue to increase the number of content options through enlarged carrying capacity, audience attention also tends to follow this trend to a certain degree. Audience attention can now be scattered across an increasing array of media content and can be clustered around a select similar interest, which brings us to the concept of audience fragmentation (Dahlberg, 2007; Sunstein, 2001). As aptly noted by an audience

measurement company executive, the fragmentation process relates to “millions of audiences of hundreds instead of hundreds of audiences of millions” (cited by Napoli, 2011, p. 57).

The ways in which people form clusters and at the same time disconnect with others is an open question, but most discussions on the formation of audience fragmentation posit that people select media content based on similarities between the audience and content. Especially in the research domain of news media and political communication, these similarities often reflect people’s attitudes and interests toward an issue. For example, while the former involves the extent to which people prefer news stories that support their pre-existing attitudes about an issue, the latter indicates the extent to which people prefer news stories that address issues of their great interest.

These two driving forces, attitude consistency and issue interest, pose two layers of concerns (and opportunities). Regarding the first type of fragmentation, manifested concerns are directed toward the tendency to seek consonant information and avoid dissonant information (Bennett & Iyengar, 2008; Jang, 2014a). This confirmation-biased selective exposure might decrease people’s exposure to political difference, contributing to partisan polarization (Stroud, 2011). This audience fragmentation has often been labeled as echo chambers, cyberbalkans, and enclaves of homogeneous, like-minded media (Iyengar & Hahn, 2009; Sunstein, 2007). The consequences and implications are further addressed in detail in the second and third chapters.

The second type of fragmentation is characterized as a long tail, as illustrated by Chris Anderson (2006), the editor of *Wired* magazine. The long tail scenario suggests that any kind of interest can be catered and developed with the aid of niche marketing,

which is facilitated by the Internet. Previously, traditional mass media carefully filtered and published information that was expected to attract as many audiences as possible and disturb as few as possible (Shirky, 2008). As a result, media content tended to be relatively homogeneous across media outlets (Gerbner, Gross, Morgan, & Signorielli, 1982; Prior, 2007). This common media system contributes well to a democratic decision-making in that most people get the same news and easily recognize socially shared problems. However, people may experience difficulties developing their interest through this media system. Especially if a topic is not appealing to many people, those who are interested in the topic might not be able to obtain topic-specific information using mass media. Currently, the Internet decreases the cost of information creation and distribution, and users can find niche information effectively with the search function. From the perspectives of political communication, those who have similar needs and interests can easily establish connections with one another and voice their opinions. Related questions about the role of different media in the process of interest-based fragmentation are addressed in the fourth and fifth chapters.

Audience autonomy. Traditionally, most audiences have little influence on mass media (Neuman, Guggenheim, Jang, & Bae, 2014). Audiences are typically limited to obtaining information already filtered through the gatekeeping process (Maratea, 2008; Singer, in press). However, the emergence of the Internet has provided audiences with unprecedented control over when, where, and how they use media. The shift to “immediate media” (Panek, 2012), such as digital recorders, portable devices, and streamed content, has allowed for even greater efficiency with which users can selectively consume media content. Given that audiences are assumed to be “cognitive

misers” (Fiske & Taylor, 1991) who are programmed to avoid information overload, audiences are willing to replace any media source whenever they consider it unsatisfactory (Lee, 2013). Thus, in the digital environment where individuals can fulfill their psychological needs more responsively, it becomes critical to understand how audiences selectively consume information and what drives their information choices.

Audience autonomy can also be viewed as the transformation of the audience from “passive observer to active participator in a virtual world” (Livingstone, 2003, p. 338). Constraints on attention to social issues are shifting from producers to audiences (Goode, 2009; Webster, 2011). Traditionally, journalists and editors have served as gatekeepers who control the flow of information to the public. This gatekeeping role has been inevitable because the limited capacity of mass media has constrained “all the news” into “all the news that’s fit to print.” The gatekeepers’ central role was to assign different weights to each issue within the limited space or airtime. Today, the lack of such constraints on cyberspace appears poised to undermine the gatekeeping role dominated by elite news organizations (Jang & Pasek, 2014; Shoemaker & Vos, 2009). Most dramatically, the Internet enables ordinary citizens not only to create but also to broadcast information. User-generated content competes with traditional mass media for public attention (Neuman et al., 2014; Shirky, 2008). New media, particularly the rise of social media, functions to break the monopoly that the traditional media holds on agenda setting. The Internet blurs the traditional division between content provider and consumer by alleviating barriers of communication among users and between users and elites (Gillmor, 2006; Jacobson, 2013). As noted above, it should be recognized that the fragmentation process and audience autonomy describe overlapping phenomena, but

these two concepts illustrate fairly well how technological developments may potentially undermine the traditional approaches to media audiences who have long been considered as “mass” or “consumer.”

Methodological Advances and Media Selection Research

The move to a more interactive and fragmented information environment may also challenge the traditional methodological approaches to audience behavior (Napoli, 2011). At the most common level, media use is operationalized as the aggregate quantity of media exposure in self-reported surveys and forced-exposure in experimental settings. Despite some merits of these measurements, the traditional measures often fail to highlight all of the important aspects of audience behavior in digital communication. Increasingly complex nature of audience behavior, such as interactivity and selectivity, is hardly captured through exposure-focused analysis.

Research on audience selectivity is particularly susceptible to errors from self-reported data. While media scholars have acknowledged that self-reported news exposure yields frustratingly unreliable data (e.g., Prior, 2009), it is increasingly difficult to expect that respondents recall their past media use accurately. In addition, to provide more accurate assessment of media selection behavior, research should consider both what is read, watched, and selected and what is avoided, skipped, and not chosen, but comprehensive recall of all such information is almost impossible. Moreover, given that heuristics and top-of-the-head considerations strongly affect surveys, the measures tend to reflect recent exposure to the news or a generalized belief about how the respondent perceives his or her own understanding of the political news (Zaller, 1992).

While surveys suffer from impaired recall and motivated introspection,

experimental studies also face criticism that the media effects are often overestimated due to the forced exposure-based experiments. In such designs, participants are supposed to give full attention to media stimuli, making it unclear to what extent the observed effects in the lab are applicable to everyday media use (Hastall & Knobloch-Westerwick, 2013; Slater, 2004; Stroebe, 2000). For example, the question is whether and how people's media use would differ if they were more distracted.

On the other hand, the Internet has allowed commercial firms and researchers to collect detailed data on audience's behavior (Mullarkey, 2004). Virtually every Web activity is logged and stored in large datasets. Although access to these data is not always open to public, some data, such as Twitter, are publicly traceable. The emergence of big data may provide new research opportunities to study various aspects of the audience beyond exposure. In addition to real-time datasets, more controlled tracking data are available via behavior tracking software. This electronic measure logs every clicking activity unobtrusively within a created news website, allowing researchers to analyze users' selective behavior more accurately. Since it allows researchers to test directly what message characteristics attract users' attention, quasi-experiments that use behavior-tracking software have guided much of recent selective exposure research.

Plan of the Dissertation

The dissertation consists of six chapters, introduction, four empirical studies, and conclusion. All chapters delve into the technological shifts influencing the dynamics of information consumption and their implications for democratic citizenship. This dissertation focuses on two significant factors that drive selective news consumption.

Drawing from research on selective exposure, the second and third chapters examine how (in)consistency between issue attitudes of messages and audiences affects information selection behavior. On the other hand, the fourth and fifth chapters revisit the notion of issue publics to investigate how the Internet promotes selective learning based on issue interests and the relationship between new media and specialist-type citizens.

Chapter 2

The second chapter examines selective exposure based on confirmation-bias, the audience's tendency to select media messages that support rather than contradict their existing views (Chaffee, Saphir, Graf, Sandvig, & Hahn, 2001; Donsbach, 2009; Garrett, 2009a; Garrett, 2009b; Knobloch-Westerwick, 2012; Stroud, 2011). Over the past two decades, political communication scholars have expressed concerns regarding the consequences of such selective consumption of political information on the deliberative democracy. This confirmation-biased selective exposure appears to be problematic because a reinforced exposure of online users to attitude-consonant information may lead to fragmentation and political polarization (Iyengar & Hahn, 2009; Stroud, 2008; Sunstein, 2001). If individuals wall themselves off from politically diverse opinions, this would seriously hinder the performance of deliberative democracy, in which citizens should access and critically evaluate a wide range of information before reaching informed decisions (Brundidge, 2010; Kwak, Williams, Wang, & Lee; Neuman, Bimber, & Hindman, 2011; Papacharissi, 2004).

This chapter presents two experimental studies to extend selective exposure. Both studies use behavior tracking software that is used to observe participants' clicking activities unobtrusively. Study 1 pays particular attention both to how selective seeking

and avoidance are independent concepts and to how this distinction matters in political communication. Selective avoidance that has not been effectively measured and separately analyzed is the primary concern of Study 1. Political communication scholars have shown that individuals' tendency to deliberately avoid dissonant information is particularly harmful to the formation of informed citizenry (Garrett, 2009a; Garrett, 2009b; Mutz, 2006). Voluntary national samples participated in this study.

Study 2 illustrates how people exhibit selective exposure depending on varying levels of cognitive load. One major criticism of selective exposure research or media effects research is that media effects are often overestimated due to forced exposure-based experiments. In such designs, participants are asked to give full attention to media stimuli, making it unclear to what extent the observed effects in the lab are applicable to everyday media use (Hastall & Knobloch-Westerwick, 2013; Slater, 2004; Stroebe, 2000). For example, a question that remains unaddressed is how people's media use would differ if they were more distracted. In response to this question, Study 2 examines whether any distractions in the media use contexts influence individuals' selective exposure behaviors. This study not only investigates whether selective exposure requires substantial cognitive efforts but also sheds light on the media selection behavior in the current multitasking media environment (Foehr, 2006; Jeong & Hwang, 2012). In this experimental study, participants (college students) are randomly assigned into two groups. One group freely browses the website while the other group are asked to multitask during the browsing activities. A more detailed description of research design and methods is presented in Chapter 2.

Chapter 3

As the previous chapter illustrates, most research on selective exposure has focused on information consumption in political domains (Iyengar & Hahn, 2009; Knobloch-Westerwick, 2012). However, other media scholars, for example, in the field of science communication, have addressed the importance of understanding how the public consumes the information from the media (Dunwoody, 1999; Rogers, 1999). As policy makers often make their policy decisions based on public opinion as well as the perspectives of the scientific community, it is critical to study how the public forms its scientific views by selectively consuming science information (Druckman & Bolsen, 2011; Page & Shapiro, 1983).

Chapter 3 extends the relevant literature in a number of ways. First, although it is reasonable to anticipate that individuals' information selection in science domains may resemble the trend exhibited in political contexts, other theoretical explanations suggest opposite directions. For example, Berlyne's (1970) schema theory and Shoemaker's evolutionary accounts (1996) posit that individuals may pay increasing attention to science information that is novel or deviates from what is already saved in their schema rather than information that is familiar or consistent with their existing views. News stories about science issues often report unusual events or findings that may threaten individuals' existing norms and possibly pose potential risks to their survival. In a similar vein, previous research has found that although regular smokers were more likely than nonsmokers to consider the evidence for a smoking-lung cancer relationship as less appealing, regular smokers were more likely than nonsmokers to display interest in reading dissonant (e.g., smoking leads to lung cancer) information (Feather, 1962).

Second, this chapter provides an initial assessment of individuals' psychological

propensities to seek or avoid science information. Previous research (Feldman, Maibach, Roser-Renouf, & Leiserowitz, 2012; McCright & Dunlap, 2011; Zhao, 2009) has shown that climate change skeptics reinforced their attitudes and perceptions of the global environmental issues through repeated exposure to partisan cable media. Such selective exposure observed by these studies is due mainly to structural factors rather than individual orientations. In other words, if Republicans watched Fox News based on their partisanship rather than on their attitudes toward specific science issues, such as climate change, Fox News viewers' exposure to climate change skeptics would not necessarily be a result of individuals' tendencies to seek out skeptical views on climate change; rather, it would be a result of by-product of channel selection. Thus, the present chapter examines selective exposure in an online setting where individuals can freely choose science information based on their psychological tendencies.

Finally, this chapter addresses how individual characteristics (e.g., deference to scientific authority, science knowledge, perceived science knowledge, attitude extremity, attention to science in mass media, political ideology, and religiosity) may influence an individual's tendency to seek consonant or dissonant science information. Thus, this study explores the boundary conditions under which individuals seek or avoid a certain type of science information online.

Chapter 4

Chapters 4 and 5 also examine information consumption in the emerging media environment but emphasize different aspects of audience selectivity. Both chapters focus on how audiences' issue interest (or importance) instead of confirmation bias motivates selective behavior (Chapters 2 and 3). Numerous researchers have argued that issue

publics who passionately follow certain topics of great interest to them display a great deal of issue-specific information without being attentive to all kinds of political issues (Converse 1964; Henderson, 2013; Krosnick 1990). Research has indicated that these issue specialists acquire issue-specific information through the combination of personal issue interest and the availability of information (Hutchings, 2003)

Several media scholars have recently begun to pay particular attention to the role of new media in cultivating issue specialists (Kim, 2009; Jang & Park, 2013). The premise is that since new media offer individuals technological efficiency with which they obtain information of interest, people tend to become specialist-type citizens rather than generalist-type citizens (Prior, 2009). The technological functions, such as hyperlinks or Google search, enable individuals to seek information selectively without having to wait for mass media to provide information they want. These technological affordances fit well with specialists' nature to acquire information in only a few domains of their concerns (Kim, 2009).

Chapter 4 presents a case study using secondary national data (n=1208) from the Kaiser Family Foundation's health tracking survey. This study first examined the relationship between individuals' issue interest and issue-specific knowledge and the way individuals' primary source of medium influences this relationship. If the Internet allows for selective learning about issues of personal interest, those who rely on the Internet should be more capable of translating their issue interest into issue-specific knowledge compared to those who rely on traditional media, such as network TV, newspapers, and radio.

Chapter 5

Following chapter 4, this chapter contextualizes the formation of information specialists within the processes of media evolution. The prime focus of this chapter is to propose a method to estimate the degree to which an individual is a specialist- or a generalist-type citizen. As this chapter illustrates, relatively little has been known about information specialists, and this lack of empirical research is mostly due to inadequate instrumentation of the concept of the specialist and generalist. Since Krosnick's series of co-authored studies in the early 1990s (Krosnick & Telhami, 1995), researchers have used personal issue importance as a proxy measure of issue specialists (i.e., issue publics). That is, those who think an issue is important to them are treated as specialists within the domain. However, this operationalization can be problematic because it overlooks the core element of issue publics. By definition, issue publics are different from attentive publics who are generally interested in a wide range of issues. Rather, issue publics should be (1) passionately interested in a particular issue and should also be (2) uninterested in other issues in general due to their limited cognitive capacity. However, the issue importance measure does not capture the second part of the definition. An individual for whom climate change is important can be either an environmental specialist or a generally sophisticated citizen who believes that the environment is important just like all other issues. To overcome this limitation of the previous measures, this chapter proposes an alternative way of measuring the concept of the specialist and generalist. Using the 2008 American National Election Studies data, this study reveals various characteristics of specialists and generalists. The implications of the growth of specialists as well as the validity of the proposed method are discussed.

Chapter 6

Chapter 6 provides an overall assessment of research findings by making connections between them. It also considers the wide-ranging implications of selective information consumption developed in Chapters 2 through 5. This chapter situates the issues related to audience selectivity within the broader normative concerns regarding citizen competence and knowledge gap. Moreover, it discusses the limitations of the studies and proposes the ways in which future research can address them. These discussions also touch upon new research opportunities with big aggregated media data that enable researchers to better capture the public's selective attention to various social issues.

Chapter 2

Selective Seeking and Avoidance in a Multitasking Media Environment

Over the past decade, new information and communication technologies (ICTs) have triggered a renewed interest in the study of *selective exposure*, the audience's tendency to select media messages that support rather than oppose their existing views (Chaffee, Saphir, Graf, Sandvig, & Hahn, 2001; Donsbach, 2009; Garrett, Carnahan, & Lynch, 2013; Graf & Aday, 2008; Iyengar & Hahn, 2009; Johnson, Zhang, & Bichard, 2011; Knobloch-Westerwick, 2012; Knobloch-Westerwick & Kleinman, 2012; Slater, 2007; Stroud, 2012). A prevailing concern is that selective exposure runs counter to deliberative democracy in which citizens should access and critically evaluate a wide range of information before reaching informed decisions (Brundidge, 2010; Papacharissi, 2004; Iyengar, Hahn, Krosnick, & Walker, 2008). Seeking out opinion reinforcing information and avoiding opinion challenging information may lead to political polarization (Iyengar & Hahn, 2009; Stroud, 2012), fragmentation (Sunstein, 2001) and decreased political tolerance (Mutz, 2006).

However, there are at least two major challenges to the legitimacy of this normative concern about the ICTs-driven selective exposure. First, recent studies have indicated that despite people's preference for consonant information, their tendency to avoid dissonant information, which is particularly harmful to the formation of informed citizenry, is relatively weak (Garrett, 2009a; Garrett, 2009b; Johnson et al., 2011). These

studies suggest that as long as citizens do not systematically avoid encountering heterogeneous perspectives, the negative consequences of the relative preference for consonant over dissonant information are minimal. Yet, this line of research has not received due empirical scrutiny mainly because previous studies did not effectively distinguish selective seeking and avoidance.

Another challenge is that media selection behavior has been typically observed in a lab setting where participants are asked to give full attention to media stimuli. This experimental process may lead to the overestimation of research findings, making it unclear to what extent the observed relationships in the lab experiments are applicable to everyday media use (Hastall & Knobloch-Westerwick, 2013; Slater, 2004; Stroebe, 2000). For example, it is vital that researchers investigate selective exposure in a context where participants cannot focus on a single media stimulus due to involuntary distraction or voluntary multitasking activities.

The current chapter, consisting of two interrelated studies, extends selective exposure research by responding to the two abovementioned challenges in the relevant literature. Both studies use behavior tracking software to measure selective exposure online in an unobtrusive manner. The first study, utilizing a quasi-experimental design, investigates selective seeking and avoidance separately to offer a direct assessment of whether they are independent phenomena or simply two sides of the same coin. Selective avoidance that hinders the deliberative public sphere is the primary concern of the first study. The second study, with an experimental design, examines how people exhibit selective exposure depending on a varying level of cognitive load on them. This study not only investigates whether selective exposure requires substantial cognitive efforts but

also sheds light on the media selection behavior in the current multitasking media environment.

Selective Exposure in Political Contexts

Selective exposure serves as a key concept that embodies the minimal effects era in communication research (Klapper, 1960). Early research documented that partisan voters tended to reinforce their existing attitudes through greater exposure to their own party campaigns rather than opposing party campaigns (Lazarsfeld, Berelson, & Gaudet, 1944). This observation was theoretically explained by cognitive dissonance theory (Festinger, 1957; Festinger, 1964), which posits that when facing dissonance, individuals try to reduce the dissonance by seeking out attitude consistent information and avoiding attitude challenging information. This line of research indicated that media effects on attitude change should be minimal because alternative views are screened out in the first place.

However, early reviews indicated that selective exposure research yields mixed results at best (Sears & Freedman, 1967). Although some studies found evidence of partisan motivated exposure (Stempel, 1961), many correlational studies could not control for confounding factors, such as a person's social milieu (see Freedman & Sears, 1966). In another major review, Frey (1986) attempted to specify conditions under which selective exposure was more or less likely to occur. For example, the review indicated that cognitive dissonance theory could explain selective exposure when decisions preceded the information search but not when the information search was useful for

future decisions. Notably, Frey (1986) concluded that the tendency to avoid dissonant information was much weaker than the tendency to seek out consonant information.

After a dormant period that lasted until the late 1990s, the explosion of new ICTs has made selective exposure one of the most popular topics in communication research (Bryant & Miron, 2004; Garrett, 2009b). With the advent of the Internet and partisan media (e.g., cable networks, talk radio), media users gained more choices and enhanced control over media content, leading to the concern that citizens may wall themselves off from diverse perspectives. Although recent studies predominantly supported the relationship between preferences for cable TV sources and partisanship (Stroud, 2012), they reported inconsistent findings concerning the relationship between Internet use and selective exposure (Bennett & Iyengar, 2008; Brundidge, 2010; Hargittai, Gallo, & Kane, 2008; Iyengar et al., 2008; Knobloch-Westerwick, 2012). For example, some studies (Iyengar et al., 2008; Knobloch-Westerwick, 2012) showed that individuals tended to choose media messages that were consistent with their predispositions while other studies (Brundidge, 2010; Garrett, 2009b) found that online news users were more likely to encounter political difference through inadvertent exposure.

Selective Avoidance as a Separate Phenomenon

Although both selective seeking and avoidance have important ramifications for political attitudes and attitude strength, avoiding alternative views is particularly threatening to the principle of deliberative democracy (Garrett, 2009b). Encountering diverse opinions and engaging in rational discussions with a broad array of citizens are prerequisites for a deliberative public sphere (Neuman, Bimber, & Hindman, 2011;

Papacharissi, 2004). However, if excluding heterogeneous viewpoints becomes a habitual routine in Internet use, the decreased breadth of information in like-minded enclaves may accelerate polarization and fragmentation among the public (Sunstein, 2001).

In addition, selectivity research suggests the need to examine avoidance and seeking separately (Fahr & Böcking, 2009; McLeod & Becker, 1974). McLeod and Becker (1974) pointed out that seeking and avoidance are two different rather than inverse processes because non-seeking acts do not always entail avoidance behaviors. Similarly, Kahneman, Knetsch, and Thaler (1991) supported this reasoning by showing that damage-avoidance does not work in line with benefit maximization. Their research indicated that avoidance of losses is not proportional to missed benefits.

Given the political consequences and theoretical importance of selective avoidance, it is important to understand the extent to which online users have a tendency to avoid opinion challenging information systematically. Reviews of selective exposure (see Chaffee et al., 2001; Frey, 1986; Holbert, Garrett, & Gleason, 2010) indicated that although people show a tendency to seek out consonant information, their tendency to avoid dissonant information is weaker or even nonexistent. Several explanations exist for the limited evidence of selective avoidance. First, selective avoidance may not be helpful for decreasing the dissonance. Avoiding additional dissonant information may prevent further increases in the existing dissonance, but it may not actually reduce the existing dissonance (Frey, 1986). On the contrary, because intentional information avoidance is considered to be against the norm of a balanced or fair mindedness, the dissonance could increase (Donsbach, 2009). Second, people may think that understanding opposing views

is useful for making counterarguments in the future (Knobloch-Westerwick & Kleinman; 2012). Finally, it may be practically difficult to avoid encountering all opinion challenging information (Garrett, 2009b).

Consistent with the early reviews, a handful of recent studies (Garrett, 2009b; Johnson et al., 2011) showed that the orientation toward selective avoidance is weak. For example, Garrett (2009b) provided strong evidence for selective seeking but little support for selective avoidance. Garrett (2009b) found that online use increased perceived familiarity with dissonant information as well as consonant information. However, these findings from self-reported data are subject to several limitations. First, it is increasingly difficult to distinguish actual exposure from recalled exposure (Prior, 2009; Slater, 2004). For instance, Garrett (2009b) employed respondents' perceived familiarity with arguments for and against candidates as a core measure of selective media exposure, but this operationalization is subject to criticisms. For example, individuals may have been familiar with their own candidate's opinions not because they had been selectively exposed to partisan media content but because they had been surrounded by like-minded people rather than heterogeneous people. Second, it is unclear whether the failure to discover selective avoidance was due to an individual's weak psychological tendency to avoid dissonant information or due to structural features of the Internet. For example, few people may use news customization functions as their default option (Hargittai, 2004).

Given these methodological challenges, recent research on selective exposure has begun to use behavior tracking measures of online activities (Garrett, 2009a; Knobloch-Westerwick, 2012; Knobloch-Westerwick & Kleinman, 2012; Iyengar et al., 2008). In

these studies, participants' use of every hyperlink was automatically recorded and later analyzed and compared to their preexisting attitudes. However, previous studies using this automatic measure could not provide a due assessment of how much selective avoidance is a common practice in an online setting. These studies found that individuals preferred consonant to dissonant information when two types of messages were given, but this relative preference does not necessarily mean that individuals completely avoid dissonant information and only seek consonant information.

To overcome the limitation of interpreting the relative preference, the current study uses behavior tracking software and includes not only consonant and dissonant information but also neutral information regarding each issue. When neutral information is available as well, selective avoidance can be effectively assessed independently from selective seeking. For example, selective avoidance can be evidenced by showing that individuals tend to select dissonant information less than neutral and consonant information. If individuals have no preference between dissonant and neutral information, they may not intentionally avoid dissonant information. Therefore, the current research allows participants to choose information from three types of media messages (two opposing views and one neutral view) online. Based on prior studies and theoretical reasons described above, the study expects selective seeking to occur but not avoidance.

Hypothesis 2.1. (H2.1): Participants are more likely to choose to read attitude consonant information than attitude dissonant or attitude neutral information on the Internet.

Hypothesis 2.2. (H2.2): Participants' tendency to avoid attitude dissonant information is weaker than their tendency to seek out attitude consonant information on the Internet.

The first study assesses whether selective exposure is a common practice in an emerging media environment to the extent that deliberative democracy is at risk. This investigation focuses on selective avoidance that potentially impedes the formation of informed citizenry. However, to better understand the extent to which selective exposure is prevalent in the current media environment, other contextual factors should be incorporated into this line of research. The second study relates one of the most common but yet to be studied features of online information-seeking behavior, multitasking, to selective exposure research.

Selective Exposure in a Multitasking Media Environment

One of the fundamental challenges for experimental selective exposure research is that participants are typically assumed to pay full attention to given stimuli throughout the entire experimental process. This common procedure fails to consider that individuals do not always have sufficient cognitive resources available for single media-related activity in their local media use contexts. Media users often suffer from cognitive deficits due to distraction or multitasking activities. Moreover, since the current media saturated environment has dramatically popularized media multitasking in recent years, it is increasingly important to incorporate any influence of insufficient cognitive energy into selective exposure literature (Rideout, Foehr, & Roberts, 2010; Wang & Tchernev, 2012). Convergent technologies have allowed users to search for information, listen to

music, watch sports, chat with friends, or check stock prices simultaneously by means of the same medium.

To date, only a handful of studies have examined the effects of multitasking (Armstrong & Chung, 2000; Jeong & Hwang, 2012; Pool, Koolstra, & van der Voort, 2003). Yet, it can be argued that related studies that manipulated the cognitive load demands of messages can also add to our understanding of the effects of multitasking (Chock, Fox, Angelini, Lee, & Lang, 2007; Fox, Park, & Lang, 2007; Geiger & Reeves, 1991). These studies rest on the limited capacity model (Lang, 1995; Lang, 2000), which assumes that humans have limited capacity to encode, store, and retrieve information at a time. Facing a great amount of information, individuals allocate processing resources to a piece of information (Lang, 2006). This view indicates that multitasking can impair the processing of media messages because media users attempt to economize any effort by investing insufficient cognitive resources into each task. When an overload of information exceeds the processing capacity available at that moment, some mental process is bound to be bypassed.

A considerable body of literature has examined how increased cognitive load affects information processing. These studies found that when individuals suffered from the lack of cognitive resources, they were more likely to believe the media messages (Gilbert, 1991) and perceive them as more positive (Geiger & Reeves, 1991), realistic (Shapiro & Kim, 2012), and personally relevant (Chock et al., 2007). These findings suggest that the judgments under high cognitive load may simply be default responses and the alternative judgments are formed only through effortful processing. For instance, Geiger and Reeves (1991) found that individuals showed positive attitudes toward

political candidates when they were exposed to fast-paced political ads. This indicates that increasing processing demands due to the fast-paced ads may go beyond individuals' cognitive capacity (Chock et al., 2007; Fox et al., 2007), leaving insufficient resources to make critical evaluations about the political actors; thus, the default reaction may be positive.

The limited capacity model and related empirical evidence provide a theoretical explanation of how increased cognitive load may influence individuals' selective exposure. For selective seeking or avoidance to occur, it is essential that individuals categorize media messages into consonant, dissonant, or neutral information based on their predisposition. However, if this discriminating process requires substantial cognitive efforts, users may not exhibit selective exposure in case of high cognitive load. Only one study (Fischer et al., 2005, Study 3) has examined this idea. In their paper-pencil study, participants had to decide whether to extend the contract of a store manager. Subsequently, they were asked to select pro- or con-information about the manager in either distracting or nondistracting contexts. The confirmation bias was only seen in the low cognitive load condition, suggesting that selective exposure takes additional cognitive resources. However, Fischer et al.'s (2005) study investigated selective exposure in the post-decision situation, which has little implication for typical media use contexts (Knobloch-Westerwick & Meng, 2009). In addition, this study provided participants with only two types of information (pro or con) regarding one fictitious issue. Such a limited information-search setting makes it difficult to understand how people selectively seek and avoid political information in an online context (Iyengar et al.,

2008). To address this theoretical gap, it is necessary to examine the cognitive process of selective exposure by offering participants a wide range of real-world media messages.

Therefore, the present chapter investigates this issue by observing selective exposure in both high and low cognitive load conditions. If selective exposure is less pronounced in the high cognitive load condition, this indicates that selective exposure consumes significant cognitive resources. In contrast, if selective exposure does not involve controlled cognitive process, there should be no impact of the manipulation of cognitive load on selective exposure. As suggested by the limited capacity model and the initial evidence provided by Fischer et al. (2005), the current study hypothesizes that increasing cognitive load moderates selective exposure in an Internet setting.

Hypothesis 2.3. (H2.3): Participants in the high cognitive load (multitasking) condition are less likely to practice selective exposure than those in the low cognitive load condition.

Study 1

Method

Design Overview

The first study examined whether people selectively seek consonant messages and avoid dissonant messages compared to neutral messages. The current study design generally mirrors previous work done by Knobloch-Westerwick and colleagues (e.g., Hastall & Knobloch-Westerwick, 2013; Knobloch-Westerwick, 2012; Knobloch-Westerwick & Meng, 2009) except that neutral messages were included. Participants

were told that they were going to participate in two separate studies. They first filled out the baseline survey questions and then were asked to browse through an online news magazine for a scheduled period of four minutes.¹ Participants' selection and exposure time for specific articles were automatically recorded.

Participants

American adults ($n = 271$) participated in the study online in exchange for cash value reward. The survey firm *Qualtrics* administered the data collection in the summer of 2012. Based on the stratified quota sampling method, participants were chosen from a sample frame that closely mirrors U.S. census data. Participants ranged in age from 18 to 72, with a mean age of 47.21 ($SD = 13.58$). Of this sample, 54% were male, and the median income category was \$50,000 – \$75,000. Participants' party affiliation was 28% Republican, 29% Democrat, and 43% Independent.²

Stimulus Material

¹ Participants were supposed to browse through the website for four minutes because previous studies indicated that participants did not feel much distraction nor boredom for the given period (e.g., Hastall & Knobloch-Westerwick, 2013).

² The debate concerning the validity of the non-probability national sample is still under way. However, a growing number of studies in political communication have benefitted from national volunteer samples (e.g., Curran, Iyengar, Lund, & Salovaara, 2009; Morey, Eveland, & Hutchens, 2012; Shah, McLeod, & Lee, 2009). The current study sample was demographically similar to samples from other probability surveys. The 2008 American National Election Study (ANES) reports an average age of 47.8, which is very close to the sample of this study. While the median income category of the study sample was \$50,000 – \$75,000, the American Community Survey 2006–2008 reports \$63,000 as an average income. The party affiliation of the sample largely reflected the results of the ANES. The present study slightly overrepresents Republicans (2%) and underrepresents Democrats (5%) compared to the ANES.

Main page. The online news magazine “news.com” was created for this study, mimicking common news websites. The website title and menus were deactivated, but the layout was retained throughout the presentation of news stories.



Figure 2.1. Screenshot of Online News Magazine.

As seen in Figure 2.1, the main page displayed 12 news leads featuring four political issues including abortion, gay rights, health care, and the Tea Party movement.

Each issue was covered by three news articles that represented three different views on the issue (two opposing views and one neutral view). All news leads consisted of headlines and subheads that were similar in length. Each news headline contained about 6 words, and each subhead ranged from 23 to 27 words. The location of the news leads was randomized across participants to counterbalance the effects of the news leads' positions.

News article page. The website consisted of two-layer structure in which participants could select a news story in the middle of the main page and then only click back to the main page from actual news article pages. Although there were graphics on the main page, the news article pages contained only text. All news stories were taken from real news sources on the Internet and were edited to be equal in length, ranging from 249 to 265 words.

Procedure

The entire procedure was conducted online. The advantages of computer-based research have been acknowledged in the recent literature (for a review, see Gaines, Kuklinski, & Quirk, 2007; Jang & Lee, 2014). Compared to lab research, online research not only allow participants to respond to experimental stimuli in a natural settings (e.g., home) but also allow them to be less susceptible to potential biases that are often introduced by the presence of the researcher (e.g., demand characteristics). Although decreased control over participants' behavior might be a disadvantage for the researcher, this increases random errors without systematically biasing the results.

Participants started the study by reading a brief description of the study and giving informed consent. First, both groups filled out a questionnaire. The first set of

questions asked about attitudes toward ten political issues, including four focal issues (abortion, gay rights, health care, and the Tea Party). Six additional issues (global warming, gun control, war, immigration, women's rights, and legalizing marijuana) were included and served as a distraction. Then, participants answered questions about political interest, media use, and demographics.

After completing the baseline survey, participants were led to an instruction page for the following task, browsing through the experimental news magazine. Participants were told that they could select and read as many news articles as they wanted and were informed that time would not be sufficient for reading all of the articles. Then, participants started browsing the news magazine. All clicking behaviors were recorded unbeknownst to them. After four minutes of browsing, the final page automatically appeared and participants were debriefed and thanked. Twelve participants who did not view any article were eliminated from further analysis.³

Pretests

Two separate pretests were conducted for news leads and actual news stories. Thirty-two participants with a mean age of 48.80 years were selected for a news lead

³ To alleviate any concerns about the effects of taking the baseline survey on website browsing behavior, an additional test was conducted with college students who were the same study population of Study 2 but did not participate in Study 2. A total of 110 student were randomly assigned into two groups. One group (n = 53) took the survey before browsing through the website like Study 1, but the other group (n = 57) engaged in browsing without previously taking the survey. Instead, their issue attitudes were measured at the end of the study. Repeated measure analyses of variances (ANOVAs) were conducted with the condition as a between-subject factor and three types of selective exposure as within-subject factors. There were no direct or interaction effects of the condition on selective exposure behavior. Although these tests were more pertinent to Study 2 which employed student samples than Study 1 which used national samples, there is no reason to suspect that any sensitization effects of the baseline survey would take place only among national samples.

pretest. Additionally, forty participants, with a mean age of 46.24 years, participated in a news article pretest. These pretest participants were recruited from the same population.

The purpose of the pretests was to examine whether three news leads and articles for each topic were equally interesting while representing three different views on the issue. To this end, pretest participants rated 12 news leads and articles in terms of interest and perceived issue support (Knobloch-Westerwick & Meng, 2009). Interest was measured by asking participants to report their interest in 12 news leads and articles on a 5-point scale (1 = *Not at all interesting*, 5 = *very interesting*). In addition, perceived issue support was measured by asking participants “In your impression, is the portrayal of abortion in the news lead (or article) strictly neutral, or does it take sides with supporters or opponents of abortion (gay rights / universal health care / the Tea Party movement)?” based on a 9-point scale (-4 = *very strongly opposing*, 4 = *very strongly supporting*).

Pretest results for news leads and articles are summarized in Table 2.1 and Table 2.2. As expected, *F*-tests for three news leads and articles about each issue yielded insignificant results for the reported interest but significant results for perceived issue support. Further, paired *t*-tests were conducted for perceived issue support to make sure that every pair of news leads and articles within each topic reflected distinct views. All paired *t*-tests being significant, stimuli construction was assumed to be successful.

Measures

Issue attitudes. The attitude toward each issue was assessed by two items. Participants indicated how strongly they disagreed or agreed with the statements based on a 6-point scale with *strongly disagree*, *disagree*, *somewhat disagree*, *somewhat agree*, *agree*, and *strongly agree* as the response categories. The wording of the questions for attitudes

Table 2.1. News Lead Pretest for Interest and Perceived Issue Support

Issue	Interest		Issue Support		Paired <i>t</i> -Test
	<i>M</i> (<i>SD</i>)	<i>F</i> Test	<i>M</i> (<i>SD</i>)	<i>F</i> Test	
Abortion		$F(2, 62) = 2.17$		$F(2, 62) = 45.56^{***}$	$df = 31$
News 1	3.53 (1.22)		2.16 (1.65)		1,2: 7.32 ^{***}
News 2	3.39 (1.00)		0.03 (0.18)		2,3: 5.15 ^{***}
News 3	3.56 (1.10)		-2.31 (2.65)		1,3: 7.38 ^{***}
Gay Rights		$F(2, 62) = 0.64$		$F(2, 62) = 270.98^{***}$	$df = 31$
News 4	3.15 (1.22)		3.25 (1.34)		4,5: 11.89 ^{***}
News 5	3.16 (0.95)		0.00 (0.57)		5,6: 18.69 ^{***}
News 6	3.41 (1.19)		-3.25 (1.08)		4,6: 18.09 ^{***}
Health Care		$F(2, 62) = 2.03$		$F(2, 62) = 48.03^{***}$	$df = 31$
News 7	2.91 (1.23)		3.09 (1.80)		7,8: 7.38 ^{***}
News 8	3.00 (0.92)		-0.09 (1.33)		8,9: 2.65 ^{***}
News 9	3.38 (0.98)		-1.06 (1.98)		7,9: 7.99 ^{***}
Tea party		$F(2, 62) = 0.97$		$F(2, 62) = 83.58^{***}$	$df = 31$
News 10	3.22 (1.04)		2.78 (1.31)		10,11: 11.23 ^{***}
News 11	3.00 (1.08)		-0.16 (0.63)		11,12: 4.87 ^{***}
News 12	3.28 (1.20)		-1.72 (1.70)		10,12: 9.97 ^{***}

Note: Interest ranges from 1 to 5, and issue support ranges from -4 to 4. *F*-test and paired *t*-test results show that three news leads on each issue are perceived similarly interesting but each pair of news leads within each topic expresses distinct views. ^{***} $p < .001$.

Table 2.2. News Article Pretest for Interest and Perceived Issue Support

Issue	Interest		Issue Support		
	<i>M (SD)</i>	<i>F Test</i>	<i>M (SD)</i>	<i>F Test</i>	Paired <i>t-Test</i>
Abortion		$F(2, 78) = 0.10$		$F(2, 78) = 110.05^{***}$	$df = 39$
News 1	3.50 (1.06)		2.10 (1.37)		1,2: 9.72 ^{***}
News 2	3.50 (1.01)		0.10 (0.44)		2,3: 8.19 ^{***}
News 3	3.57 (1.22)		-2.73 (2.34)		1,3: 12.12 ^{***}
Gay Rights		$F(2, 78) = 0.73$		$F(2, 78) = 355.10^{***}$	$df = 39$
News 4	3.33 (1.31)		3.38 (1.10)		4,5: 12.86 ^{***}
News 5	3.45 (0.99)		0.00 (1.16)		5,6: 15.78 ^{***}
News 6	3.55 (1.09)		-3.37 (1.05)		4,6: 24.19 ^{***}
Health Care		$F(2, 78) = 0.47$		$F(2, 78) = 84.12^{***}$	$df = 39$
News 7	3.18 (1.28)		3.13 (1.70)		7,8: 9.10 ^{***}
News 8	3.25 (1.10)		-0.05 (1.66)		8,9: 4.06 ^{***}
News 9	3.08 (1.16)		-1.30 (1.62)		7,9: 11.24 ^{***}
Tea party		$F(2, 78) = 0.56$		$F(2, 78) = 77.42^{***}$	$df = 39$
News 10	3.05 (1.30)		2.40 (1.87)		10,11: 9.23 ^{***}
News 11	2.88 (1.07)		-0.32 (0.69)		11,12: 5.10 ^{***}
News 12	2.87 (1.22)		-1.92 (1.54)		10,12: 9.77 ^{***}

Note: Interest ranges from 1 to 5, and issue support ranges from -4 to 4. *F*-test and paired *t*-test results show that three news articles on each issue are perceived similarly interesting but each pair of news articles within each topic expresses distinct views. ^{***} $p < .001$.

toward the four target issues were as follows: abortion (I support the policy that legalizes abortion if having a child would be extremely difficult for the woman financially; I favor abortion in case of birth defect cases; $r = .71, p < .001$), gay rights (I support the policy that legalizes same-sex marriage; I am favorable towards gay rights; $r = .70, p < .001$), health care (I support a universal health care system that provides universal coverage for all members of society; I support Obama's health care reform plan; $r = .82, p < .001$), tea party movement (I would vote for a presidential candidate supporting tea party; I support the Tea Party movement; $r = .84, p < .001$). The two items for each issue were averaged and transformed into dichotomous variables.

News article exposure. Participants' clicking activities were unobtrusively captured.

This programming device allowed us to produce a record of how many times each news article was selected and how long each news article was viewed. Both selection and exposure time of news articles were employed as a basis for exposure measures.

Exposure time was measured by the aggregated time, in seconds, spent on an article page.

Selective exposure. Measures of selective exposure to consonant, neutral, and dissonant information were created based on the correspondence between individuals' preexisting issue attitudes and the perspectives of the news articles toward each issue. Selective exposure to consonant information was assessed in terms of the total number of attitude-consistent news articles that participants clicked to read across the four issues as well as the accumulated exposure time to those articles. Similarly, selective exposure to neutral and dissonant information was measured based on aggregated selection and exposure time of neutral and dissonant news articles.

Results

The initial hypotheses predicted that people would prefer consonant information to neutral or dissonant information (H2.1), but that their tendency to avoid dissonant information compared to neutral information would be relatively weak (H2.2). As seen in Figure 2.2, repeated measure analysis showed that participants exercised selectivity in choosing news articles. The number of selected articles was significantly different across three types of information (consonant, neutral, and dissonant), $F(2, 518) = 8.53, p = .01, \eta^2 = .032$.

Selective Seeking

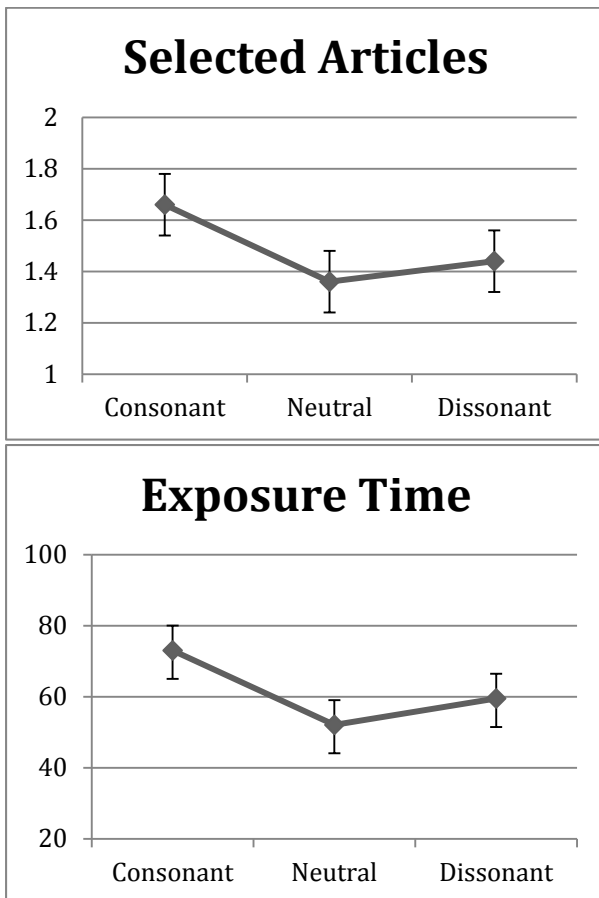


Figure 2.2. Selective Exposure to Consonant, Neutral, and Dissonant Online Information ($n = 259$). Error bars represent 95% confidence intervals.

To test H2.1 and H2.2, post-hoc comparisons were obtained with Bonferroni corrections.⁴ Participants selected consonant news articles ($M = 1.66$, $SD = 1.00$) more frequently than neutral articles ($M = 1.36$, $SD = 1.02$), $t(258) = 3.92$, $p < .001$, or dissonant articles ($M = 1.44$, $SD = 1.00$), $t(258) = 2.91$, $p = .01$. In addition, participants spent more time reading consonant articles ($M = 73.07$, $SD = 57.94$) than neutral articles ($M = 52.07$, $SD = 51.96$), $t(258) = 4.12$, $p < .001$, or dissonant articles ($M = 59.48$, $SD = 62.56$), $t(258) = 2.39$, $p = .05$. Overall, both measures of selection and exposure time supported H2.1.

Selective Avoidance

H2.2 posited that selective avoidance is weaker than selective seeking. The results supported the prediction. Although participants were attracted to attitude consonant news articles, they did not show any preference between dissonant and neutral news articles, $t(258) = 1.06$, $p = .87$. The exposure time measure also paralleled this trend, $t(258) = 1.48$, $p = .42$, supporting H2.2.

Discussion

The current study provides compelling evidence for selective seeking but little evidence for selective avoidance. When participants were confronted with consonant, neutral, and dissonant news leads with regard to four political issues on the Internet, they preferred consonant information over the other two types of information. However,

⁴ Bonferroni corrections were employed to minimize concerns about the increased possibility of type I error due to multiple tests at the same time. With Bonferroni methods, each pairwise comparison was tested at a statistical significance level of .017 instead of .05.

participants did not systematically avoid dissonant information compared to neutral information. Overall, the current findings serve to diminish concerns regarding any negative political consequences that may be exacerbated by selective avoidance. Further implications will be addressed in the general discussion.

Study 2

Method

Design Overview

The second study examined selective exposure in two different settings in which cognitive load varied. Participants were randomly assigned to one of the two conditions (*cognitive load*: load vs. no load). Both groups completed the baseline survey and browsed through the same website used in Study 1 for four minutes. The level of cognitive load was differentiated across two groups by a manipulation technique that has been used in previous research (e.g., Ditto, Scepansky, Munro, Apanovitch, & Lockhart, 1998; Fischer, Jonas, Frey, & Schulz-Hardt, 2005).

Participants

A sample of 185 undergraduate students at a large Midwestern university in the United States participated in this study in exchange for extra course credit. The average age of the participants was 19.67 ($SD = 1.16$), and 63% of them were females.

Procedure

The procedure was almost identical to Study 1, except cognitive load was manipulated across the two groups during the browsing time. After completing the

baseline survey, both groups were led to an instruction page. In the cognitive load condition, participants were asked to work on an extra task while they were browsing through an online magazine. The instructions stated that people often have to do multiple tasks simultaneously and that their multitasking ability would be evaluated in this ‘natural’ environment. Then, the additional task was described. During the scheduled browsing time, participants listened to a recorded female voice reading strings of letters in random order, one letter every three seconds. The job of the participants was to count the number of vowels in the letter strings (see Fischer et al., 2005, for more details about this manipulation technique). After the browsing time was over, participants were asked to indicate the number of vowels they heard and the level of perceived distraction on an 11-point scale (*0 = not at all distracted, 10 = extremely distracted*). In contrast, participants in the no load condition were simply asked to browse through the website without any additional task. After four minutes passed, participants were asked to report the level of perceived distraction. Then, they were debriefed, thanked, and dismissed. Five students who did not click any news leads were excluded from further analysis.

Given that the manipulation technique involves unrealistic tasks, it is worth addressing the advantages of employing this method. First, the present research wanted to ascertain that additionally requested task should impose the same amount of cognitive load on individuals throughout the browsing period. Unlike many other multitasking activities where individuals can easily switch their focus from one task to the other, the current method compels individuals to remain focused on the counting task during their online behavior. This consideration is critical to this study because it aims to capture the effects of cognitive load on every momentary clicking behavior rather than on overall

performance or judgment. Second, because the counting activity involves an auditory process, it can increase cognitive load without interfering with participants' visual activities physically (e.g., causing them to turn their eyes away from the screen). On the other hand, other types of audio-related tasks, such as listening to music, were not employed because prior studies indicated that music caused little distraction effects (Pool et al., 2003)

Pretests for news leads and articles were conducted again with student samples. As seen in Study 1, three news leads and articles about the same topic were considered equally interesting, but their views were perceived to be significantly different from one another. The pretest results are not reported here because they are almost identical to those in Study 1.

Results

Manipulation Check

Manipulation of cognitive load was successful because participants in the cognitive load condition felt increased distraction during the browsing time ($M = 6.08$, $SD = 1.82$) compared to those in the no load condition ($M = 4.31$, $SD = 1.96$), $F(1, 178) = 39.04$, $p < .001$.

Effects of Cognitive Load on Selective Exposure

H2.3 predicted that those in the cognitive load condition would be less selective in choosing news articles on the Internet compared to those in the no load condition. The assumption was that when people are asked to do multiple tasks simultaneously (under the high cognitive load), they have few cognitive resources left to monitor whether

encountered information is consistent with their predisposition, leading to a balanced information search. Thus, the objective of the study was to determine whether cognitive load alters the pattern of exposure to three types of information.

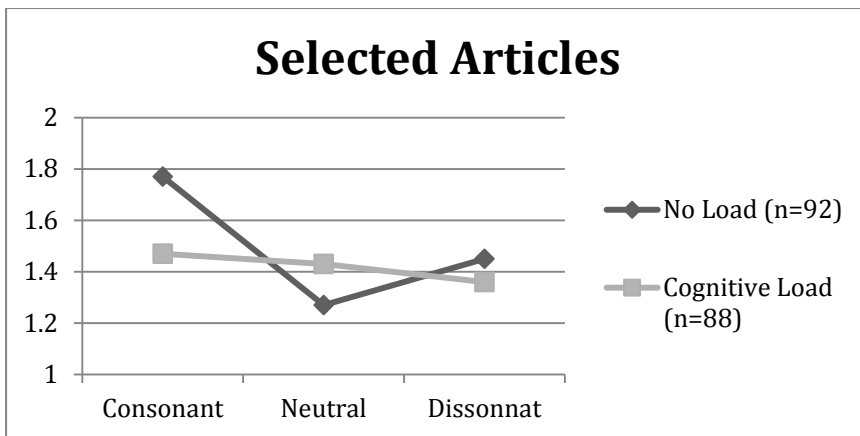
Table 2.3. Influence of Cognitive Load on Selective Exposure

	Selected Articles		Exposure time (
	No load	Cognitive Load	No load	Cognitive Load
	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>M (SD)</i>
Consonant	1.77 (0.94)	1.47 (1.03)	84.86 (56.74)	60.67 (52.45)
Neutral	1.27 (0.97)	1.43 (1.02)	53.16 (49.02)	59.59 (56.88)
Dissonant	1.45 (0.87)	1.36 (1.01)	66.35 (54.27)	60.14 (65.34)
<i>F</i> -test	<i>F</i> (2,182) =	<i>F</i> (2, 174) =	<i>F</i> (2, 182) =	<i>F</i> (2,174) =
	8.51***	0.28	6.78***	0.01

Note: *** $p < .001$.

Repeated measure analyses of variances (ANOVAs) were conducted with cognitive load as a between-subject factor and three types of selective exposure as within-subject factors. Both selection and exposure time of news articles served as outcome variables. As expected, cognitive load showed significant interaction effects with the pattern of

article selection, $F(2, 356) = 3.13, p = .05, \eta^2 = .017$ and marginal interaction effects with the pattern of exposure time, $F(2, 356) = 2.81, p = .06, \eta^2 = .016$. To interpret the pattern of selective exposure more clearly, separate F -tests and post hoc comparisons with Bonferroni corrections were run within each condition as shown in Table 2.3. First, participants in the no load condition yielded the same pattern demonstrated in Study 1. Participants clicked to read consonant news articles ($M = 1.77, SD = 0.94$) more frequently than neutral articles ($M = 1.27, SD = 0.97$), $t(91) = 3.73, p < .001$, or dissonant articles ($M = 1.45, SD = 0.87$), $t(91) = 1.97, p = .05$. On the other hand, participants did not avoid dissonant articles compared to neutral articles, $t(91) = 1.50, p = .42$. The results of exposure time also supported the pattern, indicating the presence of selective seeking but the absence of selective avoidance (H2.1 and H2.2).



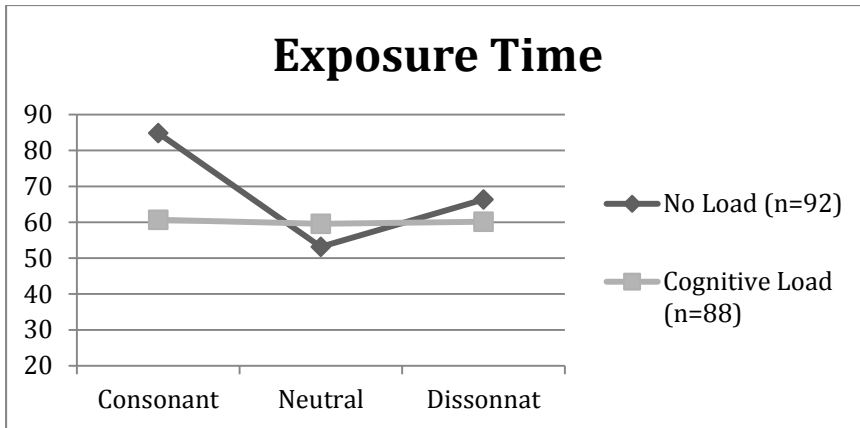


Figure 2.3. Selective Exposure to Consonant, Neutral, and Dissonant Information Online by Experimental Conditions.

In contrast, participants in the cognitive load condition did not practice selective exposure. They selected 1.47 consonant articles ($SD = 1.03$), 1.43 neutral articles, ($SD = 1.02$), and 1.36 dissonant articles ($SD = 1.01$), but these differences were not statistically significant, $F(2, 174) = 0.28, p = .76, \eta^2 < 0.01$. Moreover, they spent an almost equal amount of time on consonant articles ($M = 60.67, SD = 52.45$), neutral articles, ($M = 59.59, SD = 56.88$), and dissonant articles ($M = 60.14, SD = 65.34$), $F(2, 174) < .01, p = .99, \eta^2 < 0.01$. As illustrated in Figure 2.3, participants under a high cognitive load did not exercise any selectivity in information selection and exposure time. Therefore, H2.3 was supported.

General Discussion

The present experiments aimed to investigate confirmation-biased selective exposure on the Internet. Two experiments found evidence for selective reinforcement seeking but little hint of selective challenge avoidance, and this pattern was replicated across national and college student samples. In addition, the current research sought to

examine the effects of increased cognitive load on selective exposure by asking the half of the participants to do the other task during their browsing behavior. Taken together, the findings not only offer a systematic assessment of selective seeking and avoidance separately but also extend the study of selective exposure online in a number of aspects.

First, to demonstrate that selective seeking and avoidance are not two sides of the same coin but rather independent phenomena, the current research compared exposure to consonant and dissonant information against exposure to neutral information. In previous studies, exposures to consonant and dissonant information were compared against each other so that selective seeking and avoidance were not effectively disentangled (Iyengar et al., 2008; Knobloch-Westerwick, 2012). Although there was one study (Garrett, 2009a) using behavior tracking software that contained some neutral information, exposure to neutral information was neither analyzed nor discussed in the study. In addition, Garrett's (2009a) study employed a sample of partisan website users who were already engaged in selective exposure and held deep interest in and extreme views on politics. The present experiments, therefore, assessed selective avoidance and selective seeking separately with both national and student samples.

In line with early reviews (Frey, 1986; Sears & Freedman, 1967) and recent studies (Garrett, 2009a; Garrett, 2009b; Johnson et al., 2011), the results showed that although people tended to seek out information with which they agreed under certain circumstances, there was no evidence that people avoided attitude challenging information systematically. Although acknowledging the limitations of small pieces of evidence, the current findings highlight the positive rather than the negative aspects of new ICTs in relation to the political landscape. If online users seek out consonant

information without sacrificing encounters with challenging viewpoints, the frequent use of the Internet will increase the overall amount of exposure to other opinions. Overall, the weak evidence for selective avoidance and the strong evidence for selective seeking may alleviate the concerns regarding the potential effects of selective exposure on negative political consequences (Stroud, 2012; Sunstein, 2001).

Another important finding is that media users' cognitive condition moderates selective exposure. When participants' cognitive ability was distracted by multitasking, they did not exercise any selectivity in choosing information. From the perspective of the limited capacity model, multitasking may have overloaded participants, leaving insufficient resources to discriminate every media message based on their existing preferences. This finding is particularly relevant to the current media saturated environment where individuals often confront a myriad of information from single or multiple media. Along with individuals' weak psychological orientation to avoid challenging information (Study 1), Study 2 findings further indicated that selective exposure may not be a robust phenomenon in real-world contexts, suggesting that selective exposure research needs to incorporate contextual factors into the design (Slater, 2007).

However, several limitations should be noted. First, the cognitive load manipulation may have low ecological validity. Although the literature suggests that the method is an internally valid technique to increase cognitive load (Fischer et al., 2005) and it is considered suitable for the current research design to impose the same level of cognitive load continuously on individuals, asking participants to count the number of vowels does not reflect real life circumstances. As various possible combinations of

media multitasking may produce differential distraction effects (Pool et al., 2003; Pool, van der Voort, Beentjes, & Koolstra, 2000; Yeykelis, Cummings, & Reeves, 2014), future research needs to account for these differences resulting from task features and medium characteristics (Wang & Tchernev, 2012).

Another limitation stems from the fact that Study 2 employed convenient student samples, failing to provide rich moderating analyses. For example, it is important to incorporate age differences into the analysis because research into multitasking in general suggests that multitasking is more common among younger people (Carrier, Cheever, Rose, Benitez, & Chang, 2009). Similarly, future research should also consider how the systematic variations in media skills may produce different multitasking effects (Campbell & Kwak, 2010; Park, in press).

Finally, the observed online behaviors may have little generalizability to other types of online venues. Although the current study created an online magazine resembling many common websites, the Internet presents users with information also via other forms and functions. For example, the current design offered liberal, conservative, and neutral views on the same issue presented on a single screen. This may well mimic the results of a search engine query or aggregated news websites (e.g., Yahoo news) but is unlikely to reflect partisan media outlets or blogs (e.g., Fox News, Huffington Post). Moreover, it is important for future research to examine selective exposure on social networking sites. Because information from social networking sites such as Facebook is often “pushed” rather than “pulled,” the inadvertent exposure to challenging perspectives is highly plausible. It is also reasonable to predict, however, that relatively homogeneous relationship circles may limit the spectrum of other viewpoints.

Since survey research on selective exposure suffers from impaired recall and unreliable reports (Knobloch-Westerwick & Kleinman, 2012; Prior, 2009), much of recent selective research has been guided by experiments or quasi-experiments employing a behavior tracking measure. Although this measure is valuable to examine selective exposure at the individual, psychological level, it is less useful to analyze selective exposure at the aggregate, structural level. For example, little is known about which features of the Internet influence the target phenomenon. As the Internet provides media exposure through various structural formats (such as Google searches, portals or specific websites, or email messages), future research should develop and benefit from advanced measures that can observe selective exposure in relation to diverse structural characteristics.

Chapter 3

Selective Exposure in Science Communication

A recent shift from traditional “push media” to emerging “pull media” has implications for how the public consumes science news and information (Anderson, Brossard, & Scheufele, 2010; Cline & Haynes, 2001; Fahy & Nisbet, 2011; Horrigan, 2006; Neuman, Park, & Panek, 2012, p. 1022). By virtue of increased control and choice over media content afforded by the Internet, science news audiences not only passively accept information presented by journalists but also actively seek out information based on their individual predispositions (Prior, 2007; Sunstein, 2001). Without any time limit or space constraints, almost an infinite number of science news stories compete for attention from online news audiences (Tewksbury, 2003).

It is important to understand how individuals select information from the media, especially with regard to controversial science issues (Dunwoody, 1999; Rogers, 1999). Because policy makers incorporate the perception of the general public as well as the views of the scientific community in policy decisions on controversial issues, it is critical to examine the types of science information that the public consumes and that ultimately shape public opinion (Druckman & Bolsen, 2011; Page & Shapiro, 1983). For example, audiences’ continuous exposure to attitude-consistent views and avoidance of challenging views, which is referred to as selective exposure, can lead to an extreme view within an individual as well as polarized public opinions at the aggregate level (Festinger, 1957;

Iyengar & Hahn, 2009; Jensen & Hurley, 2010; Stroud, 2012; Sunstein, 2001; see also Boykoff & Boykoff, 2004).

Recent research has provided empirical evidence of selective exposure in relation to the changing media environment (Garrett, 2009b; Iyengar & Hahn, 2009; Knobloch-Westerwick, 2012). Yet, most efforts have focused on political agendas rather than on science controversies. Although it is reasonable to expect that individuals' information selection in science domains may parallel the trend observed in political contexts (as shown in the previous chapters), other theoretical explanations can predict alternative possibilities. According to this perspective, individuals may pay increasing attention to science information that is novel or deviant from what is already stored in their schema rather than information that is familiar to or consistent with their existing views (David, 1996; Lang, 2000; Shoemaker, Danielian, & Brendlinger, 1991). The main purpose of this investigation is to clarify these conflicting views on information preference in science communication. The present study extends the relevant literature in several aspects.

First, the current research provides a critical test of the two competing predictions for individuals' tendency to be attracted to attitude-congruent or attitude-incongruent science information. Second, to examine the robustness of observed patterns across various topics, this study takes four controversial science issues into account, including stem cell research, evolution, Genetically Modified (GM) foods, and global warming. Third, by employing behavior tracking software, this study examines individuals' online information-seeking behavior regarding science issues in an accurate and unobtrusive manner. This non self-reported measure has methodological merits in selective exposure

research. In fact, self-reports about media exposure to specific content have yielded frustrating results due to flawed recall and motivated introspection (Prior, 2009). Finally, this study addresses how individual characteristics (e.g., deference to scientific authority, science knowledge, perceived science knowledge, attitude extremity, attention to science in mass media, political ideology, and religiosity) may influence individual's tendency to seek congruency or incongruency when choosing science information. Thus, this study explores the boundary conditions under which individuals seek or avoid a certain type of science information online.

Confirmation Bias in the Changing Media Environment

A confirmation bias with regard to media exposure was originally documented by public opinion research in the mid 20th century (Lazarsfeld et al., 1944). During campaigns, voters tended to reinforce their partisan views by being exposed to more of their own party's campaign appeals rather than counterparts. This observation was theoretically analyzed using cognitive dissonance theory (Festinger, 1957), which proposes that individuals try to reduce existing dissonance by seeking out consonant information and avoiding challenging information. The study of selective exposure generated concerns not only about the "limited media effects" paradigm but also about the democratic process of public opinion formation (Klapper, 1960, p. 64). Seeking supporting opinions and avoiding challenging opinions were considered antithetical to the principle of deliberative democracy, which posits that understanding diverse opinions and engaging in rational discussions with a wide array of citizens are prerequisites for an ideal public sphere (Neuman et al., 2011).

Although inconsistent evidence accumulated between the 60's and the 90's moderated the concern about minimal media effects driven by confirmation bias (see for reviews, Donsbach, 2009; Frey, 1986; Sears & Freedman, 1967), media scholars, facing the rapid development of media technologies, have returned to this concept of selective exposure in the new century (Bennett & Iyengar, 2008; Garrett, 2009a; Iyengar & Hahn, 2009; Knobloch-Westerwick, 2012; Stroud, 2012; Sunstein, 2001). The emergence of new media, particularly the Internet, provides the audience with abundance of information as well as increased control to select what media content to attend to. As media users now have the power to select news on their own, which has been previously available only to gatekeepers in news organizations, it may become more common for individual users to choose information that is consistent with their pre-existing attitudes (Johnson et al., 2011). Indeed, recent studies found that people tended to exhibit confirmation-biased selective exposure when seeking political information online (e.g., Iyengar, Hahn, Krosnick, & Walker, 2008; Knobloch-Westerwick, 2012).

Science communication scholars have also begun to explore the extent to which a certain type of science information is more likely to be selected or avoided based on the audience's predisposition. Previous studies indicated that partisan viewers are more likely to be exposed to a particular perspective on science issues through exposure to partisan media (Feldman et al., 2012; Hart, 2008; McCright & Dunlap, 2011). For example, through their content analysis and longitudinal analyses, Feldman et al. (2012) found that dismissive tones toward global warming represented by Fox News were negatively associated with the viewers' acceptance of this environmental issue. As Fox News viewers disproportionately consist of skeptics rather than believers of the global

science issue in the first place, these findings indicate that individuals tend to reinforce their existing attitudes through their selective exposure to attitude-congruent information about science issues.

Although prior work indicated the possibility of selective exposure through the preference of partisan media channels, much less is known about selective exposure based on the correspondence between messages and individual characteristics. Given that cable news viewers are unlikely to select a certain channel based on their attitudes towards science issues, it seems imperative to examine how media users navigate individual science issues based on their predisposition. If confirmation bias is a major driving force that governs information seeking behavior regarding science controversies, individuals are more likely to choose to read consonant over dissonant or neutral information when encountering an array of views on the issues at the same time.

Criticisms of Selective Exposure

Festinger's (1957) assumptions about confirmation-biased selective exposure did not gain universal support (Hart et al., 2009). Early reviews revealed that evidence from correlational studies simply reflected de facto selective exposure, indicating that individuals tend to display selective exposure due to their social milieu rather than any psychological orientations to seek support and avoid challenge (Sears & Freedman, 1967). In addition, more recent reviews (Chaffee et al., 2001; Donsbach, 2009; Frey, 1986; Garrett, 2009b) suggest that based on mixed findings, selective exposure may not be a robust phenomenon in real life contexts but may occur only under limited conditions.

Critics have identified two main issues that produce inconsistent support for selective exposure. First, Festinger (1957) originally hypothesized that selective exposure occurs when individuals are experiencing dissonance; however the author did not make any assertions about when individuals are in the state of consonance. Festinger's (1957) assumption may not pertain much to everyday media use context because media users are unlikely to experience cognitive dissonance (Donsbach, 2009; Knobloch-Westerwick & Meng, 2009). Second, according to reviews (Frey, 1986) and recent evidence (Garrett, 2009b; Johnson et al., 2011), people have little motivation to avoid challenging information other than a motivation to decrease dissonance. For example, they may think that challenging information is useful to fully understand an issue or to counterargue an issue. The utility of exposure to diverse perspectives tends to trump the motivation to decrease the psychological discomfort (Knobloch-Westerwick & Kleinman, 2012). Moreover, it appears practically difficult or cognitively effortful to avoid every challenging information individuals encounter in the media (Garrett, 2009b; Jang, 2014b).

Seeking Incongruency and Science Communication

In addition to mixed findings on confirmation bias, alternative views can be used to theoretically predict that individuals tend to pay more attention to information that is schema-incongruent rather than schema-congruent. First, schema theory contends that new information that is not congruent with schema evokes more attention and interest compared to information that is familiar to schema (Berlyne, 1970; David, 1996; Johnston, Hawley, Plewe, Elliott, & DeWitt, 1990; Lee, 2008). Schema refers to abstract

knowledge structure, which shapes individuals' perceptions of the world and functions as heuristics that help them evaluate new information (Srull, Lichtenstein, & Rothbart, 1985). When people encounter new information, they actively search for its relations with individual schema that they have developed in the past. When information violates the assumption of the existing schema, information tends to become salient and draw increasing attention and interest, leading to deeper processing and better recall (Berlyne, 1970; Lee, 2008; Rovee-Collier, 1989; Srull et al., 1985).

An individual's tendency to select and attend to schema incongruent information is increasingly relevant to science communication, which often conveys messages about risk and threat. News stories about science issues often describe unusual events or unexpected findings that may threaten individuals' existing norms and possibly pose potential risks to their health or survival. Previous research found that although regular smokers were more likely than non-smokers to perceive evidence for a smoking-lung cancer relationship as less convincing, regular smokers were more likely than non-smokers to show interest in reading challenging (e.g., smoking leads to lung cancer) information (Feather, 1962). This evidence suggests the possibility that individuals may want to seek out counter-attitudinal messages especially when the messages involve cues or signal regarding potential risks.

Shoemaker (1996), who adapted a perspective of evolutionary psychology to theorize about why journalists tend to present news stories about deviant events and why audiences are attracted to schema incongruent information, further developed this view. According to this view, it is the nature of all human beings, not just journalists, to survey their surroundings for things that are deviant because deviant events may pose potential

threats. Human beings who constantly monitor their environments tend to make better decisions whether to flight or fight against unexpected occurrences compared to those who do not watch their surroundings (Lee, 2008). Drawing on the evolutionary perspective, Shoemaker (1996) maintained that individuals are bound to pay special attention to news stories that deviate from their held opinions, and such characteristic is a key part of the news value (Shoemaker & Cohen, 2006). As a certain level of surveillance motive is inherent in human beings, news audiences who encounter deviant news reports are motivated to read details of the story. This evolutionary account resonates well with the prediction that media users are more likely to seek out schema-incongruent rather than schema-congruent news stories, especially when news stories describe science issues.

Overall, there are conflicting theoretical views concerning selective exposure to science information, but little evidence has been documented yet. Before the increased prevalence of online news outlets, science journalists simply assumed that news selection criteria they use for science news stories work effectively for audiences as well. Although this may be the case in a traditional media environment where audiences accept whatever science news stories their favorite news media present, it may not hold true in the current media environment where audiences can select or avoid scientific media messages based on their schema congruency (or incongruency). Based on the current state of literature, a research question is asked as follows:

Research Question 3.1 (RQ 3.1): What type of science news stories (congruent, incongruent, or neutral) are individuals more likely to select to read online based on their pre-existing views of science issues?

Role of Other Predispositions

As a recent meta-review on confirmation bias (Hart et al., 2009) indicated, it is critical for extending selective exposure research to identify conditions that may accelerate or attenuate the tendency to seek or avoid a certain type of information. However, little is known about who is more or less likely to engage in selective exposure behavior when seeking information about controversial science topics. Prior work showed that people who perceived that they did not have sufficient information about a science issue were more likely to seek science information and less likely to avoid related information (Kahlor, Dunwoody, Griffin, & Neuwirth, 2006). Another research also indicated that individuals employ firmly held beliefs, such as political ideology or religious views, as heuristics when seeking information about stem cell research from the mass media (Nisbet, 2005). However, the outcome variables analyzed and discussed in these science communication studies were related to general information seeking behavior, not to selective seeking based on individuals' pre-existing opinions. In addition, each study considered only a single topic (e.g., contamination of the Great Lakes in Michigan, stem cell research). Thus, the current research aims to explore the role of individual predispositions in seeking congruent (or incongruent) information online concerning four controversial science issues. Due to the limited prior scholarship, the following research question is posed here.

Research Question 3.2 (RQ 3.2): How do individual characteristics, such as deference to scientific authority, science knowledge, perceived science knowledge, attitude extremity, attention to science in mass media, political ideology, and religiosity

influence selective seeking and avoidance?

In addition, it is worth examining how each science issue elicits different patterns of selective exposure. Although the four issues chosen in this study have common characteristics and belong to controversial science topics, the nature of each controversy may be substantially different, leading to varying patterns of information seeking behavior. For example, individuals' perspectives on science issues may reflect religious orientations in case of evolution or stem cell research, but the divisions over the existence of global warming are mixed with political ideology as well as trust (or mistrust) in scientific findings (Jang, 2013; Malka, Krosnick, & Langer, 2009; McCright & Dunlap, 2011). It may not be surprising that individuals display somewhat different patterns of information preference across four controversial domains. Moreover, separate analyses for each of four issues can illuminate how individuals process information about science controversies differently from other political issues.

Research Question 3.3 (RQ 3.3): How do individuals exhibit different patterns of selective exposure across four science domains?

Research Question 3.4 (RQ 3.4): How do individuals exhibit different patterns of selective exposure to science issues compared to political issues?

Method

Design Overview

The study examined whether individuals selectively seek congruent or incongruent information regarding controversial science issues. Participants were instructed that they were going to participate in two independent studies. They first

completed a survey and then were told to browse through an online science magazine for a scheduled period of four minutes. Participants' online activities, including selection of and exposure time to each news article, were automatically recorded.

Participants

Two hundred-thirty eight American adults participated in this study online in exchange for cash value rewards credited to their online accounts. The survey firm *Qualtrics* collected the data in the fall of 2012. This company drew a panel from a sample frame that closely mirrors the U.S. census data based on the stratified quota sampling method. Participants ranged in age from 18 to 82, with a mean age of 46.32 ($SD = 14.17$). Of this sample, 52% were female, and the median income category was \$50,000 – \$75,000. Participants' party affiliation was 28% Republican, 30% Democrat, and 42% Independent. Although the debate concerning the representativeness of the national volunteer sample is under way, a growing number of social science studies have benefitted from non-probability national samples as they are more likely to alleviate concerns about homogeneous sample characteristics (e.g., Curran, Iyengar, Lund, & Salovaara, 2009; Morey, Eveland, & Hutchens, 2012; Vavreck & Rivers, 2008). The demographics of the current sample were close to those from other probability surveys.⁵

Stimulus Material

⁵ The 2008 American National Election Study (ANES) reported an average age of 47.8, which is similar to the mean age of participants in this study ($M = 46.32$). In addition, whereas the American Community Survey 2006–2008 reported \$63,000 as an average income, the median income category of the current sample was \$50,000 – \$75,000. The party identification of the sample largely resembles the results of the ANES, although in the present study, Republicans (2%) were slightly overrepresented and Democrats (4%) were underrepresented compared to the ANES.

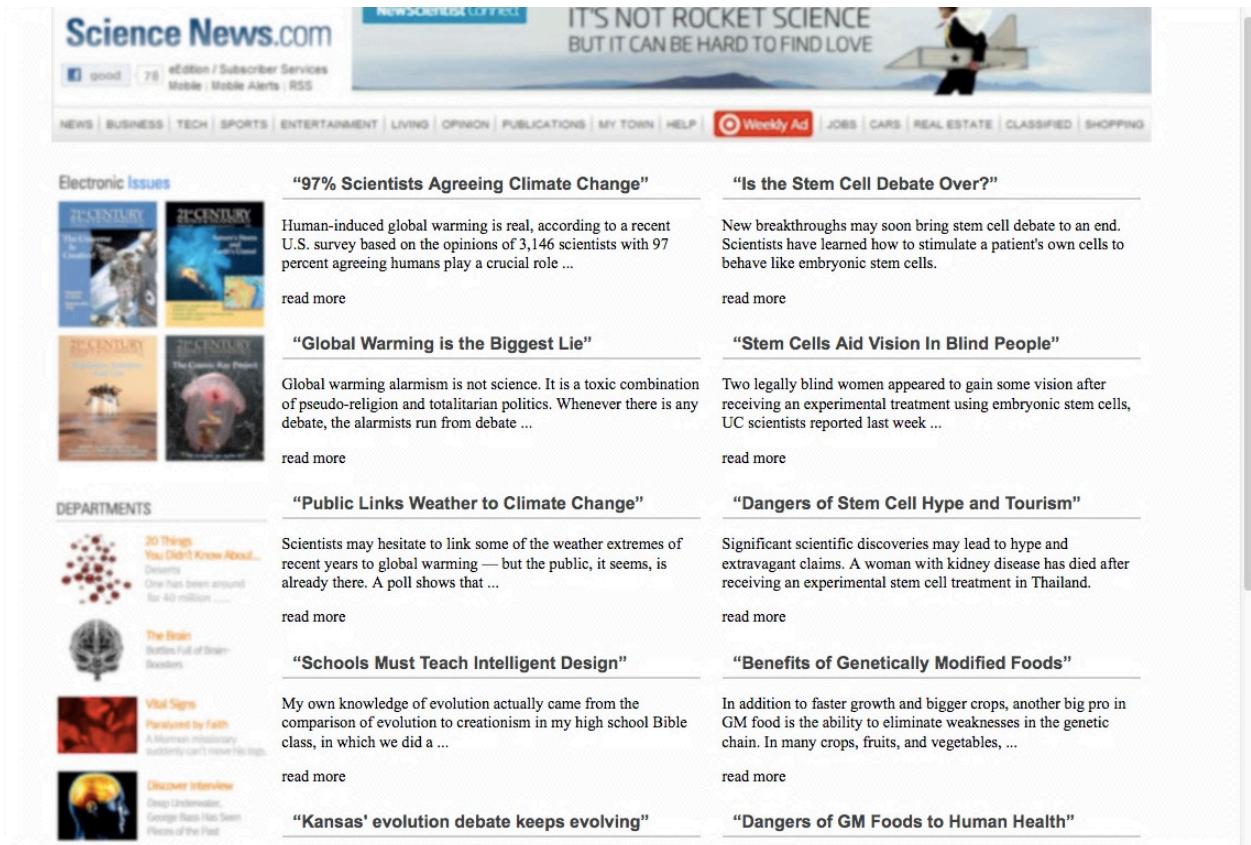


Figure 3.1. Screenshot of Online News Magazine.

Main page. The online news magazine “sciencenews.com” was created to resemble common news websites. As seen in Figure 3.1, the website title and menus were blurred and deactivated. The main page displayed 12 news leads featuring four science issues, including stem cell research, evolution, GM foods, and global warming. Each science topic was covered by three news reports that reflected three distinct views on the issue (two opposing views and one neutral view). All news leads included headlines and subheadings that were similar in length. The headlines consisted of about 6 words, and the subheadings ranged from 23 to 30 words. The position of each news leads was randomly rotated across participants to counterbalance any effects of the locations.

News article page. The online magazine consisted of one layer where participants could choose to read news articles on the main page and then click back to the main page from actual news article pages. The main page and news article pages did not involve any images or cues relevant to news articles. All news articles were taken from either Associated Press (AP) in the Lexis/Nexis database or the Google news database and were edited to be equal in length, ranging from 296 to 306 words. Any references to source or news organizations in the articles were removed.

Procedure

The entire procedure was processed online. The benefits of computer-based research have been recognized in the literature (for a review, see Gaines, Kuklinski, & Quirk, 2007). Compared to lab settings, online settings not only allow participants to react to stimuli in a natural setting (e.g., home) but also to be less vulnerable to any systematic biases occurring due to the presence of the experimenter (e.g., demand characteristics). Although the researcher may have decreased control over participants' behavior, this would only increase random errors without systematically contaminating the results.

Participants initiated the study by reading a description of the study and signing a consent form. First, participants completed a baseline survey. The first set of questions involved the attitude and attitude importance toward various science and social issues, including four focal issues (stem cell research, evolution, GM foods, and global warming). Six additional social issues (abortion, gun control, health care, immigrants, gay rights, and legalizing marijuana) were included to serve as a distraction. Participants then responded to the items, such as deference to scientific authority, science knowledge,

perceived science knowledge, attention to science news, and demographics.

Subsequently, participants were led to an instruction page providing an information on browsing through the experimental online magazine. Participants were informed that they could choose and read as many news stories as they wanted and that they do not need to read all the stories. By clicking the start button, participants began browsing through the online magazine. Every use of hyperlinks was automatically recorded. After four minutes of browsing, the final page appeared and participants were debriefed and thanked. Ten participants spent less than fifteen seconds on news story pages; thus, they were not fully engaged in the study and were removed from further analysis.

Pretests

The goal of the pretest was to assess whether three chosen news leads and articles for each topic that presented three different views on the issue were equally interesting and important. Thirty-six participants (age: $M = 48.81$, $SD = 14.12$; 50% female) and 38 participants (age: $M = 47.82$, $SD = 11.95$; 47% female) were recruited from the same population for a news lead pretest and a news article pretest respectively.

The pretest participants evaluated 12 news leads and articles in terms of interest, importance, and perceived issue support (Knobloch-Westerwick & Meng, 2009). Interest and importance were assessed by asking participants to report their interest in and perceived importance of the article regarding 12 news leads and articles on 5-point scale (1 = *Not at all interesting / Not at all important*, 5 = *very interesting / very important*). Perceived issue support was assessed on a 9-point scale (1 = *very strongly opposing*, 9 = *very strongly supporting*) by asking participants, “In your impression, is the portrayal of

Table 3.1. Pretest Results for 12 News Leads

Issue	Interest <i>M (SD)</i>	Importance <i>M (SD)</i>	Issue Support <i>M (SD)</i>
GM Foods	$F(2, 70) = 0.36$	$F(2, 70) = 0.36$	$F(2, 70) = 86.10^{***}$
News 1	3.33 (0.99)	3.14 (0.72)	2.53 (1.44)
News 2	3.31 (0.89)	3.33 (1.07)	5.06 (0.98)
News 3	3.44 (1.16)	3.25 (1.25)	7.28 (1.45)
Stem Cell	$F(2, 70) = 1.14$	$F(2, 70) = 1.32$	$F(2, 70) = 74.35^{***}$
News 4	2.94 (1.17)	2.91 (1.11)	3.06 (1.37)
News 5	3.19 (0.89)	3.28 (1.03)	4.89 (0.95)
News 6	3.28 (0.97)	3.25 (1.05)	6.97 (1.36)
Global Warming	$F(2, 70) = 0.49$	$F(2, 70) = 0.23$	$F(2, 70) = 18.27^{***}$
News 7	3.03 (1.03)	3.47 (1.13)	3.08 (1.46)
News 8	2.83 (0.91)	3.42 (1.05)	4.50 (1.42)
News 9	2.91 (1.32)	3.31 (0.98)	6.06 (2.70)
Evolution	$F(2, 70) = 1.09$	$F(2, 70) = 0.13$	$F(2, 70) = 14.14^{***}$
News 10	3.00 (1.01)	3.08 (0.84)	3.53 (2.10)
News 11	3.14 (0.99)	3.06 (1.04)	4.78 (0.83)
News 12	3.22 (1.07)	2.97 (1.00)	5.83 (1.66)

Note: Interest and importance range from 1 to 5, and issue support ranges from 1 to 9. *F*-tests were conducted for three news leads within each domain. * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3.2. Pretest Results for 12 News Articles

Issue	Interest <i>M (SD)</i>	Importance <i>M (SD)</i>	Issue Support <i>M (SD)</i>
GM Foods	$F(2, 74) = 0.18$	$F(2, 74) = 0.41$	$F(2, 74) = 67.73^{***}$
News 1	2.89 (1.11)	3.13 (0.84)	2.65 (1.82)
News 2	2.97 (0.91)	3.03 (0.94)	4.79 (1.09)
News 3	3.03 (1.03)	2.85 (1.01)	7.42 (1.75)
Stem Cell	$F(2, 74) = 1.47$	$F(2, 74) = 0.76$	$F(2, 74) = 56.72^{***}$
News 4	2.95 (0.93)	2.89 (0.99)	2.87 (1.74)
News 5	2.95 (0.80)	2.97 (0.88)	4.92 (1.00)
News 6	3.26 (1.03)	3.11 (1.01)	7.15 (1.73)
Global Warming	$F(2, 74) = 0.22$	$F(2, 74) = 0.22$	$F(2, 74) = 40.69^{***}$
News 7	2.92 (0.94)	3.26 (0.98)	2.89 (2.00)
News 8	3.08 (1.08)	3.24 (0.82)	4.52 (1.31)
News 9	3.05 (1.18)	3.13 (0.84)	7.11 (2.59)
Evolution	$F(2, 74) = 0.38$	$F(2, 74) = 0.55$	$F(2, 74) = 73.08^{***}$
News 10	3.18 (1.06)	2.89 (0.86)	2.16 (1.79)
News 11	3.00 (0.90)	3.03 (0.79)	4.95 (0.70)
News 12	3.16 (0.97)	2.82 (0.87)	6.66 (1.82)

Note: Interest and importance range from 1 to 5, and issue support ranges from 1 to 9. *F*-tests were conducted for three news articles within each domain. * $p < .05$; ** $p < .01$; *** $p < .001$.

stem cell research (evolution/GM foods/global warming) in the news lead (or article) strictly neutral, or does it take sides with supporters or opponents of stem cell research (evolution/GM foods/global warming)?”

Table 3.1 describes the mean values of interest, importance, and perceived issue support regarding 12 news leads. *F*-test results indicated that three news leads within each topic were considered similarly interesting and important although they presented divergent perspectives. The pretest for 12 news articles yielded identical results, as shown Table 3.2. Thus, the pretest results suggest that stimulus construction was successful.

Measures

Issue attitudes. Each issue attitude was assessed by two items. Participants reported how strongly they agreed with the statements on a 6-point scale with *strongly disagree, disagree, somewhat disagree, somewhat agree, agree, and strongly agree* as the response options. The attitude measures were adopted from previous research (Hart & Nisbet, 2012; Ho, Brossard, & Scheufele, 2008; Kim, Kim, & Besley, 2013; Miller, Scott, & Okamoto, 2006; Rughinis, 2011). The items were worded as follows: stem cell research: “I favor medical research that uses stem cells from human embryos” ($M = 4.12$, $SD = 1.42$); evolution: “I think human beings evolved from earlier species of animals” ($M = 4.43$, $SD = 1.58$); GM foods: “I support use of genetic modification technology for producing foods” ($M = 3.33$, $SD = 1.16$), and global warming: “We should increase government regulation on industries that produce a great deal of greenhouse emissions” ($M = 4.65$, $SD = 1.07$). Based on the obtained values, participants were divided into two groups per topic for the purpose of further analysis.

News article exposure. A behavior tracking device automatically recorded participants' use of the hyperlink. This measure enabled us to record how many times each news article was selected and how long each news story was read at the individual level. Both selection of and exposure time to news stories were utilized as a basis for exposure measures. Exposure time was recorded by assessing the accumulated time, in seconds, spent on an article page.

Exposure to congruent / neutral / incongruent information. Exposure to attitude-congruent, neutral, and attitude-incongruent information was assessed in terms of accordance between participants' attitudes toward issues and the viewpoints of the news articles on each science topic as indicated by the pretest. Exposure to attitude-congruent information was measured based on the proportion of the number of attitude-congruent news articles that participants selected across the four issues as well as the proportion of the aggregated exposure time to those articles. Likewise, exposure to neutral and attitude-incongruent information was assessed based on the proportion of the aggregated selection of and exposure time to neutral and attitude-incongruent news articles. For example, if an individual read 5 news stories for 200 seconds in total and spent 90 seconds reading attitude-incongruent news stories, his or her values of exposure to incongruent information would be counted as .4 (selection) and .45 (time). The percentage values were used for the aggregated measure because participants varied significantly in terms of their total amount of news article selections and exposure time.⁶

⁶ The percentage values were employed as an aggregated measure (sum of four issues) for exposure to consonant, dissonant, and neutral information. However, for an issue-based measure, the raw values (e.g., the number of selected articles and time spent in seconds) were used because most percentage values would generate either 0 or 1.

Deference to scientific authority. Deference to scientific authority was assessed with a composite index of two 6-point items (1 = *strongly disagree*, 6 = *strongly agree*) taken from previous research (Binder, 2010; Ho et al., 2008): (a) “Scientists know best what is good for the public”, (b) “Scientists should move ahead with research even if it displeases some people” ($M = 3.63$, $SD = 0.90$, $r = .42$).

Science knowledge. A science knowledge index was created using five true–false items from prior studies (Ho et al., 2008; Miller, 1998): (a) “Light travels faster than sound” (86.8% correct), (b) “Antibiotics kill viruses as well as bacteria” (64.9% correct), (c) “Adult stem cells are used to develop treatment for disease” (56.1% correct), (d) “Electrons are smaller than atoms” (78.1 % correct), and (e) “Stem cells can only be developed from human embryos” (53.5 % correct). The index was constructed by summing up the number of correct responses ($M = 3.39$, $SD = 1.08$).

Perceived science knowledge. Perceived science knowledge was measured on a 6-point scale (1 = *strongly disagree*, 6 = *strongly agree*): “I have much knowledge about science in general” ($M = 3.36$, $SD = 1.08$).

Attitude extremity. An attitude extremity measure indicates the degree to which an individual’s attitude deviates from the midpoint of the self-report rating scales (Krosnick, Boninger, Chuang, Berent, & Carnot, 1993). An index of attitude extremity was generated from the four issue attitude scales described above. First, responses to four topics were recoded to range from 1 to 3 with *strongly disagree* and *strongly agree* coded as 3, *disagree* and *agree* coded as 2, and *somewhat disagree* and *somewhat agree* coded as 1. These values from four topics were then summed to create an index of attitude extremity ($M = 7.37$, $SD = 1.75$).

Attention to science in mass media. An index of attention to science in mass media was constructed using two 6-point scale items (1 = *strongly disagree*, 6 = *strongly agree*): (a) “I pay attention to stories about science, technology, and medicine on television”, (b) “I pay attention to stories about science, technology, and medicine in newspapers” ($M = 3.51$, $SD = 1.16$, $r = .66$)

Political ideology. Political ideology was measured with a single 7-point scale item ranging from 1 = *very conservative* to 7 = *very liberal* ($M = 4.54$, $SD = 1.51$).

Religiosity. Religiosity was evaluated according to the mean response to two 5-point scale items ($M = 2.42$, $SD = 1.08$, $r = .66$). Participants were asked, (a) “How much is religion important to your life?” (1 = *Not at all important*, 5 = *Extremely important*) and (b) “How often do you go to church?” (1 = *Never*, 5 = *More than once a week*).

Results

Seeking Congruency or Incongruency?

On average, participants read 4.11 ($SD = 2.35$) news stories and spent 174.14 ($SD = 60.59$) seconds on news article pages within 240 seconds of scheduled browsing time. Participants clicked on 1.42 ($SD = 1.07$) news stories that contain attitude-congruent views, on 1.09 ($SD = 1.12$) neutral news stories, and on 1.59 ($SD = 1.05$) attitude-incongruent stories. The proportions were 34.58% ($SD = 23.82$) probability of selecting a story with consonant views, 24.07% ($SD = 22.76$) for neutral views, and 41.34% ($SD = 26.82$) for dissonant views (Table 3.3). Repeated measure analysis revealed that this difference was significant, $F(2, 454) = 19.12$, $p < .001$, $\eta^2 = .08$. Exposure time measures yielded similar results. Within the time spent on news article pages,

participants spent 34.56% ($SD = 27.60$) of their time reading consonant news stories, 23.64% ($SD = 26.44$) of their time reading neutral stories, and 41.80% ($SD = 29.86$) of time reading dissonant stories. This difference was also significant, $F(2, 454) = 16.20$, $p < .001$, $\eta^2 = .07$.

Further, to assess the two competing perspectives more directly, exposures to congruent and incongruent information were compared against each other. The paired t -tests generally supported the view that media users are attracted to dissonant rather than consonant science information. As shown in the last row in Table 3.3, the likelihood of selecting incongruent science news stories was higher than the likelihood of selecting congruent stories, $t(227) = 2.02$, $p < .05$. and the time spent on incongruent stories was

Table 3.3. Selective Exposure to Consonant, Neutral, and Dissonant Science Information

	Selected articles			F -test	Exposure time (s)			F -test
	Consonant	Neutral	Dissonant		Consonant	Neutral	Dissonant	
Stem cell	0.30 (0.46)	0.23 (0.42)	0.41 (0.49)	$F(2, 454)$ = 10.01***	12.27 (28.02)	6.32 (16.94)	18.76 (33.36)	$F(2, 454)$ = 11.77***
Evolution	0.41 (0.49)	0.25 (0.43)	0.39 (0.49)	$F(2, 454)$ = 8.76***	18.56 (32.79)	8.71 (25.46)	18.16 (33.14)	$F(2, 454)$ = 6.83***
GM foods	0.36 (0.48)	0.25 (0.44)	0.46 (0.50)	$F(2, 454)$ = 12.71***	15.89 (31.53)	9.83 (23.99)	22.64 (36.58)	$F(2, 454)$ = 8.91***
Global warming	0.35 (0.48)	0.36 (0.48)	0.32 (0.47)	$F(2, 454)$ = 0.34	13.44 (25.92)	16.32 (32.71)	13.23 (27.85)	$F(2, 454)$ = 0.75
Total (%)	34.58 (23.82)	24.07 (22.76)	41.34 (26.82)	$F(2, 454)$ = 19.13***	34.56 (27.60)	23.64 (26.44)	41.80 (29.86)	$F(2, 454)$ = 16.20***

Note: Entries are the number of selected articles and time spent in seconds along with corresponding standard deviations in parentheses. Repeated measure analyses yielded *F*-test results. *** $p < .001$.

longer than the time spent on congruent stories, $t(227) = 2.14, p < .05$.

Repeated measure analyses for each domain were computed separately to explore possible variations across four science issues. *F*-test results are summarized in Table 3.3, showing that individuals did not show any preference among three types of news stories about global warming although they did prefer one type of information to the other regarding the rest of three science issues. In addition, the paired *t*-tests for these three issues allowed for investigating the nature of information preference in more detail. As the first row of Table 3.3 indicates, individuals were more likely to click to read, $t(227) = 2.54, p < .05$, and spend time on, $t(227) = 2.20, p < .05$, incongruent rather than congruent news reports about stem cell research controversy. However, individuals did not express any preference about three different news stories about evolution in terms of the number of selected articles, $t(227) = 0.39, p > .05$, and exposure time, $t(227) = 0.12, p > .05$. Finally, individuals preferred incongruent to congruent news stories about GM foods. Both article selection, $t(227) = 2.31, p < .05$, and exposure time, $t(227) = 2.03, p < .05$, confirmed this pattern.

The Effect of Individual Characteristics on Exposure

To examine RQ 3.2, selection of and exposure times to consonant and dissonant science news articles were regressed on the following predictors: deference to scientific authority, science knowledge, perceived science knowledge, attitude extremity, attention to science in mass media, religiosity, political ideology, age, and gender. The regression results for each science issue as well as the aggregated values are illustrated in Table 3.4.

First, the regression results for the aggregated values showed that perceived science knowledge exerted the strongest effect. Individuals who perceived that they

Table 3.4. Impacts of Individual Predispositions on Selective Exposure

Article selection											
	Total		Stem cell		Evolution		GM foods		Global warming		
	Con	Dis	Con	Dis	Con	Dis	Con	Dis	Con	Dis	
Deference to science											
Science knowledge											
Perceived knowledge	.32***	-.32***	.15*								.32***
Attitude extremity											
Attention to science		.19*									-.15*
Political ideology											
Religiosity		-.17*		-.20**		-.19*					
<i>R</i> ²	.11**	.11**	.06	.07	.07	.09*	.05	.06	.11**	.03	

Exposure time (s)											
	Total		Stem cell		Evolution		GM foods		Global warming		
	Con	Dis	Con	Dis	Con	Dis	Con	Dis	Con	Dis	
Deference to science											
Science knowledge											
Perceived knowledge	.31***	-.32***		-.13#		-.21**		-.18*			.36***
Attitude extremity											
Attention to science		.16*				.16*		.20*			
Political ideology											
Religiosity		-.14*		-.17*		-.20**					
<i>R</i> ²	.11**	.10**	.03	.07	.08*	.09*	.05	.09*	.15***	.06	

Note: Age and gender were also included as control variables but were not significant. Cell entries are beta weights. * $p < .05$; ** $p < .01$; *** $p < .001$.

know much about science tended to seek out attitude-congruent science news articles and avoid attitude-incongruent articles based on both selection and exposure time measures. On the other hand, science knowledge did not affect the four outcome variables significantly. Religiosity played a role similar to the role of perceived knowledge. Those who were more religious tended to avoid science news articles that challenged their existing views. Attention to science in mass media affected the exposure to attitude-incongruent science stories. Individuals with greater attention to science in mass media were more likely to select and spend time reading incongruent science articles.

Although analyses separately done for each issue did not generate powerful models, it is worth noting that some predictors played more significant role in some issues than other issues. For example, religiosity was significantly associated with selection of and exposure time to Table information about stem cell research and evolution. Those who were religious were more likely to avoid news reports about stem cell research or evolution when the news stories were not in accordance with their own views. On the other hand, religiosity had little effect on exposure to information about GM foods or global warming, which does not typically reflect religious perspectives.

Discussion

This research attempted to increase our understanding of selective exposure to controversial science issues in an online setting. To achieve this, the present study tested two competing theoretical perspectives on the audience's selectivity in information searching behavior. While research on confirmation bias predicts that individuals are

drawn to schema-congruent science information to reduce cognitive dissonance, the current findings contradicted this proposition. The results revealed that while the information-seeking pattern of participants varied across science domains, confirmation bias was not manifested in any of four science issues considered in this study. Instead, participants tended to pay attention to challenging rather than supporting information with regard to stem cell research and GM foods. This evidence supports (a) schema theory, which suggests that deviant, novel, and schema-incongruent stimuli are more likely to capture attention (Berlyne, 1960; Lee, 2008; Rovee-Collier, 1989; Srull et al., 1985) as well as (b) Shoemaker's (1996) evolutionary account that people are taught to survey the environment and acquire new information about possible threats.

Although the way with which users interacted with information in this specific online setting did not encompass a wide variety of information seeking activities online, the current findings suggest that online users may not be as susceptible to confirmation bias as some scholars (Bennett & Iyengar, 2008; Sunstein, 2001) have argued. Along this line, concerns about polarized public opinions on controversial science issues may be qualified by the observation that people did not systematically avoid science information that features alternative perspectives. Although previous studies (Feldman et al., 2012; McCright, & Dunlap, 2011; Zhao, 2009) showed that global warming skeptics, especially Republicans in the U.S., reinforced their attitudes and perceptions of the global environmental problems through repeated exposure to partisan cable media, selective exposure exhibited by these studies are due mainly to structural factors rather than individual orientations. In other words, if Republicans chose Fox news based on their political ideology not on their attitudes toward specific science issues such as global

warming, Fox news viewers' exposure to global warming skeptics would not necessarily result from an individual tendency to seek out skeptical views on global warming; instead, it would emerge as a by-product of channel selection. On the contrary, in an online setting where individuals can freely choose science information, individuals may not be attracted to congruent news stories as observed in the current study.

The regression results examining the role of individual characteristics in selective exposure showed that perceived science knowledge positively predicted exposure to attitude-congruent information but was negatively associated with exposure to attitude-incongruent information. On the other hand, science knowledge index remained insignificant across analyses. Those who perceived that they have sufficient science knowledge were more likely to display confirmation bias. This is in line with previous findings, which indicated that if one is certain about his or her own views, he or she would be more likely to avoid attitude-incongruent information (Knobloch-Westerwick & Meng, 2009). It is likely that if individuals believed that their existing issue attitudes toward an issue were firmly established based on sufficient information about the issue, they would not want to confront challenging information that may cause cognitive dissonance. The regression analysis identified religiosity as another significant predictor. Religiosity tended to promote confirmation bias, suggesting that highly religious individuals are more likely to wall themselves off from diverse perspectives about science controversies. Not surprisingly, this tendency was evident in stem cell research and evolution issues, which often conflict with religion. Finally, attention to science in the mass media positively predicted exposure to attitude-incongruent articles. This indicates that individuals who were exposed to attitude-congruent news stories presented

in their favorite mass media outlets may seek out attitude-incongruent news stories when obtaining information online. This result resonates well with previous findings that frequent online news users tend to encounter both congruent and incongruent information and opinions through either intentional search or inadvertent exposure (Brundidge, 2010; Garrett, 2009b).

The present findings suggest that online users interact differently with science information compared to political information. The results of this study are at odds with recent findings of selective exposure in political contexts. Political communication researchers have shown that online users who confronted diverse viewpoints in an online setting tended to prefer consonant to dissonant political information (e.g., Iyengar et al., 2008; Knobloch-Westerwick & Meng, 2009). The inconsistencies between political and science domains merit further theoretical explanations. First, in line with Shoemaker's (1996) evolutionary perspective, human beings' surveillance motive rooted in biology and culture may be more likely to influence individuals' information selection than would their motive to reduce cognitive dissonance. As news stories about controversial science issues often describe potential risks and threats, novel findings, or unexpected occurrences, individuals' surveillance motive is likely to come into operation, making them attend to incongruent rather than congruent science information.

The issue-based analysis of this study may provide further basis for investigating this explanation. The results showed that individuals' tendency to prefer challenging to supporting views was witnessed only for stem cell research and GM foods issues but not for evolution and global warming issues. Interestingly, news headlines about stem cell research and GM foods employed in this study presented the controversies using a risk-

and-benefit perspective (e.g., “dangers of stem cell hype and tourism”; “dangers of GM foods to human health”). On the other hand, news headlines about evolution and global warming focused on other aspects of the debates (e.g., “global warming is the biggest lie”; “public schools should teach intelligent design”). Although a more controlled research design is necessary to provide a rigorous assessment of potential messaging effects, the current findings highlight the possibility that individuals are inclined to seek incongruency rather than congruency in science issues especially when science controversies involve discussing risks or threats.

In a similar vein, it is also possible that information utility overrides confirmation bias. Reviews (Frey, 1986; Hart et al., 2009) and recent evidence (Knobloch-Westerwick, 2012) on confirmation bias suggest that confirmation bias does not occur when individuals perceive challenging information to be useful. If audiences think highly of the information utility of science news stories, which often ponder high risks and benefits of science, they may not mind being exposed to counter-attitudinal science information.

Limitation and Future Directions

The findings from the present study help answer some questions about audiences’ selectivity in online science communication while paving the way for future investigations. Yet, probably the most notable limitation is that information seeking behaviors observed in this study have little generalizability to other kinds of online activities. Although the current study provided one type of online environment that resembles real-world online news websites and captured common online activities, such as selecting news articles by clicking news leads, this reflects only a small part of online interactions available on the Internet. For example, little is known about the extent to

which users are exposed to congruent or incongruent science information when typing search terms. Furthermore, the unique nature of social networking sites awaits future investigations in relation to selective exposure. For example, information from social networking sites such as Facebook is provided to users by an unknown algorithm. Thus, regardless of individuals' psychological propensities to seek out challenging (or consistent) information, it is possible that machine learning might now allow users to encounter diverse opinions and perspectives in the first place.

Another future direction is to examine whether individuals' preference of incongruent over congruent science information is influenced by an issue in general or specific messaging strategies. Based on the current findings, individuals tended to be attracted to incongruent information about stem cell research and GM foods but not for evolution and global warming. However, it remains uncertain whether this issue difference occurred because individuals perceived stem cell research and GM foods issues to be inherently more threatening than the other or because individuals found information about risks or threats only in the news headlines about stem cell research and GM foods issues. Future work can clarify this issue by directly measuring perceived risk both at the message and issue level.

Finally, future research is to examine the effects of audiences' selectivity on their engagement in science issues. Public opinion research indicates that exposure to balanced viewpoints on a social issue may yield ambivalence and thus hinder active participation regarding the issue (Mutz, 2006). If promoting balanced perspectives on science issues is not a primary goal of science communication (Boykoff & Boykoff, 2004), the observed tendency to seek out incongruency may pose additional challenges to

science communication strategies. Furthermore, future research should address whether ambivalence resulting from exposure to divergent opinions is a temporary state experienced in the decision making process or a finalized outcome.

Chapter 4

Selective Learning and the Growth of Issue Specialists

Theorists welcomed television as a “knowledge leveler” (Neuman, 1976, p. 122) that reduces the inequality in political knowledge (Eveland & Scheufele, 2000). They suggest that incidental and habitual exposure to daily evening newscasts leads to a narrowing knowledge gap between the more and less educated citizens. More specifically, the less educated inadvertently benefit from watching television as they become generalists who are aware of a wide range of political and social issues in spite of their relatively low interest in politics. However, as the information environment changes, many have been concerned about whether new media can fully serve a function of fostering generalists (Sunstein, 2001). By virtue of decentralized media outlets and increased user controllability, individuals, especially those who are uninterested in politics, can avoid news efficiently and seek entertainment single-mindedly. As a result, mass publics might fail to obtain the political information necessary for competent citizenship in a democratic society. Additionally, the knowledge gaps between the educated and uneducated, news junkies and entertainment fans, and the “haves” and “have-nots” widen (Bennett & Iyengar, 2008).

Despite the scholarly concerns about the decline of information generalists in the new information environment, relatively little attention has been paid to the advantage of information specialists, who are knowledgeable only within a particular domain of their

interest. If people can seek their path of interest directly via the search function of the Internet, they will engage in more effective ways of information processing with their increased levels of motivation to learn and attention (Bandura, 1982). They are more likely to learn about what is going on in the world as well especially when the topics are personally interesting to them (Prior, 2007). Thus, in the emerging media environment, the most powerful driving force of knowledge acquisition in a certain domain would be individuals' interest in the issue rather than conventional resources such as education or personal connections with experts.

The current study addresses this issue by examining whether the Internet, as compared to traditional media, facilitates the selective learning, driven by personal issue interests. Using a national survey about a health care reform bill in the U.S., I examine whether informed citizens in the health care domain consist of those generally educated or those specifically interested in the health issue. Then, the study investigates the role of different mediums in cultivating information specialists.

Who are Knowledgeable Citizens in an Issue?

Habermas (1984) posits that the functioning of a healthy democracy requires an informed citizenry whose attitudes and participation are based on a broad set of relevant and accurate information. According to a voluminous literature on political knowledge, at least three theses have been widely accepted. First, levels of political knowledge are consequential to various democratic values, including participation, representation, and abilities to form coherent and stable attitudes (Zaller, 1992). Second, overall levels of political knowledge in the U.S are frustratingly low (Lupia & McCubbins, 1998; Neuman

1986). Third, knowledge is unevenly distributed across the population and is associated with socioeconomic factors (Delli Carpini & Keeter, 1996).

However, relatively little has been examined concerning the distributed patterns of knowledge at individual levels. Who are informed citizens in each issue domain? Are their knowledge levels fluctuating or stable across domains? Responses to these questions have varied but have generally stemmed from two theoretical models. The first model posits that individuals have varying interests and knowledge levels across domains and need not or cannot be experts on every issue. This model stresses the pluralism of public opinion. The second model emphasizes that public opinion is stratified based on conventional resources such as education. Although the average citizen may not be knowledgeable in general, democracy functions owing to a small number of elites who are attentive, active, and are indeed well informed (Neuman, 1986). In the next few paragraphs I will examine each of these two arguments, which are the information specialist thesis and the information generalist thesis.

The Information Specialist Thesis: Issue interest matters

Theoretically, the concept of *issue public* is a useful framework for developing hypotheses about why citizens are more likely to be information specialists rather than information generalists. The premise of issue public explains how American citizens engage in politics, although most of them show low level of political knowledge (Converse, 1964). Practically, most people have few resources and little motivation to pay attention to all of the nation's social and political issues. Thus, citizens should be

expected to concentrate on only a few issue domains and be selective in gathering and acquiring information within a domain.

Another important premise of issue public is that individuals need not be well educated to form attitudes regarding the issues they perceive as interesting or important. Prior research has indicated that perceived self-interest motivates individuals to obtain domain-specific knowledge and engage in policy evaluations (Berent & Krosnick, 1995). One explanation of this interest driven information-seeking and information-evaluating behavior is that the knowledge construct of a certain issue becomes more accessible when people are interested in the issue (Iyengar, 1990).

The Information Generalist Thesis: Education matters

The information generalist thesis, perhaps the most widely supported proposition for explaining the functioning of democracy, offers a rather different picture of the mass polity. This approach posits that despite the general paucity of political interest and knowledge among most American citizens, democracy functions owing to a small number of sophisticated, educated, and attentive elites (Price & Zaller, 1993; Zaller, 1992).

This view indicates that education is a significant source of information for political learning. People who are more educated are presumably equipped with sophisticated cognitive ability that enables them to organize abstract ideas to understand complex political matters (cf. Grabe et al., 2009; Krosnick, 1990). For example, more educated individuals are more familiar with political issues and more knowledgeable about political events (Neuman, 1986). Although people may be more informed about

one issue than the other, those who are well informed about one issue are likely to be well informed about other issues as well (Delli Carpini & Keeter, 1996).

On closer inspection, however, these scholars did not rule out the possibilities of the specialist thesis. After discussing the methodological difficulties of assessing the pluralistic model, Neuman remarked (1986, p. 39), “The model is not wrong, but it is incomplete.” In addition, Delli Carpini and Keeter (2002) embraced the specialist thesis more explicitly in their recent paper. While calling for more research on the effects of the Internet on the growth of information specialists, Delli Carpini and Keeter (2002, p. 145) postulated, “(the Internet) will allow citizens to focus on the specific levels of politics in substantive issues in which they are most interested.” Adopting this perspective, the present study hypothesizes that although both the specialist thesis and the generalist thesis are theoretically reasonable, the specialist thesis will grow more convincing than ever before in this Internet era. Subsequently, the following section of the paper will provide a more detailed theoretical discussion of the effects of the new media environment on the growth of the specialists.

Hypothesis 4.1. (H4.1): Personal issue interest, compared to education, will be a stronger predictor of issue-specific knowledge.

Traditional Media and By-Product Learning

Before hundreds of cable channels penetrated American households, most people watched television for several hours every night. They relied primarily on the evening news broadcasts by three network channels to catch up on what was happening in the world. During the heyday of network news, many Americans were exposed to the news

partly because they were followed by their favorite sitcoms or because all three channels aired the news at the same time (Prior, 2007). Although some elite newspapers and magazines might provide selective, detailed, and in-depth information, most citizens do not benefit from these media. For more than five decades, television has been the major source of political information.

Such traditional media environment offers ample opportunities for by-product learning (Downs, 1957; Lee, 2009; Zukin & Snyder, 1984). The rational theory posits that people collect information not only through active seeking behaviors but also through accidental exposure to information (Downs, 1957). Most important is that by-product learning enables individuals to minimize the information cost, such as time and cognitive energy. The features of by-product learning are well incorporated into the process of learning from traditional news media. Even viewers who do not have much interest in public affairs are likely to encounter news information on television regardless of their intentions.

Researchers have gathered empirical evidence of incidental learning in multiple contexts. Blumler and McQuail (1968) found that viewers were able to identify policies more accurately than indifferent non-viewers. Neuman, Just, and Crigler (1992) showed that television was more effective for teaching people about low-salience issues, indicating incidental learning with low involvement.

Many researchers paid attention to the fact that incidental exposure leads to a decreased knowledge gap between more and less educated citizens (Kwak, 1999; Neuman, 1976). The gap narrows because less educated people are accidentally or occasionally exposed to TV news programs that are easily digestible, regardless of

whether or not these viewers were particularly motivated to follow the news (Neuman et al., 1992). The political information reaches not only those educated and attentive but also those with low levels of political interest and knowledge, thus allowing the latter group to keep up even with their more attentive counterparts (Bennett & Iyengar, 2008).

Another notable characteristic of traditional media outlets is homogeneous media content. The media content provided by centralized broadcast is ideologically moderate, non-controversial, and popular (Gerbner et al., 1982). To the extent that the media do not cover various spectrums of areas, it can be that individuals' personal tastes are ignored. Even if people have special interests in a particular domain, they might have difficulties obtaining relevant information through one-way publishing media. Taken together, in the traditional media environment characterized by by-product learning and homogenized information, the public is more accurately described as information generalists rather than as selectively informed specialists (Delli Carpini & Keeter, 2002).

The Internet and Selective Learning

Contrary to traditional news media, the Internet and related media technologies allow for audiences' selective learning. The technological functions, such as menu options or Google search, enable individuals to seek information directly without having to wait for the mass media to provide information they want. These technological affordances fit well with specialists' tendency to acquire information in only a few domains of their concerns (Sunstein, 2001). For example, in the traditional media environment, people are not able to develop their personal tastes because the mass media usually do not supply specialized information that might not appeal to other general

viewers. Thus, if the mass media do not help people specialize in a particular topic, they either give up becoming specialists or need to make additional efforts. In contrast, in the new information environment, individuals can obtain issue-specific knowledge easily as long as they are interested in a particular topic.

A growing body of work lends more support to this view by highlighting differences between selective or motivated learning and incidental or passive learning. According to the cognitive psychology literature, when individuals are allowed to seek their own path of interest, their motivation to learn grows, subsequently leading to a heightened attention level (Bandura, 1982; Chaffee & Schleuder, 1986). Although newspaper readership predicts higher awareness of societal issues as compared to non-readership, the relationship disappears among those who have minimal interest in the first place (Waal & Schoenbach, 2008). A similar finding is also reported in political contexts. For example, after watching television, viewers were better able to recall the candidates' statements about policy issues when they had personally important attitudes towards those issues (Holbrook *et al.*, 2005). More interestingly, they demonstrated that attitude importance increases knowledge acquisition only when accompanied by selective exposure and selective elaboration. Furthermore, Johnson and Kaye (2000) found that those who are politically interested rely more on the Internet rather than television for news consumption. There is a recent finding that selectivity in the use of the Web produces higher issue-specific knowledge, attitude extremity, and policy voting (e.g., Kim, 2009). Although such findings shed light on the relationship between the Web selectivity and issue-specific knowledge, few studies did directly compare the role of

different types of media in fostering specialists. Therefore, this study will further test which types of media make greater contribution to the growth of information specialists.

Research Question 4.1. (RQ4.1): Does the new media environment facilitate the growth of information specialists?

Hypothesis 4.2. (H4.2): The relationship between personal issue interest and issue-specific knowledge (the information specialist thesis) will become stronger among those who rely on new media, than those who rely on traditional media.

Method

Participants

The study used the secondary data from the Kaiser Family Foundation's health tracking survey regarding health care reform. Telephone interviews were conducted with 1,208 US adults between April 9 and 14, 2010, a few weeks after the health care reform bill was passed by Congress and signed by Obama in March.

A combination of landline ($n = 800$) and cell phone ($n = 408$) random digit dial (RDD) samples were used to represent all adults in the US who have access to a phone. The cell samples were offered \$5 in exchange for their cell phone minutes spent during the interview. The response rate for the landline and cell sample was 22.4% and 21.6% respectively. Subjects reported their age ($M = 51.5$, $SD = 18.0$), sex (51.3% male), race (76.2% white), and household income (Median category=between \$50,000 and \$75,000).

Measures

Issue-specific knowledge. The study created an issue-specific knowledge index using nine dichotomous yes-no knowledge items about the health care reform bill that

had been signed in March 2010. Using a split-half sample method, different sets of knowledge items were given to each half of the total sample. The issue-specific knowledge index was constructed by counting the number of items answered correctly (0 = all wrong, 9 = all correct, Cronbach's $\alpha = .626$, and $.567$ for each half)⁷. Two split-half samples were combined for further analysis ($M = 5.8$, $SD = 2.0$)⁸.

Main source of information. Respondents were asked what is their main source of news and information about the health care reform bill (1 = cable TV channels, 2 = network channels, 3 = newspaper, 4 = the Web and blogs, 5 = conversation with friends and family, 6 = radio, 7 = elected officials, 8 = an employer, 9 = community, 10 = none of the above). While the majority of the respondents reported that television channels were the most important source (38.9% Cable TV channels, 16.4% network TV channels), less than 10% of the respondents relied mostly on the Web and blogs (7.7%).

Personal issue interest. Respondents provided their perceptions about how much the health care reform would affect their family personally (1 = nothing at all to 4 = a lot).

Control variables. Following the previous studies that examined the relationships between these control variables and political knowledge (Shen & Eveland,

⁷ Relatively low Cronbach's α does not necessarily indicate the limit of the knowledge index. Rather, this reflects the dichotomous nature of single items. Furthermore, in order to create a knowledge index that taps into multiple dimensions of knowledge (i.e., to increase validity), reliability of the measure is inevitably compromised to some extent (Delli Carpini & Keeter, 1992). In other words, if knowledge items were highly correlated with one another, and reach a high level of reliability, it is hard to establish their discriminant validity. Faced with the trade-off, I chose discriminant validity rather than reliability since the main purpose of constructing the knowledge index in the current study was assessing factors influencing different levels of domain-specific knowledge.

⁸ For a simpler presentation, the issue-specific knowledge index is collapsed into low, medium, and high categories.

2010), this study included six control variables: age, gender, income, party identification, and the number of media that people use. Education was measured on a seven-point scale, ranging from 1 = none or grade 1-8 to 7 = post graduate or professional schooling ($M = 4.8, SD = 1.6$). The number of media people use was included in the analysis to extract the unique influence of their main media and to control the influence of other media. An index of the number of media sources used was created by counting the number of media sources respondents used to get information about the health care reform bill ($M = 2.7, SD = 1.3$).

Results

This study first assessed whether issue-specific knowledge is predicted by general education level or personal issue interest. Table 4.1 presents OLS multiple regression models predicting issue-specific knowledge. Model 1 consists of control variables including age, gender, income, party identification, and the number of media used. Model 2 combined education with model 1. Model 3 incorporated personal issue interest in addition to model 1. Finally, model 4 includes model 1 in conjunction with both education and personal issue interest.

Model 1 alone explains 11 percent of the variance in issue-specific knowledge. Gender and age are not significant predictors, but individuals with higher household income ($\beta = .11, p < .01$), Democrats ($\beta = .15, p < .01$), and those using diverse media ($\beta = .26, p < .01$) are more likely to have higher scores on the health care reform bill knowledge index.

To assess the information generalist thesis, model 2 included the education variable in addition to model 1. The education variable did not add a significant change to the variance initially explained by the model 1. R -square change = .00, $F(1,930) = 2.75$, $p = .10$. The coefficient for education was also not significant ($\beta = .06$, $p = .10$) at the conventional level. Thus, the information generalist thesis was not supported.

Table 4.1. OLS Regressions Predicting Issue-specific Knowledge

	<u>Model 1</u>		<u>Model 2</u> (Model1+Education)		<u>Model 3</u> (Model1+ Personal Interest)		<u>Model 4</u> (Full Model)	
	b (S.E.)	β	b (S.E.)	β	b (S.E.)	β	b (S.E.)	β
Controls								
Female	-.17 (.13)	-.04	-.17 (.13)	-.04	-.14 (.13)	-.03	-.14 (.13)	-.03
Age	-.00 (.00)	-.03	-.00 (.00)	-.03	-.01 (.00)	-.05	-.01 (.00)	-.05
Income	.10** (.03)	.12**	.07** (.03)	.09**	.08** (.03)	.09**	.06* (.03)	.07*
Democrat	.40** (.08)	.15**	.40** (.08)	.15**	.40** (.08)	.16**	.41** (.08)	.16**
The number of media	.42** (.05)	.26**	.41** (.05)	.26**	.34** (.05)	.21**	.33** (.05)	.21**
Education			.08 (.05)	.06			.05 (.05)	.04
Personal Issue Interest					.38** (.08)	.16**	.37** (.08)	.16**
R-square		.12**		.12**		.13**		.14**
R-square change from model1				.00		.02**		.03**

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

In contrast, the results of model 3 suggest that personal issue interest is a significant predictor of issue-specific knowledge. Including personal issue interest in the model, the R-square increased significantly (R -square change = .02, $p < .01$). The

coefficient of the personal issue interest variable was sizable as well ($\beta = .16, p < .01$). Finally, we included both education and personal issue interest in the model to see if the personal issue interest variable has explanatory power above and beyond the education variable. As expected, personal issue interest remained significant ($\beta = .16, p < .01$), but education became even less meaningful in the model ($\beta = .03, p = .24$). Taken together, the data supported the information specialist thesis (H4.1), indicating that well-informed citizens in the health care domain are those who think that the issue matters to them personally, rather than those who are more educated in general.

The research question concerned the role of media environment in the growth of specialists. This cross-sectional study cannot directly compare the effects of the new media environment on issue-specific political learning with those of traditional media environment. However, the survey question asking, “what is your main source of information about the health care reform bill?” allowed us to compare the characteristics of people who rely on the Internet with those who rely on television network news, cable news, newspaper, and radio. More specifically, we hypothesized that using the selective media (e.g., the Web and blogs) accelerates knowledge acquisition in the domain that people think is personally important, whereas using the non-selective media (e.g., network TV, or radio) is not so helpful for people, even in the domain that people perceive to be personally important to them.

The findings in Figure 4.1 and Table 4.2 provide support for the prediction (H 4.2). As the information specialist thesis suggests, people in general tend to show higher issue-specific knowledge when they think the domain is of great interest to them. However, this relationship disappears if people rely on network TV news, newspapers,

and radio to obtain information concerning the health care reform bill. Probably, network TV news, newspapers, and radio are not so ideal for people to learn about issue-specific knowledge because this type of media usually does not provide very detailed knowledge to viewers due partly to the limited time and space. In contrast, the relationship between personal issue interest and issue-specific knowledge remained significant among those who use the Internet ($\beta = .32, p < .05$) and cable TV channels ($\beta = .11, p < .05$) as a main source of information.

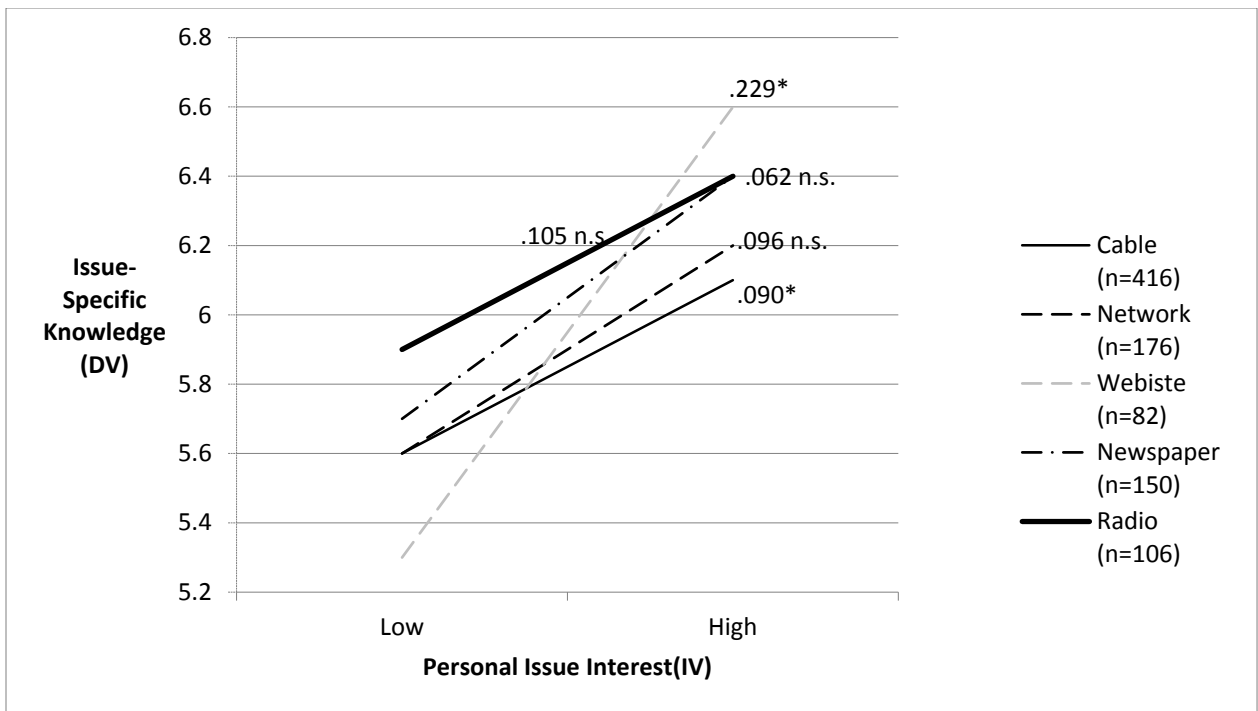


Figure 4.1. Predicting Issue-Specific Knowledge with Personal Issue Interest X Main Source of Information (Media Type).

Note: This regression model includes control variables: gender, age, education, income, party identification, and the number of media sources used. The values on the graph represent unstandardized coefficients (b) of personal issue interest in the regression model.

This result indicates that the Internet is probably the most efficient tool for individuals to translate their issue-interest into issue-specific knowledge. Notably, cable TV users also show significant relationship between personal issue interest and issue-specific knowledge. Although it might be due to the relatively larger sample size than other source users, it is also possible that cable TV users are able to develop their interests owing to hundreds of cable TV channels that provide viewers with specialized content. Overall, the findings suggest that the new media, known to be more selective and specialized, are more efficient tools to help people cultivate their interests and become information specialists in the domain.

Table 4.2. Relationships between Personal Issue Interest and Issue-specific Knowledge by Main Source of Information

Main source of information	Personal Issue Interest		R-square	N
	b (S.E)	Standardized β		
Cable TV	.09* (.04)	.11*	.14	416
Network TV	.10 (.07)	.13	.09	176
Newspaper	.06 (.09)	.07	.12	150
Website	.23* (.10)	.32*	.28	82
Radio	.11 (.08)	.16	.06	106

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

The regression model includes control variables (gender, age, income, education, party identification, and the number of media sources used).

Discussion

Responding to recent changes in the information environment, many scholars are concerned that these changes will make democracy more vulnerable. One such concern

is that the knowledge gap between the more and less educated may expand. Since the Internet affords selective exposure, the “haves” can seek political information even more efficiently while the “have-nots” are able to filter out political information more easily (Sunstein, 2001). The second concern is that the Internet facilitates audience fragmentation. As citizens tend to visit the Internet sites that are frequented by like-minded people, they may not be exposed to cross-cutting views, causing their attitudes to become even more extreme (Iyengar & Hahn, 2009; Stroud, 2010).

Although these seem to be legitimate concerns, the findings of this study suggest alternative perspectives. First, concerns about the increasing knowledge gap are based on the assumption that the knowledge gap widens between the more and less educated across a wide range of issues. However, the information specialist thesis, supported by the study, indicates that even though such a gap may appear, it is more likely to do so between those who are and are not interested in a particular issue rather than between people who are more and less educated. Furthermore, given that individuals report varying levels of interests across issues, the knowledge gap is not uniformly processed across a wide range of issue domains; thus the concerns over the increasing political information inequality may not be as threatening as we think.

Second, increased specialization may not necessarily trigger audience fragmentation. Insofar as the new media environment allows previously uninvolved citizens to cultivate an interest in particular domains, the new media may well function as a gateway into other adjacent domains. In addition, as people become more comfortable with learning through the new media, they tend to become more politically efficacious (Delli Carpini & Keeter, 2002). Furthermore, others, especially supporters of a pluralistic

model of democracy, might argue that generalists are not necessary for democracy to work, and that issue specialists would achieve the same effect (Converse, 1964). In favor of this perspective, numerous studies (Gershkoff, 2006; Krosnick & Telhami, 1995) have highlighted the role of issue specialists in light of their issue-based participation. These studies indicated that issue specialists tend to exert pressure on government and make voting decisions on the basis of their issue positions.

Another important finding of this study is that the type of media plays a moderating role in the relationship between personal issue interest and learning. Interestingly, while patrons of network TV news, newspaper and talk radio do not reflect their knowledge in proportion to their issue interest, users of the Internet and cable TV news display a higher level of knowledge according to their issue interest. Supporting this view, Holbrook et al., (2005) found that the relationship between personal issue interest and knowledge acquisition persists only when selective exposure and selective elaboration are allowed. If we juxtapose the present study with Holbrook et al.'s (2005) studies, the assumption is made that only two media, the Internet and cable TV, allow selective exposure while the other media do not.

The findings from this study help answer some important questions about how the changing media environment shapes the formation of the mass polity while paving the way for future investigations. However, these contributions must be qualified by several limitations. First, the investigation into a single-issue domain, in this case health care reform, cannot be generalized to other domains with confidence. For instance, more polarized issues, such as welfare policy and abortion, or nationally urgent issues, such as war or natural disaster, might show entirely different pictures of the dynamics in the mass

polity. Second, as the survey data are cross-sectional in nature, relationships must be qualified as correlational. Although a number of predictors, such as demographics, are clearly exogenous, the causal directions between knowledge, personal issue interest, and media use are far less clear. To make a stronger causal inference, future work is needed that involves experimental or longitudinal design.

One interesting question in this line of future research will be whether and to what degree the Internet activity remains selective. In this regard, we do not completely rule out the possibilities that other characteristics of the new media facilitate the growth of specialists. For example, as far as the degree of selectivity is concerned, visiting the [newyorktimes.com](http://www.nytimes.com) regularly will be a different activity from typing search terms in a Google box. In addition, prior research (Lee, 2009; Waal & Schoenbach, 2008) suggests that the Internet offers various opportunities for incidental as well as selective exposure. For instance, Facebook users may be incidentally exposed to provocative news articles or YouTube clips that are posted by one of their Facebook friends. Thus, it will be interesting to see whether the experience of social networking sites fosters specialists or generalists.

Chapter 5

Identifying Issue Specialists in a Changing Media Environment

The question of whether the American public mostly consists of specialists or generalists in public affairs has never been effectively resolved. Although the dominant view in the literature posits that citizens tend to be generalists who are relatively evenly interested in a wide range of public affairs, others have supported an alternative view that citizens tend to be specialists, who care only about a few particular issues and generally indifferent to all others (Delli Carpini & Keeter, 1996; Gershkoff, 2006; Krosnick, 1990; Neuman, 1986; Price & Zaller, 1993). While the debate is still under way, several media scholars have recently begun to highlight the possibility of the growth of specialists in conjunction with the changing media environment (Jang & Park, 2012; Lasica, 2002). The premise is that since new media allow users to seek information of interest selectively and avoid media content of little interest efficiently, individuals tend to become specialist-type citizens than generalist-type citizens (Delli Carpini & Keeter, 2003; Kim, 2009).

Although widely circulated, the idea has not been fully tested empirically. The lack of empirical support is mostly due to inadequate instrumentation of the concept of the specialist and generalist. Since Krosnick's (1990) series of co-authored studies in the early 1990s, researchers have employed personal issue importance as a proxy measure of issue specialists (i.e., issue publics). That is, those who think an issue is important to

them are treated as specialists within the domain. However, this operationalization can be problematic because the measure of personal issue importance is unable to distinguish those who think the issue is especially important to them (i.e., specialists) from those who think the issue is also important to them (i.e., attentive generalists).

To redress this limitation of the current measure of specialists and generalists, this paper proposes an alternative way of measuring the concept of the specialist and generalist. Further, using the proposed method, the paper examines the antecedent characteristics of specialist- and generalist-type citizens. In particular, the focus of the present study is on the relationship between specialists and the changing media environment.

Specialists and Generalists

The concept of issue publics provides theoretical reasons to believe that citizens tend to be specialists than generalists. Converse (1964) invoked the issue publics to offer a realistic explanation of how citizens can respond to public policy in a rational manner, despite their low level of general political interest and knowledge. For most people, once having managed their more pressing matters of family, job, and leisure, they have few resources and little energy left to study every social and political issue. As the cost of becoming well informed in general is substantial, people are expected to focus on only a handful of issues at best. Thus, the theory of issue publics suggests that citizens tend to be specialists, who are experts in a particular domain though lacking interests in other domains.

However, empirical research has not met theoretical expectations. The evidence has been mixed. Neuman (1986) found that educated individuals are more familiar with political issues and more knowledgeable about political events in general. Delli Carpini and Keeter (1996) were also skeptical about the existence of a multitude of distinct specialists, showing that knowledge about the United Nations was a good predictor of knowledge about racial issues. These researchers concluded that, if citizens are informed about a certain topic, they tend to be informed about other issues as well. Such studies suggested that some general characteristics of individuals (e.g., education) are significant predictors of interest or knowledge across issues—a view that rests on the assumption that the more educated are presumably equipped with greater sophisticated cognitive ability that enables them to organize abstract ideas to understand complex political matters (Grabe, Kamhawi, & Yegiyan, 2009).

Yet several studies (Chen, 2012; Holbrook, Berent, Krosnick, Visser, & Boninger, 2005; Krosnick, 1990; Krosnick & Telhami, 1995) have reported that people are interested in only a few issues and attach varying degrees of attitude importance to each issue. Analyzing the ANES data, Krosnick (1990) found no strong correlations among the perceived importance of various issues. For example, respondents perceiving foreign policy to be important were not necessarily to think that domestic social issues were also important.

Although both sides have gained empirical support in their own right and attracted some scholarly attention, the literature has not fully flourished yet. In particular, since Delli Carpini and Keeter (1996) did not find much indication of information specialists in their extensive project, research has not been fully flourished in this area. One reason is that

much research has framed the question at the aggregate level and examined whether specialists or generalist prevail in the society. In contrast, little is known about who are likely to become specialists and what characteristics each type of citizen has. The individual-level approach that examines various factors contributing to a specialist or generalist will generate empirical evidence that has been lacking in this debate. Henceforth, this study puts forth to refine a measure for the individual tendency to be specialists or generalists and examines the characteristics of specialists and generalists.

Previous Measures of the Issue Publics

Most previous literature related to issue publics has employed demographic variables and personal issue importance as individual measures to identify issue publics (Krosnick, 1990). Older people were assumed to be members of the issue publics on health care issues, and women were treated as issue publics on abortion or breast cancer issues (Bolsen & Leeper, 2013). However, this demographic-based approach is problematic because it may overrepresent or underrepresent the issue publics on social issues. Other studies used personal issue importance as a measure of issue specialists. For example, those considering an abortion issue to be important are assumed to be abortion issue publics (Kim, 2009). Previous research showed that those who perceive an issue to be personally important show stable opinions and become cognitively and behaviorally involved in the issue (Boninger, Krosnick, Berent, & Fabrigar, 1995; Kim, 2009; Krosnick, 1988). However, this measure tends to overlook the core aspect of issue publics. By definition, issue publics are different from attentive publics who are generally interested in a wide range of issues. Rather, issue publics should be (1)

passionately interested in a particular issue, but (2) uninterested in other issues in general due to their limited cognitive capacity. However, the issue importance measure does not capture the second part of the definition. An individual perceiving the environmental issue to be personally important can be either an environmental specialist or a generally attentive citizen who perceives the environment to be also important like all other issues.

Alternative Measure

Based on this theoretical definition of the issue publics, generalists and specialists could be best differentiated by the measurement of how equally or unequally individuals assign their personal issue importance across various domains. While specialists weight their focus differently across issues depending on their personal issue importance, generalists tend to distribute their focus relatively evenly across issues. Therefore, this study concentrates on dispersion in personal issue importance within an individual.

Personal issue importance can be measured by asking people how they think an issue is important personally. Thus, the distribution of personal issue importance in an individual manifests in the variation of her or his responses across issues within the individual and can be captured by the standard deviation. As a measure of inequality, the standard deviation has been widely employed in the fields of sociology and economics to compare social inequality across nations, cities, and other social groups (e.g., Veenhoven, 2005). Accordingly, the current study proposes to measure the tendency to be a specialist or generalist by the standard deviation of personal issue importance. Below we will see that this statistical index fits the above-mentioned demands for reconceptualizing the

specialist-type citizen and testing the proposition that the changing media environment relates to the rise of issue specialists.

First, the proposed indicator that measures the dispersion of issue importance is to capture the key concept of issue publics, which assumes that individuals are interested in only a few issues and indifferent to all others due to few resources and little motivation. The greater the variation of personal importance across issues, which can be measured by a higher standard deviation, the greater tendency to be a specialist. Second, the indicator is comparable across individuals. Since the standard deviation estimates the relative dispersion of personal issue importance within each individual rather than the average level in an absolute sense, the indicator has much comparability. Third, as estimated at the individual level, the standard deviation allows us to examine the relationship between a myriad of individual characteristics and the tendency to be a specialist or generalist.

Specialists in the Changing Media Environment

Media scholars have recently begun to explore the possibility that the changing information environment tends to foster one type of citizen more than the other (de Waal & Schoenbach, 2008; Delli Carpini & Keeter, 2003; Hidaka, 2005). These scholars have posited that technological features of new media help individuals become specialists while traditional media, such as network television, radio, and newspaper shape generalists.

Two characteristics of traditional media environment deserve particular attention in relation to generalists. First, the political information supplied by traditional media, especially before a recent burst of partisan media, is relatively homogeneous and

standardized (Neuman, 1991). To seek a larger audience and maximize profits, media corporations want to appeal to as many viewers as possible while—more importantly—disturbing as few as possible. The media outlets produce the media content that is ideologically moderate, non-controversial, and popular (Gerbner, Gross, Morgan, & Signorielli, 1982).

Another feature of the traditional media environment is that the media exposure offers audiences not only an active but also a passive learning process (Downs, 1957; Zukin & Snyder, 1984). Robinson (1976) indicated that television news reaches two types of viewers: the advertent, who follow the news because they enjoy politics, and the inadvertent, who fall into the news accidentally. Using rational choice theory, Downs (Downs, 1957) explained that people who do not enjoy news and politics are still informed on public affairs through incidental learning. Prior (2007) noted that political learning depends on this technological inefficiency.

Contrary to traditional media, the emerging media technologies allow for more diversity in media content and more selectivity in media use (Bennett & Iyengar, 2008; Garrett, 2009; Stroud, 2008). Amateurs are capable of creating and distributing their ideas more freely, resulting in long-tail diversity (Anderson, 2006). In addition, the new media induce audiences' selective exposure and selective learning. Information is not given linearly, but is sought selectively through the technological functions, such as menu options or a Google search.

Here, a crucial juncture is reached where these technological affordances fit specialists' tendency to look for information in only a few domains in which they are interested (Bucy, Gantz, & Wang, 2007; Kim, 2009; Kim, 2012). As long as individuals

have interests in a particular topic, they can obtain relevant information and further develop their interests with more ease and efficiency. For example, Kim (2009) has indicated that those who perceive an issue to be important tend to engage in selective information-seeking behavior on the Web, thereby obtaining a higher level of issue-specific knowledge. However, this study adopted personal issue importance as a proxy measure of the issue publics, making it difficult to distinguish between specialists and attentive generalists. Another caveat is that the study did not examine how the pattern of information-seeking behavior differ across different media. To bridge this gap in the literature, the current study takes four different media into account and investigates how each medium is associated with the type of citizen.

Present Hypotheses

As the Internet provide users with greater control and choice over media content than traditional media, we expect the obtaining of information online to relate positively with the tendency to be a specialist but attention to news from traditional media to contribute to being a generalist. This study steps forth to test this and to examine how different media use relates to the type of citizen.

Hypothesis 5.1 (H5.1): the standard deviation of personal issue importance is positively associated with obtaining information on the Web.

Hypothesis 5.2 (H5.2): the standard deviation of personal issue importance is negatively associated with watching television news.

Hypothesis 5.3 (H5.3): the standard deviation of personal issue importance is negatively associated with listening to the radio news.

Hypothesis 5.4 (H5.4): the standard deviation of personal issue importance is negatively associated with reading the newspaper.

Method

Data came from the 2008 American National Election Study (ANES) survey (n = 2323). Face-to-face interviews were conducted between September and December in 2008. The sampling frame involved all U.S. adult citizens. The selection of individuals within the sampling frame employed a multi-stage area probability design. First, counties or congressional districts were chosen, then housing clusters were chosen within the first stage, then households, and finally, respondents within households were selected. The sampling process was random at all levels. The response rate (AAPOR's RR3) was 63.7%. Two versions of the questionnaire were used, varying question wordings of some items. Each administered to half of the respondents. Descriptive statistics for the demographic information included gender (57% female), age ($M = 46.47$, $SD = 17.97$), and race (62.1% White).

Media Variables

Television, newspaper, and radio use were measured by asking how much participants paid attention to national television news, newspaper articles, and radio news, respectively. The responses varied from 5 = *not at all* to 1 = *a lot*. The responses were then reverse-coded from one to five (television, $M = 3.07$, $SD = 1.33$; newspaper, $M = 2.16$, $SD = 1.33$; radio, $M = 2.11$, $SD = 1.39$). Depending on the version of the questionnaire, online use was measured by asking participants to report the number of days they read a daily online newspaper in the past week or they review news on internet

in a typical week. Two versions of responses were merged and treated as a single measure ($M = 1.62$, $SD = 2.53$).

Standard Deviation of Personal Issue Importance (SDI)

The SDI was constructed based on personal issue importance on nine issues that the ANES Board has carefully considered and included as one of the most important social problems in the U.S. Personal issue importance was measured according to the extent to which an issue is important to a respondent (1 = *not at all important*, 5 = *extremely important*). Two versions of the survey included similar issues although several issues are entirely different. The first version involved spending and services, defense spending, government medical health insurance, guaranteed job and income, aid to the blacks, environment vs. job tradeoff, gun access, abortion, and the role of women. The other half included spending and services, defense spending, prescription drug coverage for seniors, universal health coverage, illegal immigrant work period, citizenship process, aid to the blacks, lower emission standards, and gun access. The SDI for each respondent was calculated based on these nine issue importance items. Missing data on each issue were handled with a pairwise method, but this does not create any concern since each issue item has less than two percent missing information.

Control Variables

Control variables included age, gender, race, education, political ideology, general political interest, and survey version. Education was measured on a 7-point scale, ranging from 1 = *less than eighth grade* to 7 = *post-bachelor's degree* ($M = 3.87$, $SD = 1.78$). Respondents were asked to report their political ideology on a 3-point scale, ranging from 1 = *liberal* to 3 = *conservative* ($M = 2.13$, $SD = 0.91$). Finally, depending

on the version of the questionnaire, general political interest was measured by asking either how much they were interested in politics and elections (1 = *most of the time* to 4 = *hardly at all*) or how closely they followed politics and elections (1 = *extremely closely* to 5 = *not closely at all*). Both versions were reverse-coded from zero to one with higher values indicating greater interest. Then, they were combined into a single measure ($M = 0.49$, $SD = 0.33$).

Results

The hypotheses investigated the claim that the changing media environment relates to the citizen type. Specifically, the study hypothesized that new media relate with specialists while traditional media (television, newspaper, and radio) relate with generalists. To test these hypotheses, the SDI was regressed on various demographics, political interest, and four medium variables. Table 5.1 summarizes the results of the ordinary least squares hierarchical regression.

The first block included control variables. Among demographics, the young and males showed a higher level of SDI than their counterparts, indicating they tend to perceive a few issues to be particularly important to them and pay little attention to other issues. This analysis allowed us to assess the construct validity of the proposed measure. The construct validity is generally established either when the target measure correlates with what it is theoretically predicted to correlate with (i.e., convergent validity), or when it is uncorrelated with other measures with which it should not be associated (i.e., discriminant validity). The regression results added to both the convergent and discriminant validity of the SDI. First, general political interest related strongly and

negatively with the SDI. This demonstrates the convergent validity of the SDI because the SDI is supposed to represent specialists whose general political interest is limited. Second, the SDI is independent of education, which corroborates the discriminant validity. This suggests that the SDI is neither a certain tautological measure nor statistical artifact but instead taps onto a unique dimension of individual characteristics.

The regression results of the full model yielded support for H5.1, H5.2, H5.3, and H5.4. Not only did all four medium variables relate with the SDI, but there was a striking difference between online use and traditional media use in relation to the SDI. When people pay attention to online news, their SDI values also grow, indicating that their perceived issue importance varies significantly across issues. On the other hand, as people use traditional media such as television, newspaper, and radio, they distribute their perceived importance evenly among various issues. Although these results do not demonstrate causal relationships between the type of medium and the citizen type, the findings confirm the recent speculation that the Web use relates to the growth of specialists, while traditional broadcasts are associated with generalists (Kim, 2009).

Discussion

Although the categorization of specialists and generalists are theorized in the original issue publics literature, the concept has not been firmly grounded in empirical research. The dearth of evidence is partly because most research in the area has focused on whether specialists or generalists prevail in the society, without viewing the question as a matter of degree. Another reason is that the previous

Table 5.1. Predicting Standard Deviation of Personal Issue Importance (SDI) (N = 2323)

	Model 1	Model 2
Control Variables		
Age	-.051*	-.028
Gender (Male = 1)	.043*	.044*
Race (White = 1)	.011	.002
Education	.031	.029
Ideology	-.009	-.003
General Political Interest	-.138***	-.106***
Media variables		
Online		.074***
Television		-.051*
Newspaper		-.042 [#]
Radio		-.060**
Total adjusted R²	.024	.037

Note: Entries are standardized beta coefficients. [#] $p < .1$; * $p < .05$; ** $p < .01$; *** $p < .001$.

measure such as personal issue importance did not fully capture the theoretical concept of issue publics. As argued previously, with personal issue importance, we cannot distinguish a specialist from an attentive generalist. Although the notion of being indifferent to other general issues constitutes the essential feature of issue publics and specialists, it has been largely overlooked, especially in the course of operationalization.

The current paper responded to these two limitations by assessing the possibilities of the alternative method that captures the individual's tendency to be a specialist. The analyses suggested the standard deviation of personal issue importance serves as a valid

measure that quantified the concept of specialists. Not only did the indicator touch on the core aspect of specialists theoretically, but it also established convergent and discriminant validity. Further, using this proposed measure, the study have found that specialist-type citizens are significantly associated with the Internet use.

The distinctive role of each medium depends on the technological efficiency through which audiences can gather what they want from the media (Prior, 2007). By virtue of diverse media content and greater user controllability, individuals can arrive at information in the particular domain in which they want to specialize (Tewksbury, 2003). The positive relationship between specialists and Internet use is consistent with the trend of personalized politics. As shown in recent research (Bennett, 2012; Campbell & Kwak, 2011), there are more diverse mobilizations in which citizens are mobilized based on their personal lifestyle values, and this large-scale collective action is often organized through digital media. Selective information gathering leads members of latent issue publics to be activated in the areas that are personally relevant to them (Kim, 2012).

Although the findings highlight affordances of new media for selective exposure to issue-specific information, it should be noted that emerging media do not entirely preclude incidental exposure to general information entirely. Previous studies have suggested that Internet users also have ample opportunities for exposure to a wide range of information as a byproduct of their other information-seeking behaviors (Lee, 2009; Tewksbury, Weaver, & Maddex, 2001; Yadamsuren & Erdelez, 2010). For example, users often stumble across information that they do not necessarily perceive to be important to them but that is related to what is happening in the world (Yadamsuren & Erdelez, 2011). This may be particularly relevant for social networking site users,

because they may have limited control over their exposure to information that is posted by other social media users (Jang, Lee, & Park, 2014; Park, 2013). Future work needs to examine the extent to which specific online activities are related to incidental exposure.

The current findings must be qualified by several limitations. The first limitation stems from the characteristics of the data. Since the data are cross-sectional in nature, all of the presented relationships must be regarded as correlational. It is difficult to infer whether media use actually influences the type of citizenry, or whether the causal arrow flows in the opposite direction. Second, although nine policy issues employed in the ANES serve to represent various social and political domains to a certain extent, there may be little confidence in generalizing the findings beyond these issues. Third, the relatively-small effect size suggests that the reality may be more complex than indicated by the present analysis. Future works should demonstrate the complex paths from media use to the individual's tendency to be a specialist or generalist.

Conclusion

Given that people increasingly rely on the new media rather than the conventional media, the findings clearly suggest that the proportion of specialist-type citizens will grow in the society. Then, one important question may be whether specialist-type citizens make democratic society healthier or more vulnerable.

However, it is not so simple to answer the question. Many political communication scholars have expressed concern that with the increased emergence of specialists, the society will become more fragmented. Tsfaty (2003) indicated that publics should agree on what are important issues in the community to facilitate a meaningful

discourse on public affairs. Particularly, traditional news media have long served this role by providing citizens with information journalistic institutions deem relatively important. However, if specialists seek information only in a certain domain of their interest and avoid all other issues, the society will lose common agendas that should be shared by all public members (Kim, 2012). Another concern about the rise of specialists is that public opinion will grow polarized (Sunstein, 2001). As the current findings indicated, specialists tend to engage in selective exposure through new media, which in turn reinforce their issue attitudes, resulting in a more polarized public opinion at an aggregate level.

Others, however, especially supporters of a pluralistic model of democracy, have argued that generalists are not necessary for democracy to work and that specialists would achieve the same or even better outcomes. In favor of this perspective, numerous studies have indicated that people who perceive an issue as relevant to them also tend to be behaviorally engaged in the issue (Gershkoff, 2006; Krosnick & Telhami, 1995). Krosnick and Telhami (Krosnick & Telhami, 1995) described them as players in the arena of influence, who exert pressure on government and vote based on their issue positions. Considering that most citizens are notoriously indifferent to public affairs in general, it is commendable that citizens care about at least a few issues of interest rather than none. This rise of issue specialists may moderate the traditional deficiencies of political participation among those who are less attentive to public affairs in general but who care about specific issues (Henderson, 2013). In fact, some argue that protestors in Arab Spring or occupy movements become issue specialists by obtaining mobilizing

information and coordinating collective actions through emerging technologies (Bennett, 2012).

The present study attempted to reassess the concept of specialist and generalist, especially in conjunction with the changing media environment. Perhaps one of the most significant contributions of the present study is that it demonstrated that the type of citizenry could be measured at the individual level and linked to other individual characteristics. Here, we have seen only a few key characteristics of specialists, in terms of individuals' media use, issue-specific knowledge, and attitude extremity. Other theorized features of specialists await more empirical support. For example, the question of whether specialists actually engage in diverse social and political activities at least within a domain of their interest is still unanswered.

Chapter 6

Conclusion

This dissertation examined two major types of selective news exposure: whether people prefer information they agree with, and whether people prefer information about issues they care about. The first part of this project, Chapters 2 and 3, used behavior tracking software to unobtrusively observe online users' news choices based on message characteristics, users' predispositions, and media use contexts. These studies investigated the prominence of selective exposure in an online setting, but the findings did not provide full support for the concept. A more nuanced understanding of selective exposure in the new media environment is suggested. The second part of this dissertation, Chapters 4 and 5 used secondary survey data to examine how the selective nature of new media facilitates the rise of specialist-type citizens. The findings suggested positive associations between new media use and becoming specialists. These findings were discussed in previous chapters. This chapter therefore focuses on the questions that have been raised but not yet fully addressed in this project.

Is Selective Exposure Dominant?

The results of the second and third chapters showed mixed results for confirmation biased selective exposure. At the most basic level, both national and student samples tended to select news stories that support their political attitudes.

Despite evidence of selective seeking, however, there was no hint of selective avoidance, which has been considered particularly harmful to the working of the democratic system. The findings questioned the dominance of selective exposure in an online setting. When student participants were asked to multitask during their browsing activities, they failed to exhibit confirmation bias. From the standpoint of the limited capacity model (Lang, 2000), extra work might have overloaded the participants, leaving them insufficient cognitive energy to decipher every media message they encountered based on their predispositions. Finally, as Chapter 3 illustrated, national samples did not prefer dissonant news stories about controversial science topics. Instead, at least for some topics such as stem cell research and genetically modified foods, participants were attracted to dissonant messages. These findings supported Shoemaker's evolutionary accounts and schema theory but not confirmation biased selective exposure.

Overall, a series of findings suggests that selective exposure may not be a robust phenomenon. Evidence of selective exposure varied significantly, depending on message topics and media use contexts. Thus, these findings seem to lend little support for the predictions that the Internet would facilitate selective exposure, eventually leading to political polarization. However, cautions should be made against overly zealous interpretations of the findings. To assess and situate these findings within the literature, it is important to recognize how psychological orientations and structural factors work together to facilitate or hinder selective exposure.

Although browsing activities shown in Chapters 2 and 3 resembled one kind of real-world behavior on the Internet, other types of media use that involves varying levels of structural forces may yield different results (Sandvig, 2007). For example, when

people receive news that has already been filtered through their favorite cable television channels or partisan websites, they may not have been able to select each news story based on their preferences. Once they have made their channel decisions, their psychological propensities may not exercise much power to select information. Instead, structural factors may drive media exposure. In this line of thinking, it is reasonable to say that the experimental settings where participants freely selected each news article based on their preferences reflected psychological factors more than structural elements. Thus, given that the Internet offers a range of information environments with varying levels of structural elements, it may be ill-advised to generalize the current findings to all kinds of online behavior. Generalizability may be only achieved by additional research examining different online contexts.

Important but remained unanswered is the way in which the choices of algorithms influence selective exposure (Resnick, Garrett, Kriplean, Munson, & Stroud, 2013). Sometimes people explicitly select their filters by visiting their bookmarked sites or following political actors on Twitter, but sometimes people are fed information automatically by the new Internet filters. These computerized filters such as Google Search or Facebook news feeds present personalized media content based on what users' similar others have done. The Google search results for "global warming" might generate completely opposite results for an environmental activist and an oil company executive. Pariser (2011) coined the term, "Filter Bubble" to call attention to the idea that Internet filters significantly limit the diversity of individual exposure thus causing different people to see the world very differently. Although the filter bubble also describes the concern about selective exposure, it takes somewhat different approach to

the issue. Filter-based selective exposure focuses on structural algorithms rather than psychological orientations. As this personalization process is increasingly prevalent in the digital information environment, subsequent research should adopt this perspective to examine selective exposure and audience fragmentation.

New Perspectives on Audience Fragmentation

Fragmentation, driven by the Internet, has been associated with negative social outcomes. This concern indicates that despite the massive amount of information on the Internet, users encounter only the information and interaction that reinforce the attitudes that they already have, insulating them from other perspectives (Brundidge, 2010; Stroud, 2011). Users' increasing ability to filter and select what they like may lead to audience fragmentation in which society loses its common agendas that should be shared and solved by all public members (Kim, 2012). Audience fragmentation is also predicted to accelerate group polarization and extremism (Lee, Choi, Kim, & Kim, 2014; Sunstein, 2007). Moreover, audience fragmentation is blamed for the knowledge gap between the more and less politically sophisticated. Since the Internet affords selective exposure, the "haves" can readily obtain political information while the "have-nots" can filter it out conveniently (Prior, 2007).

The current results, however, highlight some advantages of fragmentation. First, if the Internet promotes interest-driven information exposure, then citizens at least have better access to information in the areas that are personally important to them. As Price, David, Goldthorpe, Roth, & Cappella (2006) illustrated, attention to a particular issue has positive consequences including crystalized issue attitudes and active participation on

that issue. This is normatively desirable because it suggests that political minorities, such as women and ethnic minorities can be increasingly engaged in the political issues that affect their personal lives (Bolsen & Leeper, 2013). As the theory of pluralistic democracy suggests, the growth of issue specialists not only protects the collective interest in their policy areas (Dahl, 2005; Henderson, 2013) but also allows society to embrace diverse voices. These issue specialists are expected to watch claims and actions of political actors in their policy arenas although the general public is not well-informed about policy matters (cf. Claassen & Nicholson, 2013).

Similarly, audience fragmentation, or even group polarization is often viewed as an important catalyst of second-order diversity (Gerken, 2005). The idea of second-order diversity suggests that although people seek out only consonant messages and communicate with similar others, society as a whole could hear a wider range of opinions. According to this view, society can be better off with a decentralized system and diverse groups even when members show little internal diversity. More recent research (Campbell & Kwak, 2012; Lee, Kwak, & Campbell, in press) also recognizes the value of internal homogeneity, indicating that citizens with strong-tie homogeneity tend to be more open to deliberation with dissimilar others and this dialogic openness leads to increasing political participation.

These findings have implications for ongoing concerns about the knowledge gap between the more and less educated. According to these concerns, the interactive nature of the Internet may benefit only those who are close followers of politics, leading to a widened knowledge gap. However, the rise of issue specialists may mitigate a clear division between more and less sophisticated citizens. For example, people who are

generally less interested in politics but care about a few personally relevant issues may be in line with more generally sophisticated elites, at least within the domain of those issues (Henderson, 2013). Because individuals do not have the same interest in all issues (Converse, 1964), the knowledge gap may not be uniform across the full spectrum of domains.

Finally, the unanswered but important question in this line of research is whether the dramatic increase in media choice and niche content actually boosts an overall increase in audience attention. In a digital sphere where the production and supply of information is virtually unlimited, increasing media attention to one issue may not necessarily result in diminished attention to other ones (Zhu, 1992). Since tools for editing, publishing, and disseminating information are widely available, ordinary people can now broadcast news messages by acting as citizen journalists or disseminating those messages through networks like Twitter (Murthy, 2013). Hence, the constraints which prevailed in the traditional mass media – ranging from paying professional journalists to the once-high cost of news dissemination – may no longer limit the available supply of information. Although research has shown that the tail in media content lengthens as users have more access to content options that have not been available previously (Anderson, 2006), little is known about whether this long tail will fatten and contribute to an increase in total consumption. As every online activity is logged and available for direct analysis, future research may employ big media data to answer this question.

In closing, I remain fascinated by information choices and effects in the changing media environment. Whereas this dissertation focuses on individual-level attention and selection, my research interests expand to include public-level attention and expressive

behavior. For example, by analyzing large data sets of social media, I explore how, why, and how long the public pays attention to certain aspects of issues but not others and the way in which user-oriented conversations differ from traditional news coverage.

Acknowledging the possibilities and limitations of new electronic data, I hope that my future research contributes to the study of the relationships between new media technologies and public attention and opinion.

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