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"What I tweet is not what I think": towards a comprehensive multi-version two-way agenda-setting framework

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"WHAT I TWEET IS NOT WHAT I THINK":

TOWARDS A COMPREHENSIVE MULTI-VERSION TWO-WAY

AGENDA-SETTING FRAMEWORK

by

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DEDICATION

I would like to dedicate this work to my parents, Hui Wang and Hailiang Zhang.

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ABSTRACT

While the traditional agenda-setting theory assumes that a unified issue salience pattern ("the agenda") will transfer from news media to the public, the emergence of the Internet has challenged this classic communication theory in three ways: by providing two versions of the public agenda (i.e., self-reported issue importance measured by a survey versus social media expressions), by affording two versions of the media agenda (i.e., presented on news websites versus on organizations' Twitter accounts), and by enabling potential two-way agenda-setting effects. This dissertation aims to construct a multi-version two-way agenda-setting framework via (1) elaborating on the theoretical and practical reasons behind the proposed framework and (2) empirically testing the framework by combining survey and digital texts data around the 2020 US presidential election. The results show an imbalanced two-way agenda-setting relationship, with the traditional media-to-public direction still stronger than the reverse. While the two versions of the media agenda were similar to each other, what people thought was found to be different from what they tweeted.

This dissertation also explored the moderating effects of issue-, media-, and

individual-level characteristics on the direction and strength of the agenda-setting effects. The issue-wise comparison showed stronger effects in both directions among obtrusive issues, compared to non-obtrusive issues. Interestingly, traditional, non-digital-native media presented a slightly stronger two-way agenda-setting relationship between their news tweets and citizens' tweets compared to digital-native media. This difference, however, was not found in news websites. Individuals with specific characteristics, such as being females, being older, being white, as well as having lower income, lower opinion leadership, and lower social capital, were more likely to influence and be influenced by the media agendas compared to their counterparts. Also, while the well-educated population followed the agenda of news websites more closely, the group with a lower education level followed news tweets on more issues. Finally, the last chapter discusses theoretical, methodological, and practical implications.

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LIST OF ABBREVIATIONS

API	Application Program Interface
BERT	Bidirectional Encoder Representations from Transformers
IAS	Intermedia Agenda Setting
LGBT	Lesbian, Gay, Bisexual & Transgender
MIP	Most Important Problem
MPD	Minneapolis Police Department
NH	News Headlines
NLP	Natural Language Processing
NT	News Tweets
OANN	One America News Network
PT	Personal Tweets
SNS	Social Networking Site
SP	Strength of Personality
SVM	Support Vector Machine
UGC	User-generated Content
WTSC	Willingness to Self-censor

CHAPTER 1 Introduction

On May 25, 2020, Darnella Frazier recorded a video with her phone and uploaded it to Facebook. At the time, this 17-year-old teenager could never imagine that this seemingly ordinary social networking site (SNS) post would ignite the fury of millions and incite large-scale anti-racism protests worldwide.

The death of George Floyd, a Black American who was cruelly murdered by a Minneapolis police officer during an arrest, was one of the most defining incidents in the US in 2020. It raised the salience of the issue of racism to an unprecedented level and even changed the direction of the 2020 US presidential election. Zuckerman et al. (2019) showed that 343 unarmed Black Americans were killed by police during 2013-2016, the years that witnessed the birth and growth of the Black Lives Matter movement. Most of these incidents were covered by the media briefly and soon slipped away from public attention.

The Floyd case could have been one of them, but the Facebook video became a game changer: It provided solid evidence to refute the police's press release, which defined the death as a "medical incident during [a] police interaction" (Levenson, 2021). It was the large number of ordinary people who shared, liked, and commented on this video on SNSs, especially the more open platforms like Twitter, that pressured the news media to follow up on this incident and the Minneapolis Police Department (MPD) to re-investigate it. In the delayed news coverage, we can see many quotes from SNS posts, which were already widely spread on Twitter, Facebook, and Instagram. We can even see the impact in the year following: an increased number of commentary and editorial

articles about racism on news media. This time, it was not professional journalists who captured the breaking news, decided its newsworthiness, and set the public agenda. The public took the lead and set the media agenda.

This story indicates the interactive two-way communication between the public and the media in digital spaces: the public can report breaking news, collectively raise issue salience, and the issue might be picked up by the news media, while the news media summarize public opinions and influence their readers.

The process is afforded by the emergence of the easy-to-use SNSs. SNSs refer to web-based services on which people construct profiles, connect with other users, as well as view and traverse the lists of connections within the system (boyd & Ellison, 2007). The networked nature of SNS has contributed to the transformation of information flows from the traditional one-to-many mass communication mode to the many-to-many mass self-communication mode (Castells, 2007). The ways that the public and news media use SNSs have also extended the traditional definition of news beyond products of professional news organizations and changed how the broadly defined news is selectively produced, disseminated, and amplified.

On the one hand, individual members of the public not only use SNSs as a source of news, but can also contribute to the information flow just like what professional news organizations do. Shearer and Grieco (2019) reported that 55% of U.S. adults used social media as one of their news sources often or sometimes in 2019; the number has also increased each year since 2016 and surpassed printed newspapers in 2018 (Shearer, 2018). Additionally, ordinary people, like a doctor in Wuhan or an actor in Los Angeles,

now have the potential to share breaking news with millions in seconds, engage in public discussions initiated by others, strategically amplify an issue for societal attention, and collectively push an agenda to news media. Audiences have been replaced by users, who can be both message receivers and senders (Jenkins et al., 2013).

On the other hand, the adoption of SNSs has changed how newsrooms work. Professional journalists use SNSs to not only share news and redirect traffic to the more traditional media platforms, but also to look for breaking news and monitor public opinion. The trend of media convergence, a phenomenon describing the blurred boundary and increased connectivity between media forms, since the 1980s has encouraged traditional news media to adopt a plurality of media formats, especially digital ones like news websites (Peil & Sparviero, 2017). Since the 1990s, traditional news organizations started to expand their existence online. Soon after, they adopted SNSs, including Facebook, Twitter, and MySpace, as channels to distribute news, market their brand, interact with audiences, and redirect traffic to their websites (Ju et al., 2014; Messner et al., 2012; Newman, 2009). By 2010, almost all major newspapers and television news organizations had built their SNSs landscape (Messner et al., 2012).

Meanwhile, public expressions on SNSs, especially the more open ones like Twitter, are highly accessible and updated real-time. Journalists can easily search, browse, and collect information right after an incident occurs. Thus, they were increasingly used by journalists as a proxy of public opinion, to replace the one obtained from the traditional survey method. Previous studies also show that journalists are actively monitoring, collecting, and analyzing SNSs as public opinions (McGregor, 2019)

and to quote SNS posts as Vox Populi (Lukito et al., 2020), directly or indirectly with Big Data tools, such as Dataminr and NewsWhip. This synthesized public opinion on SNSs, then, could impact the journalists' version of pseudo-environment, influence the relative importance of different issues in their mind, and potentially redefine newsworthiness.

The daily routine changes on both sides altogether reflect a revolutionized power dynamic change. Castells (2013) proposed that power in the current network society, where the society is structured around digital networks of communication, should be redefined as the ability to shape social consent via communication. Earlier communication scholars stressed "media power," which is the non-coercive bargaining power that media owners use to influence key actors in the society with their control over the information flow (Couldry & Curran, 2003). Yet, the above changes show that this power is not exclusively owned by professional news organizations. Chadwick (2017) argued that we are now living in a hybrid media system, where individuals, news organizations, and other political institutes can all work as actors in building information flows. SNSs play a vital (yet not determining) role in this power transformation by empowering the once voiceless individuals. While many SNSs studies focused on how technologies can connect ordinary citizens for grassroots social movements (e.g., Freelon et al., 2016; Tufekci, 2017; Yang, 2008), we should not ignore a longer-term and subtler way of the public making social changes: through the aggregated power of influencing the information flow with scattered daily online expression. This relatively understudied route calls for theoretical explication and empirical demonstration of the "people's power" and challenges the traditional one-way media effect theories, especially the

agenda-setting theory.

Media effect research, generally speaking, examines all impacts created by communication activities on individuals and society. Since the early 20th century, media effect theories have developed from the theory of uniform and strong influences to theories of selective and indirect effects (Lowery & DeFleur, 1995). Yet, the idea of "media" has been largely limited to professional mass media. Even when the public's initiative was considered, much emphasis was put on their selectivity as receivers. Before the Web 2.0 era, when user-generated content (UGC) became a defining character, the public did not have many regular channels to influence news production other than the rare cases of calling or writing letters to newspapers and TV news programs. On SNSs, as discussed above, individual users can also be a medium. With the two-way information flow described above, the denotation of media has been largely broadened in the digital era.

The agenda-setting theory is one of the most classic theories in media effect research connecting news and public opinion. Inspired by Lippman's (1922) thesis on how our cognitive maps of the world are determined by the pseudo-environment constructed by news media, the agenda-setting theory stresses that the salience of a given issue transfers from news media to the public (McCombs & Shaw, 1972). Here, media agenda refers to the proportions of news coverage that different issues have, while public agenda is defined as the perceived issue importance in the public's mind. Although a highly theoretically valuable theory, the predictive power of the agenda-setting setting has been questioned (see Bennett & Iyengar, 2008), as it has three assumptions that have

been challenged by the new communication patterns introduced by SNSs in recent decades.

The first assumption of the agenda-setting theory is a unified public agenda. McCombs (2004) has proposed an Acapulco typology — a four-part typology of perspectives of the agenda-setting theory. It divides the measurement of public salience into aggregate and individual data and categorizes the focus of the media agenda as the entire agenda and single item agenda. While the typology distinguishes between different levels of public agenda, it does not consider another factor that could further clarify the concept of the public agenda: the perceived audiences of the public opinion. Essentially, all opinions that we can collect are *expressed* opinions. While the intention of agenda-setting researchers is to draw "the picture in our heads," we must be aware that the public agenda, normally constructed by self-reported survey data, cannot be simply equated to individuals' true thoughts. Individuals are still constrained by a major limitation of the survey method: when participants express their opinions with researchers as their perceived audience, they may be influenced by social desirability. Another way that we can observe public opinions is on SNSs, where people express themselves in a more complex social setting. Additionally, the public, if aware of the monitoring behaviors of the news media, may also strategically and selectively emphasize or contain their opinion expression, either independently or collectively, to shape the news agenda in their desired directions. As no previous literature has systematically examined the difference between the two versions of public agenda — what people report in a survey and what they post on SNSs — this study will contribute to the agenda-setting literature by distinguishing

the two and explore the nuances behind the potential discrepancies.

Second, the traditional agenda-setting theory also assumes a uniform news agenda. Early agenda-setting studies were normally conducted based on a manual content analysis of a few mainstream news media, such as the most studied New York Times (e.g., Althaus & Tewksbury, 2002; Winter & Eyal, 1981; Wu & Coleman, 2009). This theory and method combination was largely due to the limited capacity of human coding and the fact that few mainstream news media indeed dominated readership back then. With the proliferation of news outlets, intermedia agenda-setting — the phenomenon where news organizations observe each other to determine newsworthiness and thus follow each other's agenda — came to our attention. Scholars have considered the differences between news organizations, yet still regarded the news agenda within a news organization as internally consistent, despite the proliferation of numerous distribution platforms. Earlier studies showed that the public agenda change caused by the printed version and online version of the same news outlet was different, which can be attributed to the technological features of websites (Althaus & Tewksbury, 2002). Within the digital news environment, however, less evidence is available as to how news agendas presented on news websites and news SNS accounts, the two major information sources for Internet users, differ from each other. Therefore, the second goal of this dissertation is to compare the two versions of the news agenda and reveal the factors behind the discrepancies.

Lastly, the traditional agenda-setting theory describes a one-way salience transfer process from the media to the public, which, as explained above, may lack predictive power in the changed power dynamic. The gatekeeping power, the ability to control

general access to information, is not exclusively held by professional journalists anymore. The proliferation and equalization of gatekeepers to include members of the public makes it possible to observe a two-way agenda-setting process, in which the public agenda can reversely influence the media agenda. This reverse agenda-setting effect, which I borrow from opinion leader scholars (Brosius & Weimann, 1996), has theoretical roots in the agenda building and intermedia agenda-setting (IAS) literature. To answer the "who sets the media's agenda" question, the former theory emphasizes how professional actors, such as organizations, interest groups, public relations, and political campaigns, can transfer their issue salience to news media (McCombs, 2014). IAS, as mentioned above, focuses on how news media are influenced by their peers. There has been some exploration on how public expression on SNSs can shape the media agenda under these two frameworks (e.g., Conway et al., 2015; Harder et al., 2017; Kim et al., 2016; Melek, 2017). However, it is problematic to indistinguishably equate the ordinary SNSs users to professional organizations that have direct contact with the press or to regard social media as a unified medium. The reverse agenda-setting effect — issue salience transfer from the public to news media — deserves exclusive theorization and empirical tests. Accordingly, the third goal of this dissertation is to clarify the potential two-way agenda-setting directions and the influencing factors behind them.

In sum, this dissertation aims to theorize a new multi-version two-way agenda-setting framework with empirical evidence to improve the explanatory and predictive power of the agenda-setting theory. This framework incorporates three major theoretical changes brought by social media. First, I propose that there are two versions of the public

agenda — one expressed in a more private survey and one expressed on (semi-)public social media platforms. Second, news media can also present two different versions of the agenda — one in the traditional forms and one selected to cater to the preferences of social media users and to fit with the platform affordances. Third, there should be two directions of agenda-setting effect — one from the media to the public (the traditional direction) and one from the public to the media (the "reverse agenda-setting" direction). Chapter 2 details the theoretical framework of this dissertation.

I then empirically test the proposed theoretical framework by (1) analyzing the agendas from news media's social media accounts and websites comparatively; (2) revealing the discrepancy of issue salience between self-reported data and actual social media expression; and (3) examining the impact of issue-, individual-, and media-levels of contingent variables on the direction and strength of the agenda-setting effect. The election periods are arguably the best time to observe information flows, as they are when all parties, including news media and the public, are most engaged in monitoring news and expressing opinions on social issues (McCombs, 2014). Taking the discussions around the 2020 US presidential election as an example, this study innovatively connects individual-level survey responses of 854 US adults and the corresponding individual tweets, in tandem with all website articles and news tweets published during the election period from 27 major US news organizations. The SNS Twitter was selected due to its wide use among both the public and the media in the US context, as well as its news-friendly affordances. By juxtaposing the correlations (aggregate-level analyses) between the media agenda and a snapshot of people's perceived issue importance and the temporal

relationships (issue-level analyses) between the timestamped SNS expressions and the news agenda, this dissertation also discusses the strengths and weaknesses of different techniques of measuring the agenda-setting effects. Chapter 3 reviews the research methods and procedures.

Chapter 4 summarizes the research findings. Overall, the two versions of public agenda represented by survey and by social media expression do not transfer issue salience to each other at an aggregate level, and only have significant issue-level correspondence on two out of the 19 issues. The two versions of media agenda, however, showed strong overall correlation and mutual agenda-setting relationship on most issues in the time-series analyses. As for the reverse public-to-media agenda-setting relationships, a two-way pattern was indeed found, but with the traditional agenda-setting direction being much stronger than the reverse. If taking a closer look at the contingent factors, issue-wise comparison indicates that issues with higher obtrusiveness presented stronger two-way agenda-setting relationships. In other words, people are more likely to influence and be influenced by both news headlines and new tweets when the issues are directly relevant to their daily lives and issues that people have to rely on news media to know about. Additionally, news tweets, especially those from non-digital-native media, showed a slightly stronger mutual connection with the public agenda compared to digital-native ones. As for media with different political orientations, while mainstream media have the strongest traditional agenda-setting power on both news websites and Twitter, conservative media were influenced by (i.e., reversely set by) the public agenda on more issues. Finally, individuals with specific characteristics, such as being females, being

white, as well as having lower income, lower education level, lower opinion leadership, and lower social capital, were more likely to be influenced by the media agendas. In sum, the results empirically present an imbalanced two-way agenda-setting pattern as hypothesized.

Chapter 5 provides discussion on the contributions and implications of this dissertation. In short, this contributes to the agenda-setting scholarship both theoretically and methodologically. Theoretically, it expands the traditional conceptualization of media and public agendas to better represent the complexity of digital information flows nowadays. Proposing a cross-platform two-way theoretical map, the current study challenges the one-way agenda-setting assumption by connecting media effects, public opinion, and civic engagement literature. Methodologically, the study builds upon agenda-setting's tradition of connecting survey and content analysis, and further innovatively introduces an approach matching survey responses and the corresponding social media expression. By connecting and comparing what people think through a survey and what they tweet, we will be able to illustrate more complete information flows and to explore multi-level factors, including individual behaviors, that drive the flows in the digital era. Ultimately, this study provides normative implications for participatory democracy by revealing a longer-term and subtle version of civic engagement: If the public gains the ability to strategically construct and promote the desired version of public agenda to news media, they can not only engage in the existing discussion of social issues, but also decide what to discuss through the potential two-way agenda-setting process. Their voice amplified via news media may have the potential to provoke

policy changes, just like the more aggressive routes of grassroots social movements. Nevertheless, this reverse agenda-setting power could be seized by some members of the public or controlled by polarized opinions. Thus, studying the mechanism is necessary for us to understand potential biases and accordingly design civic infrastructure that facilitates healthy civic engagement.

CHAPTER 2 Theoretical Background and Literature Review

This chapter provides an overview of the theoretical background and a review of the past empirical works for the three main questions of this dissertation work. I first introduce the traditional agenda-setting theory and the three assumptions that are challenged by the current digital media environment. The second and third section then offer elaboration on why and how we should expect two versions of the public and media agenda respectively. In the fourth section, I propose a two-way agenda-setting mechanism with theoretical support rooted in recent extensions of the agenda-setting theory. This chapter ends with a comprehensive literature review of the empirical evidence of two-way agenda-setting and of the potential contingent factors drawn from previous literature.

2.1. Agenda-setting Theory: Basic Assumptions and Challenges

Agenda-setting theory is one of the most classic and widely applied media effects theories in the communication area. The original agenda-setting theory, which describes how issue salience transfers from news media to the public, was coined by McCombs and Shaw (1972) through their famous Chapel Hill study. The theory was inspired by Lippmann (1922)'s idea of "the world outside and the pictures in our heads" and emphasizes that the public, who do not have direct experience with what is happening in the world, live in a pseudo-environment constructed by the media. Here, the media agenda normally refers to the relative amount of news coverage on each public issue and the public agenda is traditionally defined as the relative issue importance in the public's mind, which is also referred to as "prioritized agenda" (McCombs et al., 2014). The

proposition of media's agenda-setting effect is important as, after the early stages of media effects studies--including the strong effects ("hypodermic needle") stage from 1900s to 1930s and the limited effects stage from 1940s to 1960s--it brought media effects studies back to a more scientific strong effects stage by elaborating on the mechanism behind media effects. The theory stresses that media may not be able to decide what we think, but what we think about (Lowery & DeFleur, 1995; McCombs, 2004).

After almost 50 years of development, agenda-setting research has gone beyond "what to think about" to "what to think" and "how to think about." The extensions of the issue-level agenda-setting (first level) include attribute-level agenda-setting (second level) and network agenda-setting (third level) etc. The first-level agenda-setting focuses on the transfer of salience of general issues, such as economy and crime, from the media to the public agenda, whereas the second-level agenda-setting takes a step further to examine issue attributes, which could be substantive attributes (e.g., personality and ideology) or affective attributes (i.e., positive, neutral, or negative; Wu & Coleman, 2009). The third level of agenda-setting was developed based on the fact that people's mental presentations are constructed pictorially in a networked way. It assumes that the interrelationship among objects or attributes, not just the discrete salience of the elements, will transfer from the media to the public (Guo, 2016). This dissertation will start by focusing on the issue-level agenda-setting, as the diverse and short SNS posts published by both the public and the media are less likely to contain sufficient and consistent attributes for second- and third-level agenda-setting analysis, compared to the

traditionally studied long news articles/TV programs.

Additionally, as McCombs et al. (2014) and Shaw et al. (2019) summarized, the large family of agenda-setting research looks at not only the three levels of agenda-setting effects, but also (1) the psychology of agenda-setting, primarily the core concept of need for orientation among the individual members of the public; (2) the consequences of agenda-setting, which focuses on the public's behavioral outcomes such as voting; and (3) the origin of the media agenda, which includes "the prevailing cultural and ideological environment to news sources, the influence of the media on each other, the norms and routines of journalism, and the individual characteristics of journalists" (p. 782). The last type of extension is particularly relevant to the current study, as one of my goals, as mentioned above, is to explore the public agenda as one origin of the media agenda. Although the agenda building and the intermedia agenda-setting theory have provided adequate discussions on how professional organizations and other media shape a media outlet's agenda respectively, the role of the public, as represented on SNSs, in constructing the media agenda has not been systematically examined. Thus, this study will fill this gap to complete the answer of "who sets the media's agenda." Section 2.4 will provide more detailed discussion on this reverse effect.

With the emergence of Web2.0 and the largely increased visibility of UGC, some basic assumptions of the agenda-setting theory have been challenged. As discussed above, the prevalence of SNSs has changed both sides of the agenda-setting process — the media and the public (Messner et al., 2012; Peil & Sparviero, 2017; Shearer, 2018; Shearer & Grieco, 2019). These changes have posed questions to at least three basic

assumptions of the agenda-setting theory.

First, news media were relatively homogenous in terms of issue coverage back to the days when agenda-setting theory was first put forward. The public, back to the 1970s, read or watched a similar and limited set of newspapers and TV news programs. In the first 20 years of agenda-setting research, most empirical studies only did content analysis of the products from a few news organizations, including the New York Times (e.g., Althaus & Tewksbury, 2002; Golan, 2006), the Washington Post (e.g., Gilberg et al., 1980; Miller et al., 1998), and TV news programs on major networks or cable channels including ABC, CBS, NBC, CNN, and Fox News (e.g., Wu & Coleman, 2009). After almost 50 years, the news landscape in America and worldwide has been dramatically diversified, in terms of both cross-media and cross-platform variations. In terms of cross-media variations, many news media in recent decades have started to serve niche markets and provide different media agendas (Stroud, 2011). For instance, although controversy exists around whether it is the more polarized public that leads to more polarized media or the reverse, in the US we indeed witness a wider gap between the news agenda provided by liberal and conservative media in the recent decades (Prior, 2013). This change was addressed in the agenda-melding theory, which differentiated vertical media — media that are public, mass-oriented, and factual — and horizontal media, opinion-oriented media that serve specific interests (Shaw et al., 2019).

On the other hand, only limited research systematically discussed the other type of variation that challenges the unified media environment assumption of agenda-setting — cross-platform differences in how different publishing platforms within the same news

organization influence content. The 1990s saw the start of the digitalization trend of news media (Peil & Sparviero, 2017), in which news organizations began to distribute news on various digital platforms. During the digitalization process, news organizations are encouraged or even forced to adapt to platform affordances, such as the 280-character limit of Twitter. The disparity in agenda-setting effects of two most significant digital channels — website and social media — remains far from being adequately discussed. Although previous research looked at intermedia agenda-setting across publishing platforms with different affordances (Harder et al., 2017), the within-media differences, that is, how the same news organization presents different versions of the news agenda on various digital platforms, have hardly been addressed. Therefore, the first theme of this paper is to explore how news agendas from the same news organizations differ across platforms.

Second, the traditional agenda-setting theory assumes a unified public agenda, which is defined as the concerns of the public (McCombs, 2004). Prior to the social media era, public opinion was normally measured using a survey method. Thus, the public agenda in the earlier agenda-setting studies was operationalized as either the perceived issue importance rating in close-ended "Most Important Problem (MIP)" questions, or the number of occurrences in open-ended questions. In recent years, more and more academic research (e.g., Araujo & van der Meer, 2020; Ceron et al., 2016) and professional news organizations (e.g., McGregor, 2019; Paulussen & Harder, 2014) have used issue salience patterns extracted from SNSs to represent the public agenda. While the survey method has been criticized for sampling biases, low response rate,

misinterpretation of the question wording, lack of attention, social desirability, intentional

deception, etc. (Bishop, 2004; Glynn et al., 2015; Schuman & Scott, 1987), scholars also

argue that using social media data to exemplify the public agenda may be problematic

due to problems such as low representativeness, the existence of "lurkers," difficulty in

identifying political opinion, self-censorship, etc. (boyd & Crawford, 2012; Murphy et

al., 2014; Salleh, 2017). Arguing which version of the public agenda better represents the

"true" public opinion is more of a philosophical issue. The more practical route, I argue,

would be to theoretically and empirically compare the differences between the two so as

to approach the "true public agenda" from two sides. Section 2.2 will detail the

theoretical thesis.

Third, the agenda-setting process is hardly unidirectional from the media to the

public. We are currently in a hybrid media system where various actors, including both

the mass media and the public, are involved in shaping the information flows in a many-

to-many self-communication mode, instead of the traditional one-to-many mass

communication mode (Castells, 2007; Chadwick, 2017). Both the media and the public

can be message senders and receivers. Thus, while most agenda-setting studies focused

on one-way mass media effects — how the products of traditional and professional news

organizations transfer issues salience to the public — or examined the reverse impact of

public agenda under the traditional intermedia agenda-setting framework, I argue here

that we should treat the public agenda and the mass media agenda as different yet

connected elements and examine effects around both directions. Section 2.3 will

elaborate further on the reverse direction.

In this light, the above three aspects of the agenda-setting research should be updated. First, the media agenda afforded by different digital platforms should be carefully distinguished. Second, the agenda-setting effects between the media agenda and the public agenda represented by two forms — self-reported issue importance and spontaneous SNSs expression — should be juxtaposed. Potential factors behind their differences should also be examined. Third, the traditional one-way agenda-setting assumption should be revisited and replaced by an exploration of two-way agenda-setting relationships among the two versions of public agenda and two versions of media agenda. Accordingly, I expand the traditional single-version one-way agenda-setting theory to a multi-version two-way agenda-setting framework (see Figure 2.1). The following sections will elaborate on each of the updates in turn.
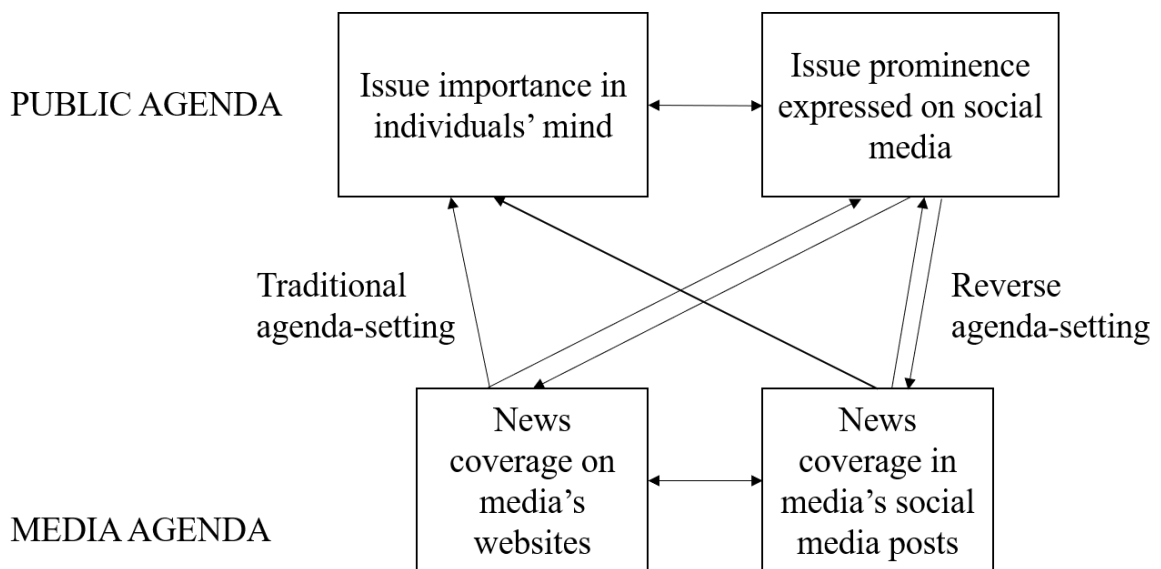
Figure 2.1. Theoretical map of the multi-version two-way agenda-setting framework.

Note. The unidirectional arrows indicate agenda-setting effects and the bidirectional arrows indicate agenda comparisons.

2.2. Two Versions of Public Agenda

2.2.1. Conceptualization and Operationalization of Public Opinions

While the goal of the original agenda-setting theory was to address the

relationship between mass media coverage and public opinion, the two key concepts have

been conceptualized and operationalized in distinct ways.

First of all, we cannot examine the public agenda without discussing public

opinion research. While public opinion is a widely used term, the theoretical

conceptualization of public opinion is not unidimensional. One argument loosely defines

public opinion as "what the public think" (Glynn et al., 2015). In this view, public

opinion is regarded as a socially constructed concept, whose meaning is contingent on the

collective impact of "the social climate, technological milieu, and communication

environment" (Herbst, 1998, p. 2). Nevertheless, an alternative understanding of public

opinion defines it as "what people typically think" or "what the public express" (Allport,

1937; Lippmann, 1922). Researchers such as Noelle-Neumann (1993), who revealed that

people will conditionally and selectively express their true opinion based on the social

environment with the spiral of silence theory, have abandoned the idea of digging into

people's inner minds. She defined public opinion as "opinions on controversial issues

that one expresses in public without isolating oneself" (Noelle-Neumann, 1993, p. 63).

This definition takes the context of one's expression into consideration (after all, we will

never know unexpressed opinions), and recognizes that in reality, other people will

understand the social phenomenon by monitoring the expressed opinion.

These two types of definitions also led to different operationalization and measure

techniques. For decades, survey techniques have been the most important and almost the only way for researchers and journalists to represent what was regarded as important among the public. Yet, doubts about this self-reported method of measuring public opinion have never been dispelled. Problems raised include sampling biases, low response rate, misinterpretation of the question wording, lack of attention, social desirability, intentional deception, etc. (Bishop, 2004; Glynn et al., 2015; Schuman & Scott, 1987). As Glynn et al. (2015) concluded, equating survey results alone to public opinion is "to miss most of the story" (p. 4).

The limitations due to the artificial nature of the survey method can be largely solved by using social media data to represent public opinion. The ubiquity of social media use among the general public and their instant expression have driven public opinion research to "enter a new era" (Murphy et al., 2014, p. 789). The high data quality, cost efficiency, as well as timeliness afforded by social media data, are highly attractive to communication professionals, including journalists who once needed to go on the streets for Vox Populi (Murphy et al., 2014).

This trend also has its theoretical roots. On the one hand, if public opinion is defined as the collective thoughts of a number of people (Allport, 1937; Lippman, 1922), the sheer large number of individuals that can be captured by social media data alone makes this method overweigh the number of individuals that can be included in a survey, which has been criticized as manufacturing a "public" with what are actually individual opinions (Blumler, 1979). On the other hand, social media, especially public or semi-public platforms like Twitter, provide an environment that resembles the train setting in

Noelle-Neumann's original study — a social environment where everyone is monitoring

and being monitored — and thus become an even more desirable channel to collect

public opinion under the second definition.

Nevertheless, social media data are by no means the perfect representation of

public opinion. Above all, it is irrational to assume that everyone is online. Although

social media penetration rate has been increasing each year, 28% of US adults still do not

use any types of social media in 2019, and only 22% of the population uses Twitter,

arguably the most commonly used reference in public opinion research in the US (Pew

Research Center, 2019). Even among those who use social media frequently, 38% of

them have never expressed political opinions on social media (Duggan & Smith, 2016).

With the existence of non-users and "lurkers," the silent users of SNSs, we can only say

that social media data provide another version of public opinion (Lomborg & Bechmann,

2014). Different from survey responses that were collected independently, social media

users interact with individual and organizational accounts and express to specific target

audiences to construct their networked identity (Papacharissi, 2013). Whether the users

choose to express on political issues and the emotion in those expressions are largely

shaped by other actors, especially their close contacts (Bond et al., 2012; Kramer et al.,

2014). Thus, we are more likely to observe "herd mentality" in social media expression

than in survey responses. In short, this version of the public agenda, different from the

private, individual, representative, and measurable version constructed by surveys, is

more public, relational, hierarchical, and also measurable (McGregor, 2019). There is no

doubt that survey and social media data offer different, yet both flawed, reflections of

public opinion.

Specific to agenda-setting studies, the public agenda was considered as a subset of public opinion — what people are concerned about. Following the two definitions and operationalizations, we could expect two versions of public agenda: One that reflects what people self-reported in a survey privately and one that people expressed in a public or semi-public social environment. Corresponding to the first version, traditional agenda-setting research often measures public opinion, either at an aggregate or individual level, through self-reported survey questions. The respondents were asked either to name a list of most important issues/attributes (McCombs, 2014) and/or to draw connections between different attributes ("the mind-mapping approach"; Guo, 2014). In recent years, issue salience found in social media data has entered agenda-setting studies as an operationalization of public agenda (e.g., Avendaño, 2010; Chen et al., 2019; Conway-Silva et al., 2018). To date, however, no systematic comparison has been conducted to explore the impacts of using these two versions of public agenda in agenda-setting studies. Therefore, I ask:

> **RQ1.** Is the public agenda reflected by individuals' self-reported issue importance different from the relative issue prominence expressed on social media during the 2020 US presidential election?

2.2.2. Contingent Factors of the Difference

A following question will be, if differences exist, what factors contribute to the discrepancies between the two versions of public agenda? Two types of factors are crucial: whose opinions and what opinions are included in each agenda. First, as

mentioned above, samples drawn from those who are vocal on SNSs cannot represent the entire population. Previous studies have comprehensively discussed the sampling biases in SNS data. For instance, Hargittai (2020) found that social media users tend to have higher socioeconomic status and better Internet skills compared to the general public, which could lead to oversampling of people with these characteristics. Other scholars also warned about platform-specific sampling problems (e.g., the filtering strategies of data streams), platform design and moderation, as well as distortion from activities of nonhuman accounts (Gillespie, 2018; Ruths & Pfeffer, 2014). These problems can be partly solved by using "fire hose," which provides full access to social media data, instead of the public version of Application Programming Interfaces (APIs; Lomborg & Bechmann, 2014) and by utilizing bot detection tools (e.g., Botometer; Sayyadiharikandeh et al., 2020). Shah et al. (2015) also pointed out that a survey, especially low-response-rate ones, still provides a biased sample of public opinion. Various statistical methods can also be applied to adjust for the biases as long as the researchers are aware of them. Thus, this factor is not the main focus of this dissertation.

If given the same population, the more important factor behind the potential discrepancies between the two versions of the public agenda, then, is individuals' self-censorship of content. Self-censorship, a type of non-participation, can be loosely defined as the withholding of one's real opinions in a social setting (Hayes et al., 2006a). It has two characteristics: First, self-censorship is a conscious choice even when someone has the opportunity to speak. Second, it happens due to covert pressure or threat, especially when there is high perceived opinion congruency from other members in a conversation

(Hayes et al., 2005b; Lutz & Hoffmann, 2017). Building upon the spiral of silence theory, Hayes et al. (2005a) conceptualized self-censorship as an individual difference, which is related to high anxiety about social interaction high concern about other people's evaluation, low argumentativeness, and low self-esteem.

Self-censorship has been closely tied to political expression and is an especially harmful reason behind the potential difference between what people will disclose in an anonymous survey and in a traceable social media post. Previous scholars have empirically demonstrated that people with a high tendency toward self-censorship are more likely to repress their political expression even if they have an opinion (Gearhart & Zhang, 2014; Hayes et al., 2006b). Thus, when members of the general public have different levels of willingness to self-censor, some opinions may be disproportionately suppressed, leading to a biased representation of public opinion observed only on social media. Self-censorship differences among individuals can result in more covert and hard-to-adjust biases than the other factors mentioned above. People with high willingness to self-censor will be more sensitive to the surrounding opinion environment and be more likely to express following the others, which may widen the gap between what they report in a survey independently and what they express on social media with more social pressure.

Although self-censorship is often conceptualized in small group settings, it also applies to understanding the gap between forming an opinion and posting on SNSs. High self-censorship, based on the previous literature, could lead to a series of behaviors on social media, including hesitation before sharing any content (Sleeper et al., 2013), "last-

minute" deletion of typed content before posting (Das & Kramer, 2013), or even altering

the way of expression to one that is different from one's original intended way (Madsen

& Verhoeven, 2016). Thus, we should examine individual differences in the tendency

toward self-censorship as a moderator in the comparison between self-reported perceived

issue importance — the self-reported version of public agenda measured by survey —

and the actual SNSs expression — the version of public agenda that appears online. More

specifically, we can expect lower alignment between the two versions of agenda among

people with high self-censorship. Thus, I propose this hypothesis:

> **H1.** People with higher willingness to self-censor will have larger discrepancies
>
> between their perceived importance and social media expression about social
>
> issues during the 2020 US presidential election.

2.3. Two Versions of Media Agenda

2.3.1. The Digitalization of News Media and the Two Platforms

As briefly mentioned above, the diversification of digital platforms has witnessed

the emergence of two forms of news media that are interconnected yet different. The

trend of media convergence, a buzzword describing the blurred boundary and increased

connectivity between media forms, since the 1980s has encouraged traditional news

media to adopt a plurality of media formats, especially digital ones (Peil & Sparviero,

2017). Most news media, especially newspapers, have become multiplatform enterprises

(Ju et al., 2014). According to a 2020 survey, 86% of US adults received their news from

digital devices. It is not surprising that major news organizations have migrated to digital

spaces such as websites and social media platforms.

Since the late 2000s, especially after the launch of Twitter as a "breaking news disruptor" (Elizabeth, 2017), major US media organizations have started to expand their online presence to SNSs. Many hired specialized social media editors, who not only transfer the website news to a more SNS-friendly format, but also create content that can engage readers and citizen journalists (Gleason, 2010; Ju et al., 2014). In the early stage, newsrooms put their SNS accounts in a secondary position. They even regarded posting information on SNSs before the news article was published as "scooping themselves." After more than a decade, however, SNSs have driven so much traffic for news organizations that most of them now have a social media team, not just several editors, to engage SNS audiences (Elizabeth, 2017).

Thus, while news websites largely replicate the content from the more traditional forms (e.g., newspaper, television, and radio), the social media accounts of news organizations curate a different agenda due to audiences' characteristics and platform affordances. Although some news organizations simply post links to drive traffic to their websites or use automatic tools to indiscriminately duplicate web news, previous studies also revealed that many news media tend to create content specific to social media platforms and have a distinctive news agenda on Twitter (Armstrong & Gao, 2010; Palser, 2009). Among the 200-500 long articles posted on news websites per day, the social media team has to select 50-100 that fit the SNS users' interests more. The media agenda reflected on Twitter may also be confined largely by the platform's affordances (boyd & Ellison, 2007; Bucher & Helmond, 2017; Gillespie, 2018). For instance, news media's Twitter accounts may be used more often to post breaking news, rather than long

editorial articles, to match with the timeliness expectation of Twitter users and to fit into

the 280-character limit of the platform. Zhang and Guo (2019) also illustrated that people

consuming news on two SNSs — Weibo and WeChat — even from the same news

source, had different levels of satisfaction with the government, which implied that the

same source may present a very distinctive agenda on different digital platforms. Thus, I

ask this research question:

> **RQ2.** Is the media agenda reflected by news coverage on media's websites
>
> different from the one represented in media's social media posts during the 2020
>
> US presidential election?

2.3.2. Contingent Factors of the Difference

Additionally, the characteristics of news organizations may serve as contingent

factors of the discrepancies between the two versions of media agenda. Stromback and

Kiousis (2010) showed that media channels and type will influence the general and

specific news consumption of the public. Specifically, digital-native media, media that

were created on the web and almost solely publish online (Barthel & Shearer, 2015), tend

to be early adopters of new digital technologies (Nee, 2013). Their deeper

experimentation with more concise and multimedia storytelling may also make their

content more transferrable to SNS publishing than their non-native counterparts (Harbers,

2016). Also, online-only media were found to focus more on timeliness (Harder et al.,

2017) and thus may have a smaller time lag between publication on their website and on

SNS than those still following a more traditional publishing routine. A survey conducted

by the American Press Institute on 59 newsrooms revealed that in more print-oriented

legacy newsrooms, the culture is to predominantly focus on the traditional forms, leaving the social media teams with a feeling of being "removed from day-to-day journalism," whereas the two parts may have more organic connections for media built on digital platforms (Elizabeth, 2017). Thus, we could expect that media type (i.e., whether a media outlet is digital native) will influence the discrepancies between the two versions of media agenda. Therefore, this study hypothesizes:

H2. Compared to non-digital-native media, digital-native media will have a closer alignment between the agenda presented on their news websites and Twitter accounts during the 2020 US presidential election.

2.4. Towards a Two-way Agenda-setting Process

While the traditional agenda-setting theory describes how the salience of a given issue transfers from news media to the public (McCombs & Shaw, 1972), the emergence of social media also arouses discussions on how the agenda-setting power is shifting from traditional news organizations to ordinary people. As Chaffee and Metzger (2001) argued, "the key problem for agenda-setting theory will change from what issues the media tell people to think about to what issues people tell the media they want to think about" (p. 375). In the recent decade, social media has become the major channel for people to "tell what they want to think about."

The emergence of social media also has the potential to transfer "media power" to "people's power." "Media power" can be loosely defined as the non-coercive bargaining power that mass media can use to influence powerful actors in society (Couldry & Curran, 2003). When discussing media power, scholars normally regarded audiences as

passive receivers of the frames set by news media. Nevertheless, the low entry threshold

and interactive nature of social media enable the once silent mass to actively speak for

themselves and to reversely have more control over the greater discourse. This leads to a

growing literature calling for a new theorization of the "people's power." A seminal

study by Meraz (2009) found that traditional elite media's monopoly of agenda-setting

power is being challenged by independent blog platforms. More empirical studies

emerged soon after and expanded the discussion to more platforms beyond blogs (e.g.,

(Jones-Jang et al., 2020; Melek, 2017; Neuman et al., 2014; Van den Heijkant et al.,

2019).

2.4.1. Empirical Evidence of the Two-way Directions

Based on the preliminary systematic literature review, I found that 17 of the 30

papers examining the agenda-setting relationship between traditional news media and

social media showed a reciprocal or bi-directional relationship between social media and

traditional media (Zhang, 2020a). Among the 10 studies that quantitatively compared the

strength of the agenda-setting effects in the two directions, the traditional agenda-setting

effect (traditional media → social media) was found to be stronger in four studies, while

six studies supported a stronger reverse agenda-setting effect (social media → traditional

media). This indicates that the one-directional agenda-setting effect may not hold

nowadays in all contexts.

Despite the empirical evidence, the theoretical framework of a two-way agenda-

setting effect remains unclear. First, social media was often treated as a unified

information source. As Zhang and Guo (2019) and Guo and Zhang (2020) argued,

different types of social media accounts should be carefully distinguished when studying

information flow and media effects. Previous studies, nevertheless, went to two extremes:

Some studies treated social media as a part of the traditional media ecology and analyzed

the agenda-setting effect under the frame of intermedia agenda-setting (e.g., Conway et

al., 2015; Harder et al., 2017; Kim et al., 2016; Melek, 2017), which ignored the

expressions of ordinary users. Others, although they regarded social media expression as

a proxy of public opinion, approached the relationships from a perspective of

collective/connective actions or citizen journalism and did not connect it with media

agenda (e.g., Freelon et al., 2016; Meraz, 2009; Quinn et al., 2019). Also, the terms

referring to the agenda-setting power of social media discussion are varied: e.g., social

media's intermedia agenda-setting effect in Harder et al. (2017), social media power in

Freelon et al. (2016) and agenda trending in Groshek and Groshek (2013), which requires

systematic comparison and explication.

Thus, this dissertation aims to disentangle public opinion from miscellaneous

social media data and clarify the terminology by re-introducing the term "reverse agenda-

setting." Reverse agenda-setting was first mentioned by opinion leader scholars. For

instance, Brosius and Weimann (1996) proposed a reverse agenda-setting model, in

which "early recognizers" — people with high strength of personality (SP) — set public

agenda and media agenda. The term has not been actively studied for years since then and

was employed to name other effects (e.g., media intentionally remain silent on some

issues; Haarsager, 1991). Nevertheless, the core idea of examining the social influence of

"active audiences" moved to the center of discussion with the emergence of social media.

The seminal paper of Bennett and Iyengar (2008) argued that the current media landscape has created a new era of minimal effects, in which audiences become more engaged and have more channels to pass their preferences to journalists. Therefore, Ragas et al. (2014) advocated that it is time to revisit reverse agenda-setting — the process when the public sets the media agenda. Their empirical results, although using online search behavior to represent public agenda, added evidence to a plausible reciprocal agenda-setting pattern.

2.4.2. Theoretical Roots

In addition to the empirical evidence above, there are several theoretical and practical reasons supporting the potential two-way agenda-setting effect emerging in recent years. Theoretically, the reverse agenda-setting process has been hinted at in the original agenda-setting theory and intermedia agenda-setting theory. McCombs (2014), when explaining the agenda-building process (i.e., who set the media's agenda), mentioned three sources: major information sources, other media, and journalism norms. When talking about the first one, he stated that journalists can hardly cover every corner of the world and thus need secondary information from professional organizations, interest groups, public relation specialists, government officials, and experts, etc. (McCombs, 2014). For instance, based on an in-depth interview with political journalists, Parmelee (2014) found that tweets from political leaders had first- and second-level agenda-building power. This study also indicated that newsrooms refer to political leaders' tweets to find missed events, get quotes, polling data, viewpoints, background information, and double-check information.

Nevertheless, one important information source was missing in his argument —

the public, who is arguably the most familiar with daily incidents around them. Returning to the original thread of agenda-setting theory, we can see that it was the lack of capability to be directly informed about "the world outside" that drives us to live in the media's "pseudo-environment" (Lippman, 1922). Therefore, if individual citizens can serve as direct information sources and bypass the mediation of the institutionalized agenda builders, the traditional direction of agenda-setting should be hypothetically reciprocal or even reverse only. Qualitative studies on journalists (e.g., Lariscy et al., 2009; McGregor, 2019) have revealed that social media were actively used as quick sources to get reporting ideas and find information. Yet, as argued above, if we carefully distinguish different information sources on social media, we should not arbitrarily label all information-gathering efforts of journalists from social media as agenda-building. Ordinary citizens' posts might be evaluated and utilized very differently compared to professional actors, such as organizations and political figures.

Additionally, although some previous literature defines social media as a type of media and analyzed social media public agenda under the IAS framework (e.g., Conway et al., 2015; Groshek & Groshek, 2013), we should carefully distinguish between IAS and the reverse agenda-setting process. The logic behind the IAS theory is that journalists routinely observe and copy their peers to validate their judgment on the newsworthiness of events (McCombs, 2014). However, the public cannot be the substitute of professional journalists in this formula: news media refer to the public agenda not for news professionalism, but for a better understanding of potential readership. On SNSs, specifically, the two mechanisms may happen at the same time. As Lariscy et al. (2009)

showed, journalists use social media for various purposes, including monitoring other journalists, which falls into the intermedia agenda-setting framework, and representing the public or determining public opinion, which refers to what I emphasize here as a reverse agenda-setting process. In sum, it is theoretically necessary to discuss the process of issue salience transfer from the public to the media outside of the agenda building and IAS theories and to propose a new two-way agenda-setting framework.

2.4.3. Practical Reasons

Practically, the media ecology has been dramatically changed with the emergence of Web 2.0, where UGC has become a key characteristic. Social media, including Twitter and the blogs mentioned above, brought opportunities and radical change to the way we communicate, think, and act. First, the technological features of Web 2.0 bring us "big data," which, on the one hand, point to the exponentially increasing data created by the general public, and, on the other hand, enhance journalists' ability to monitor, collect, and analyze social media as public opinion (body & Crawford, 2012; McGregor, 2019). Journalists' usage of the public as information sources goes beyond Vox Populi (Lukito et al., 2020) and to a more general and comprehensive understanding of what people value. As Weaver and Willnat (2020) revealed, a large number of journalists are actively using social media as information-gathering tools, especially to look for breaking events. The specialized social media editors will also use SNSs to connect with potential sources, understand the culture about how to attract more traffic on SNSs, and monitor "what's being talked about, what's trending, what's hot" on social networks (Gleason, 2010). In short, newsrooms nowadays are actively listening to the public agenda represented on

SNSs to decide their coverage.

Second, the increasing commercialization and fragmentation of news media requires them to better cater to their audiences (Bennett & Iyengar, 2008). Similarly, this shift has been strengthened by the increasing polarization and selective exposure among not only Americans but also people around the world (Sears & Freeman, 1967). In a UK study, van der Pas et al. (2017) argued that the media is trying to connect with their audiences through partisanship so as to better reflect on the frames that the partisan audiences are attracted to.

Finally, the emergence of SNSs has cultivated a participatory culture, which encourages citizens to play a role beyond positive message receivers (Jenkins, 2006). Building upon the technological architecture mentioned above that enables real-time and easy access to disseminate information or express opinions, citizens can contribute to the news flows through multiple methods. First of all, we have witnessed the prevalence of citizen journalism or participatory journalism, which refer to news content created by non-professionals (Wall, 2015). This trend has motivated professional journalists to provide extensive training and even to collaborate with citizen journalists, which improves the quality of citizen journalism and further encourages this culture (Hermida, 2012). Newman (2009) even argued that with the nearly real-time news reporting among citizens on SNSs, professional organizations have already "abandon[ed] attempts to be first for breaking news, focusing instead on being the best at verifying and curating it." Thus, we could expect a two-way information flow: The news media pick up breaking news from the public, then further leverage issue importance by curating comprehensive

news content on certain events.

Importantly, the interactive nature of SNSs enables users to engage in professionally produced news in various ways, including sharing, commenting, liking, and even contacting the author(s)/editor(s) directly. Early scholars like Katz and Lazarsfeld (1995) stressed the importance of interpersonal communication, which describes how information can flow in interpersonal networks. Communication through social media arguably imitates interpersonal, unmediated interaction more than mass media (boyd & Ellison, 2007). In the social media era, it is even more common that a piece of breaking news has spread across millions of ordinary users before it is noticed by professional news organizations. The network effects can further enhance the potential reverse agenda-setting process. Messing and Westwood (2012) proved that social endorsement can sometimes be a stronger heuristic then some traditional ones, such as content type, sources, and partisan alignment. Thus, ordinary users could either contribute to the content by adding comments or highlight the importance of certain issues by providing endorsement (e.g., like the post). Based on the above theoretical and empirical support, I propose the following hypotheses and research question to examine (1) the existence of the traditional agenda-setting effect, (2) the existence of two-way agenda-setting relationships; and (3) the comparative strength of the two directions:

> **H3a-b.** The traditional agenda-setting effect (i.e., the news agenda will transfer to the public agenda as reflected by individuals' self-reported issue importance) still stands for both (a) media agenda on news websites and (b) media agenda on social media during the 2020 US presidential election.

H4a-b. There is a two-way agenda-setting effect between public agenda expressed on social media and (a) media agenda on news websites and (b) media agenda on social media during the 2020 US presidential election.

RQ3. Between the reverse agenda-setting effect and the traditional agenda-setting effect, which direction will be stronger during the 2020 US presidential election?

In addition, given that news websites and news social media accounts may present different agendas, they are likely to have distinctive agenda-setting relationships with the public agenda. Since no existing studies have empirically compared the two pairs of two-way agenda-setting effects, I ask this research question:

RQ4. Will the two-way agenda-setting effect be stronger or weaker between individuals' social media expression and media's social media posts, compared to the relationship between individuals' social media expression and media agenda on their websites, during the 2020 US presidential election?

2.3.4. Contingent Factors

Finally, several factors have been revealed to intervene in the agenda-setting direction and strength between social media and traditional news media. Previous literature examining this has discussed a vast number of issue characteristics, including whether an issue is more or less "commentable," more or less thought-provoking, more or less dramatic, conflict-laden and volatile, with a shorter- or longer-time frame, more domestic related or foreign related, and whether an issue fits news values or not (Araujo & van der Meer, 2020; Meraz, 2011a, Neuman et al., Rogstad, 2016; 2014; Sormanen et al., 2017; Van den Heijkant et al., 2019). One of the most important contingent factors in

the traditional agenda-setting research - issue obtrusiveness - has not yet been tested in the reverse direction. Issue obtrusiveness refers to the extent to which an issue obtrudes into people's daily life so that people can directly experience it without consuming news media (McCombs, 2014). Proposed by Zucker (1978), it is arguably the most examined issue attribute in agenda-setting studies (Soroka, 2002).

Previous empirical results revealed conflicting directions of the impact. Some scholars argued for a stronger agenda-setting effect for high obtrusive issues due to the cognitive priming effect of direct experience (i.e., people will pay more attention to news that are relevant to their daily lives; Chen, 2009). Others found a lower level of correspondence between the public and the media agenda for high obtrusive issues, as people already have sufficient personal experience about those issues and thus do not need to rely on news media as their primary source of information (i.e., have lower need for orientation; McCombs, 2014; Weaver et al., 1981; Winter et al., 1982). As for the reverse direction, along the same line, I propose that the media will follow the public agenda more closely on high obtrusive issues, since those are issues with which people share more personal experience. Thus, this dissertation will test both directions with the following hypothesis:

H5. Issue obtrusiveness will influence the direction and strength of the two-way agenda-setting effect.

Beyond the issue-level factors, previous agenda-setting studies have explored the effects of different media's characteristics as contingent factors in the potential two-way agenda-setting relationship, which include whether the news media is a news aggregator

or independent (Han et al., 2017), whether government-controlled or commercial-oriented (in an authoritarian context; Luo, 2014), elite or less elite, team blogging or not (Meraz, 2011b), and so on. News media's online traffic and reporting style were also found to play a role in affecting the agenda-setting effect (Ragas et al., 2014). Adding to the existing studies, this study investigates the influence of two additional factors - media type (i.e., whether they are digital-native) and the media's political orientation.

First, whether a news organization is digital-native largely influences their newsroom activities and public impact. On the one hand, we could expect the websites of non-digital-native media, which normally have a longer history and more established reputation, to have stronger traditional agenda-setting effects due to their eliteness in general. On the other hand, their digital-native counterparts may follow the public agenda more closely. Digital-native media are early adopters of new digital platforms, such as SNSs, and are more familiar with the culture (Nee, 2013; Harbers, 2016). Their focus on timeliness also encourages them to observe what is going on among social networks constantly. Elizabeth (2017) also revealed that legacy print-based newsrooms (i.e., non-digital-native media) still pay relatively more attention to traditional reporting and tend to overlook the social media team, which may weaken the strength of both types of agenda-setting effects between their social media accounts and the public agenda.

Additionally, considering the media system in the US, media's political orientation also plays an important role in the agenda-setting process. Several studies (e.g., Camaj, 2014; Chen et al., 2020; Guo et al., 2021) empirically showed the existence of a partisan selective agenda-setting effect, with the salience transfer conditional on

whether the media outlet is liberal, conservative, or mainstream. While mainstream media's agenda aligns with a broader group of the public, partisan media may have a stronger two-way connection with certain groups of people - those who have higher partisan involvement and thus read news media to reinforce their existing opinions (Camaj, 2014; Stroud, 2011). Guess et al. (2021) also implied that the increased consumption of partisan media online will inform people about certain issues, yet erode trust in mainstream media, which could impair the latter's agenda-setting effect. As several competing mechanisms could be at work at the same time, I am interested in the final outcome: At an aggregate level, how will media with different political orientations present divergent patterns in their two-way agenda-setting effects? I present the following hypothesis:

H6a-b. Media characteristics, including (a) media type (i.e., whether a media outlet is digital native) and (b) political orientation, will influence the direction and strength of the two-way agenda-setting effect.

Lastly, due to technical constraints, a previously less studied group of factors are individual characteristics, which can be examined with connected survey and social media data in this study. Traditional agenda-setting studies focus on the need for orientation as the key individual level moderator, with other factors, such as education, also briefly mentioned (McCombs, 2014). If social media has extended the role of individuals to include both message receiver and sender, it is logical to explore the impact of personal influence.

Specifically, people distinct in three types of characteristics may have different

agenda-setting relationships with the media. First, Wanta (1997) examined the effects of five demographic variables (i.e., age, education, income, gender, and race) on salience transfer of issues covered by local newspapers and found that media have a stronger agenda-setting effect on people with higher education levels. It was argued that the well-educated population pays more attention to news and are more sensitive to a diverse range of issues (Coombs & MacKuen, 1981). Additionally, people with higher household income were assumed to be less susceptible to media's agenda-setting on certain issues, such as unemployment, since they have lower relevance and need for orientation (Zhu & Boroson, 1997). Nevertheless, studies in the 20th century found minimal evidence that these demographics have strong moderating effects on agenda-setting relationships.

This minimal moderation conclusion, however, should be reexamined in the digital era. First, the existence of digital divides limits underprivileged social groups' access to digital news channels that update almost instantly (van Dijk & Hacker, 2003). In addition to basic attitudes, access, and skills divide, usage divide has become the major type of divide that we are facing (van Deursen & van Dijk, 2014). Women, the elderly, and the lower income population were found to use the Internet less for news. Thus, at an aggregated level, we could expect lower correspondence between the public and media agenda among these social groups. Second, even given the same amount of actual digital news exposure, the agenda-setting effect may still differ by demographics individually. While the earlier literature claimed no significant difference between people of dissimilar demographic characteristics in terms of their vulnerability to the news agenda (e.g., the educated population will not take a more defensive stance when reading news; MacKuen,

1979), this assumption is challenged by the demographically uneven exposure to misinformation, which was proved to be linked with lower trust in media (Ognyanova et al., 2020). Third, the reverse agenda-setting effect may also be stronger between new media and the public agenda of those from the privileged social groups. Zhang et al. (2021) revealed that the younger and more educated population used social media more frequently for active political opinion sharing. Recent studies also connected demographic factors to the likelihood of one gaining influence on SNSs. For instance, Hong et al. (2017) showed that female and older Facebook users are more likely to receive "likes" than their counterparts. Therefore, we can expect that the agenda-setting effects are moderated by demographics.

Two other factors, opinion leadership and social capital, may also impact the likelihood of someone's opinion being picked up by journalists. As mentioned above, Brosius and Weimann (1996) proposed that the "early-recognizers," those who score high in the opinion leadership scale (i.e., the SP scale), should be differentiated from the other members of the public, as they have a stronger ability to identify emerging issues and diffuse them to news media. This gap between actors with high and low opinion leadership could be more salient over time as the capability of getting news media's attention features a "rich-get-richer" pattern (Seguin, 2016). Dubois et al. (2020) also suggested that influencing and getting interaction from journalists were important motivations for opinion leaders to post opinions on SNSs. Similarly, people with higher social capital - the resources gained from direct relationships with others or membership in groups - were found to be more vocal on SNSs (Ferrucci et al., 2019). Gil de Zúñiga et

al. (2012) also presented a positive relationship between one's social capital and online network size. A larger friend network online, theoretically, will increase the likelihood of one's posts being shared and exposed to journalists. A large network increases the possibility of social endorsement (e.g., likes), which makes posts look more credible to audiences, including journalists (Messing & Westwood, 2014). Thus, the reverse direction of agenda-setting can be assumed to be stronger than the traditional one among SNS users with higher opinion leadership and/or social capital. The following hypothesis is proposed accordingly:

H7a–c. Individual characteristics, including (a) demographic factors (i.e., gender, age, race, household income, and education level), (b) opinion leadership, and (c) social capital, will influence the direction and strength of the two-way agenda-setting effect.

To illustrate visually, the comprehensive two-way agenda-setting framework proposed in this study is as below:
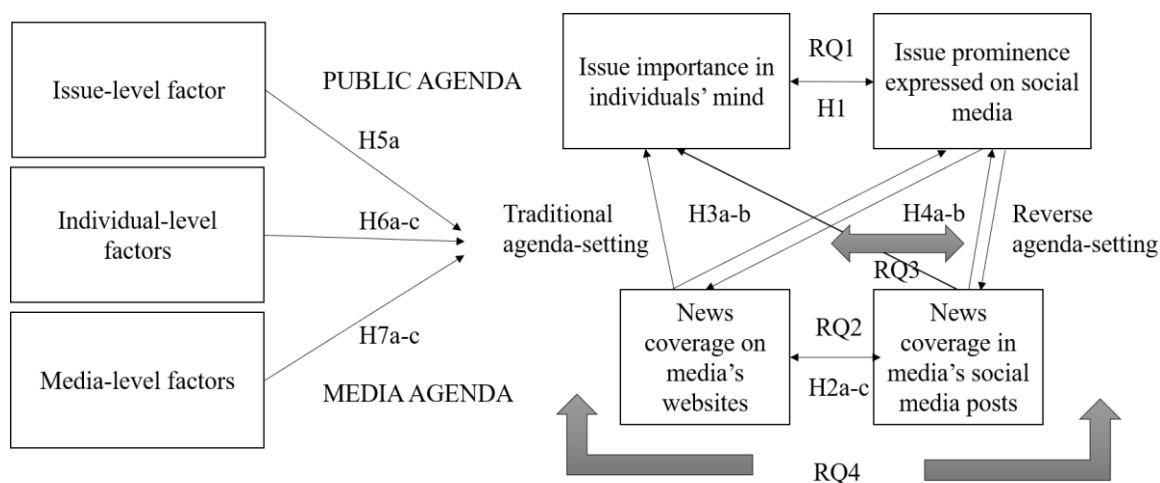
Figure 2.2. Theoretical framework with RQs and Hs.

CHAPTER 3 Data and Methods

To reiterate, the goals of this research are to examine (1) differences between the two versions of public agenda (self-reported prioritized vs. social media issue agenda); (2) differences between the two versions of media agenda; and (3) factors influencing the direction of the agenda-setting effect. To empirically test the hypotheses and research questions regarding the three overarching questions, I take discussions around the 2020 US presidential election as an example.

The selection of this time period is derived from two reasons. First, election time is when the majority of classic agenda-setting studies were conducted, as it is arguably the time when both the public and the media pay the most attention to social issues (McCombs, 2014). As discussed previously, the intention of this research is to examine the competitive relationship between various public issues. Analysis results based on the election may better reflect the direction of policy agenda changes and inform future campaign strategies.

Second, uniquely among presidential elections, the 2020 election happened during a global public health crisis — the COVID-19 pandemic, which may have further magnified the potential multi-version two-way agenda-setting effects. On the one hand, reports have shown that both traditional news consumption and social media usage have dramatically increased during the pandemic, especially on digital platforms. This increase may be attributed to people's different levels of anxiety about health, economy, and political uncertainty, as well as the increased spare time under lockdown/quarantine. According to a Nielsen report, ("Navigating the Challenges," 2020), Americans increased

their time spent on digital news by 215% from 2019 to 202. In another survey conducted among North American SNS users, a majority of participants revealed that they increased their information consumption (72%) and posting (43%) behaviors on social media (Wold, 2020).

On the other hand, the pandemic may have also widened the gap between different types of media and social groups among the public in terms of the distinct amount of attention paid to different issues (i.e., different agendas). For instance, news media with different political orientations were found to have distinctive agendas about the election and the COVID-19 pandemic (Jurkowitz & Mitchell, 2020; Mitchell et al., 2021). Research has also shown that conservatives and liberals showed divergent health risk perception and perceived media accuracy (Rothgerber et al., 2020), as well as different levels of susceptibility to media's agenda-setting effect (Calvillo et al., 2020). Thus, it is of greater importance to examine how the individual-, media-, and issue-level contingent factors affect the two-way agenda-setting relationship around this period of time. Nevertheless, the generalizability of this study might also be compromised due to the distinctiveness of this year. My goal here is not to find universal patterns, but to list all potential confounding situations so as to try to identify the true effects of the focal variables.

3.1. Data Collection

The data used in this dissertation consist of four parts — two of the public agenda and two of the media agenda. The two versions of the public agenda were measured by people's self-reported perceived issue importance and their corresponding Twitter

expression frequency on each issue. The two versions of the news agenda are operationalized as the relative amount of news coverage on the websites and the organizational Twitter accounts of 27 US major news media.

This study focuses on organizational and individual use of Twitter, as opposed to other SNS, for multiple reasons. Twitter is one of the most popular SNS in the US. By the end of 2020, Twitter reached 192 million average daily active users (@TwitterIR, 2021). 23% of US adults are Twitter users in 2021 (Auxier & Andersen, 2021). Although not as widely used as the more strong-tie-based SNSs such as Facebook and Instagram, Twitter is arguably the most open platform for news dissemination and public opinion observation. The high anonymity and asymmetrical relationships on Twitter make it an effective information-sharing platform (Halpern et al., 2017). In a 2010 study, scholars found that 85% of topics in tweets are news in nature, either breaking news or news that last longer (Kwak et al., 2010).

This number should be attributed to the active engagement of both the public and news media. On the one hand, 17% of US adults use Twitter for news (Newman et al., 2020). Besides news consumption, 54% of Twitter users also tweeted about the news, among which 33% are from news media accounts, according to a Pew report (Barthel & Shearer, 2015). On the other hand, Twitter is also the most news-friendly for newsrooms. It is more effective in terms of reaching wider audiences compared to Facebook (Ju et al., 2014). Journalists also heavily rely on their own Twitter feeds and the alert from analytical tools, which often feature Twitter as the most important data source, to inform news selection (McGregor, 2019). Santana and Hopp (2016) empirically revealed with a

national survey that journalists value Twitter more than Facebook. Thus, even though criticisms exist toward recent public opinion analyses for their overreliance on Twitter data, it is indeed the most visible representation of online public opinion for journalists. In this study, I have no intention to be involved in the debate on whether the journalists should diversify their social media sources for public opinion normatively, but rather to focus on the outcomes of the current situation.

3.1.1. Public Agenda

As mentioned above, this study matches a national representative survey and the respondents' Twitter data using their Twitter handles to compare the two versions of the public agenda.

3.1.1.1. Survey

The survey data collection was conducted from October 28, 2020, to December 21, 2020, around the time of the 2020 US presidential election when social issues were discussed most heatedly. A questionnaire was distributed online to Twitter users and administered by Qualtrics, a US-based survey company that manages multiple online panels. To achieve representativeness, the gender and age distributions of the collected sample match with those of Twitter users (Kemp, 2019; Pew Research Center, 2019), as this study focuses on people who have a Twitter handle and will express themselves on Twitter. In the survey, respondents were asked to provide a valid Twitter handle that (a) belongs to themselves, (b) had been used in the past week before the survey date, and (c) has more than 10 posts in total that are not automatically generated by third-party

Application Program Interface (API). Respondents who did not meet all three conditions were excluded from the final sample. A data validation process was conducted each day during the data collection with the R package "rtweet" to check if the provided handles met the three conditions. Among the final 854 valid samples, 52.29% of participants are males, 46.42% are females, and 1.29% were self-identified as "other gender." This sample has slightly more females than the general Twitter population. The median age is 35 years old ($SD = 16.08$), which roughly matches the general Twitter population (Pew Research Center, 2019). Table 3.1 summarizes the demographic traits of the surveyed population.

		Frequency	Percent	Twitter users census
Gender	Male	527	52.29%	56.2%
	Female	440	46.42%	43.8%
	Other	11	1.29%	-
	Missing	1	.12%	-
Income	Less than $25,000	183	19.79%	-
	$25,000 to $34,999	136	14.52%	-
	$35,000 to $49,999	130	13.93%	-
	$50,000 to $74,999	179	17.21%	-
	$75,000 to $99,999	141	14.05%	-
	$100,000 to $149,999	121	11.83%	-
	$150,000 to $199,999	52	5.27%	-
	$200,000 or more	37	3.40%	-
Race	Black/African American	134	13.35%	-
	White/Caucasian	698	72.01%	-
	Hispanic/Latino	83	8.08%	-
	Asian	37	3.98%	-
	Native American	9	.82%	-
	Pacific Islander	2	.23%	-
	Other	16	1.522%	-

Education level	Less than high school degree	19	2.11%	-
	High school graduate (high school diploma or equivalent including GED)	173	18.50%	-
	Some college but no degree	234	24.00%	-
	Associate degree in college (2-year)	119	11.71%	-
	Bachelor's degree in college (4-year)	258	26.23%	-
	Master's degree	137	13.70%	-
	Doctoral degree	17	1.76%	-
	Professional degree (JD, MD)	22	1.99%	
Age	18-29	385	40.05%	42%
	30-49	305	27.40%	27%
	50-64	210	22.48%	18%
	65+	79	7.73%	7%
	Missing	23	2.34%	6%

Table 3.1. Demographic traits of the surveyed participants ($N = 854$).

3.1.1.2. Twitter Data

After identifying the valid handles, all tweets posted in the three months before

the survey date, were collected using "rtweet." A cleaning process was also conducted to

exclude automatically generated content by third-party platforms[1] and non-English

content (only kept English and undefined tweets). Additionally, only tweets posted within

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[1] Here, I excluded sources that use Twitter API to auto-generate and auto-post content such as ads and sweepstakes (i.e., content that was not posted by the users themselves), but kept tweets from publishing tools, as the posted content is still created by the users. The final list of sources includes Buffer, IFTTT, Mobile Web (M2), Salsa Social Publishing, Streamlabs Twitter, Tweet Suite, TweetCaster for Android, TweetDeck, Twittascope, Twitter for Android, Twitter for iPad, Twitter for iPhone, Twitter for Mac, Twitter Web App, and Twitterrific for iOS.

three months (92 days) before each participant's unique survey response date was included, which means that each participant has their unique date range for three months. As these personal tweets include original, commented, and retweeted posts, the corresponding commented/retweeted content was combined with the user's own comments to inform the issue discussed. The final sample includes 378,594 tweets, ranging from July 29, 2020 to the end of December 21, 202.

3.1.2. Media Agenda

3.1.2.1. News headlines

To explore the two versions of media agenda, I first collected the headlines of all news items (including news articles and news videos) and news tweets posted by the organizational Twitter accounts from the official websites of 27 US major news outlets (see Table 3.2) from July 29, 2020, three months before the first survey response date, to December 21, 2020, the date when the last survey response was finished. The news headlines were collected from Media Cloud, an open-source platform that archives millions of online news stories nearly real-time. As One America News Network (OANN) was not in the database of Media Cloud, the OANN news headlines were downloaded through Brandwatch, a US-based third-party data provider. After collecting all items from news websites, only headlines of news articles were used to (1) match with the length of news tweets and (2) keep it consistent across news articles and news videos. Previous studies have shown that analyzing news headlines is adequate for first- and second-level agenda setting analyses (Guo et al., 2021; Guo & Zhang, 2020). A total

number of 393,289 news headlines were analyzed.

3.1.2.2. News tweets

Similarly, the news tweets were collected using Brandwatch by searching the usernames of the 27 news outlets. One thing to note about tweets is that some news media have multiple Twitter accounts, such as some regional or sectional ones (e.g., New York Times has @nytimes, @nytimesarts, @nytimesworld, @nytimesbooks, @nytimestravel, @nytimesopinion, and @nytimesmusic, etc.). To keep all media comparable, only the main accounts were included in the analysis (i.e., @nytimes). The final size of the news tweets dataset is 551,938.

Political orientation	Media name	Website	Twitter account	Twitter followers	Digital-native?
Mainstream media	ABC News	abcnews.go.com	@ABC	15,989,529	No
	CBS News	cbsnews.com	@CBSNews	7,780,502	No
	Chicago Tribune	chicagotribune.com	@chicagotribune	1,124,985	No
	CNN	cnn.com	@CNN	50,157,383	No
	Los Angeles Times	latimes.com	@latimes	3,699,460	No
	NBC News	nbcnews.com	@NBCNews	7,851,266	No
	New York Times	nytimes.com	@nytimes	47,645,254	No
	Newsweek	newsweek.com	@Newsweek	3,452,772	No
	NPR	npr.org	@NPR	8,420,716	No
	PBS	pbs.org	@PBS	2,279,129	No
	The Hill	thehill.com	@thehill	3,974,875	No
	USA Today	usatoday.com	@USATODAY	4,162,018	No
	Wall Street Journal	wsj.com	@WSJ	16,472,445	No
	Washington Post	washingtonpost.com	@washingtonpost	18,149,113	No
	Yahoo news	news.yahoo.com	@YahooNews	1,108,764	Yes
Conservative media	Fox News	foxnews.com	@FoxNews	19,860,390	No
	POLITICO	politico.com	@politico	4,313,419	Yes
	Breitbart	breitbart.com	@BreitbartNews	1,536,540	Yes
	Newsmax	newsmax.com	@Newsmax	384,372	No
	One America News	oann.com	@OANN	1,169,142	No
	The Daily Caller	dailycaller.com	@DailyCaller	769,862	No
Liberal media	Daily Kos	dailykos.com	@dailykos	291,620	No
	Huffington Post	huffpost.com	@huffpost	11,449,265	Yes

Mother Jones	motherjones.com	@MotherJones	848,695	No
MSNBC	msnbc.com	@MSNBC	3,668,136	No
Slate	slate.com	@slate	1,807,982	Yes
The Blaze	theblaze.com	@theblaze	754,967	Yes

Table 3.2. Political orientation, official websites, and Twitter accounts of 27 major US news media.

3.2. Data Processing

3.2.1. Survey Measurements

The survey probed the public agenda using a series of the Most Important

Problem (MIP) questions. It also contains measurements of other individual

characteristics that cannot be intuited by online tracking data (i.e., Twitter data). These

include people's news consumption, willingness to self-censor (WTSC), opinion

leadership, social capital, and demographic variables. The detailed measurements are as

follows.

3.2.1.1. The MIP questions

In the survey, I first measured individuals' perceived issue salience by asking the

participants "in your opinion, how important are the following issues to this country

TODAY?" on a 7-point Likert scale (*1 = Not important at all, 7 = Extremely important).*

The surveyed 19 issues were adapted from the top issues of the longitudinal Most

Important Problem poll results from Gallup Polls (Gallup Inc, 2021), including Economy

in general, Unemployment/jobs, Taxes, Foreign trade and foreign policy, Healthcare,

Education, Environment, Race relations/racism, Immigration, Politics/Government,

Terrorism, Guns/gun control, Drugs, Religion/morality, Media/Internet, Crime, Gender

equality and abortion, Military, and LGBT (lesbian, gay, bisexual and transgender) rights.

Table 3.3 and Table 3.4 summarize the basic descriptives and correlations between the 19

MIP variables.

	N	Mean	SD
Issue 1 (General economy)	854	6.06	1.07
Issue 2 (Unemployment/jobs)	854	6.08	1.03
Issue 3 (Taxes)	854	5.50	1.24
Issue 4 (Foreign trade/policy)	854	5.17	1.20
Issue 5 (Healthcare)	854	6.27	1.06
Issue 6 (Education)	853	5.96	1.12
Issue 7 Environment)	854	5.89	1.42
Issue 8 (Race relations/racism)	853	5.88	1.47
Issue 9 (Immigration)	853	5.41	1.44
Issue 10 (Politics/Government)	854	5.74	1.25
Issue 11 (Terrorism)	854	5.27	1.53
Issue 12 (Guns/gun control)	853	5.51	1.57
Issue 13 (Drugs)	854	5.08	1.49
Issue 14 (Religion/morality)	854	4.28	1.90
Issue 15 (Media/Internet)	854	4.95	1.50
Issue 16 (Crime)	854	5.54	1.30
Issue 17 (Gender equality/abortion)	854	5.33	1.33
Issue 18 (Military)	854	4.95	1.58
Issue 19 (LGBT rights)	854	4.99	1.86

Table 3.3. Basic descriptive statistics of the 19 MIP variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Issue 1	1																	
Issue 2	.440**	1																
Issue 3	.364**	.284**	1															
Issue 4	.370**	.284**	.359**	1														
Issue 5	.232**	.372**	.199**	.199**	1													
Issue 6	.225**	.328**	.149**	.253**	.368**	1												
Issue 7	.138**	.306**	.093**	.184**	.485**	.382**	1											
Issue 8	.020	.215**	.000	.050	.359**	.336**	.428**	1										
Issue 9	.241**	.192**	.187**	.439**	.140**	.135**	.060	.153**	1									
Issue 10	.265**	.195**	.214**	.370**	.223**	.262**	.201**	.308**	.272**	1								
Issue 11	.266**	.234**	.285**	.420**	.131**	.173**	.085*	.074*	.343**	.195**	1							
Issue 12	.115**	.229**	.149**	.202**	.316**	.227**	.290**	.386**	.227**	.322**	.287**	1						
Issue 13	.245**	.261**	.361**	.355**	.256**	.168**	.155**	.174**	.276**	.204**	.420**	.337**	1					
Issue 14	.121**	.086*	.254**	.261**	.020	.079*	-.102**	.040	.214**	.160**	.322**	.140**	.359**	1				
Issue 15	.219**	.174**	.259**	.360**	.225**	.259**	.172**	.167**	.240**	.250**	.188**	.204**	.283**	.276**	1			
Issue 16	.292**	.300**	.351**	.314**	.163**	.218**	.020	.040	.261**	.225**	.555**	.336**	.448**	.316**	.217**	1		
Issue 17	.050	.226**	.121**	.158**	.387**	.340**	.427**	.587**	.283**	.316**	.171**	.431**	.253**	.152**	.258**	.127**	1	
Issue 18	.308**	.169**	.295**	.469**	.000	.116**	-.050	-.112**	.242**	.209**	.457**	.107**	.360**	.397**	.247**	.405**	.000	1
Issue 19	-.060	.148**	-.005	.040	.296**	.249**	.429**	.561**	.154**	.195**	.010	.316**	.060	-.050	.149**	-.010	.633**	-.149**

Table 3.4. Correlation matrix of the 19 MIP variables.

Note. **Correlation is significant at the .01 level (2-tailed). *Correlation is significant at the .05 level (2-tailed).

3.2.1.2. Willingness to self-censor

As the study hypothesizes that self-censorship intervenes in the relationship between the two public agendas — the one represented by self-reported survey and the one on social media — the study included WTSC as a moderating variable. WTSC was measured based on a 6-item 5-point Likert scale adapted from Hayes et al. (2005). The items were adjusted to focus on political expression on social media. Examples include "It is difficult for me to express my political opinions on social media if I think others won't agree with what I say" and "There have been many times when I thought that the content others posted on social media was wrong, but I didn't let them know" (*1 = Strongly disagree, 5 = Strongly agree*; *M* = 2.72, *SD* = .84, Cronbach's α = .77).

3.2.1.3. Media consumption

This study also measured the participants' traditional and online news media consumption frequencies as control variables when exploring the reasons behind the discrepancies between the two versions of the public agenda. For traditional media consumption, the participants were asked how often they get news from traditional media sources, including printed newspaper, printed news magazine, television news (cable or local network news), and radio (*1 = Strongly disagree, 5 = Strongly agree*; *M* = 2.72, *SD* = .92, Cronbach's α = .77). Similarly, online news consumption was measured by self-reported frequency of getting news from a list of sources, which consisted of online news websites, citizen journalism sites (non-professional journalism, e.g., blogs), Facebook, Twitter, Reddit, YouTube, Snapchat, Instagram, and News app (*1 = Strongly disagree, 5 = Strongly agree*; *M* = 2.61, *SD* = .83, Cronbach's α = .84).

3.2.1.4. Opinion leadership

Opinion leadership was hypothesized as one of the factors influencing the direction and strength of the two-way agenda-setting effects. Based on the previous literature (Valente & Pumpuang, 2007), there are 10 types of methods to measure opinion leadership, such as celebrities, positional approach, and sociometric. I adopted two methods to identify individuals who have higher and lower opinion leadership. The first method is using the Personality Strength (PS) scale created by Noelle-Neumann (1985). Weimann (1991) proved that the PS scale can effectively identify opinion leaders that match with their demographic, socioeconomic status, network position, and communicative activity activation frequency. A 10-item 5-point Likert scale was used to measure one's PS (*1 = Strongly disagree, 5 = Strongly agree*; $M = 3.36$, $SD = .75$, Cronbach's $\alpha = .85$). The participants were asked to what extent they, for instance, count on being successful in everything they do or a step ahead of others.

As my survey samples are all Twitter users, the second method was used in particular to capture opinion leadership on Twitter. I adopted a commonly used method by counting the number of followers of each user (e.g., Arora et al., 2019; Yun et al., 2016). Since the number of followers might have changed in the time span of the personal tweets collection process (i.e., each collected tweet has a corresponding number of followers of the author at the time when the tweet was collected), I took the average of all of the follower numbers for each user. The 854 users were divided into the higher- and lower-followers group by the mean of all users.

3.2.1.5. Social capital

People's social capital measures were included as another set of factors influencing the strength and direction of the agenda-setting effects. In the survey, I measured offline social capital using a 6-items 5-point Likert scale adapted from Gil de Zúñiga et al. (2012) (*1 = Strongly disagree, 5 = Strongly agree*; M = 3.69, SD = .83, Cronbach's α = .79). Example items include "I have strong personal relationships with my family members" and "I like to keep a large network of acquaintances." Participants who have higher than the average social capital score were assigned to the higher social capital group, with the rest in the lower social capital group.

3.2.1.6. Demographic variables

Besides the above focal variables, this study also included demographic variables, including age, gender, race, education, and income as potential factors impacting the nature of the agenda-setting effects. Again, Table 3.1 displays all descriptive statistics of these variables. For the sake of analytical parsimony, participants were all divided into binary or trinary groups based on the demographic factors. That is to say, this study compares the agenda-setting effects between people who are older and younger, who are males, females, and other genders, who are white and non-white, who possess higher and lower education levels, and who have higher and lower household income.

3.2.2. Content Analysis

Three datasets — personal tweets from the surveyed participants, news headlines from news websites, and news posts from Twitter — were categorized using computer-

assisted content analysis method with variations of BERT (Bidirectional Encoder

Representations from Transformers), a state-of-the-art machine learning technique for

natural language processing introduced by Google in 2018 (Devlin et al., 2019). The

BERT model uses word embeddings, a way of presenting words in a vector space (words

with similar meanings will be closer to each other). As a deep learning method, BERT is

superior to traditional linear supervised machine learning models, such as support vector

machine (SVM), because (1) it uses a bidirectional presentation, which takes both left

and right context of a word into consideration and (2) it is based on the model pre-trained

using digital texts. Thus, for specific tasks like the one in this dissertation, only a small

training dataset is needed (Devlin et al., 2019). The introduction of BERT has

dramatically improved prediction accuracy in different natural language processing

(NLP) tasks.

In particular, two sets of machine learning models were trained, one for personal

tweets and one for news items. As one text can mention multiple issues, each set of the

models contains 19 binary models to predict whether the text mentioned any of the 19

issues. I used one model for both news headlines and news tweets as they tend to have

similar vocabulary and styles.

To create the human annotations for training, three student coders manually coded

around 1% samples of the three datasets (personal tweets: $N = 3,880$; news headlines: $N =$

3,958; news tweets $N = 1,986$). Each of the texts was allowed to have up to three topics.

The coders were asked to code at most the three most predominant issues addressed in

each item. Before the official round of coding, each of the coders independently coded

100 of the samples and compared their coding results with the version coded by the researcher. After discussing the discrepancies with the researcher, they coded another sample of 100 items. The final intercoder reliability indices are all higher than .800 (News headlines: Krippendorff's alpha = .877; News tweets: Krippendorff's alpha = .854; Personal tweets: Krippendorff's alpha = .816). Coded news headlines and news tweets were combined to train the news models, while the coded personal tweets were used to train separate sets of machine learning models. The final coding results were transferred to and entered the model training process as binary codes (1 = present; 0 = absent).

As for training the models for personal tweets, I adopted BERTweet, a model specifically pre-trained using English tweets. This model was proved to perform better on tweet classification tasks than the previous state-of-the-art models (Nguyen et al., 2020). As the tokenizer of BERTweet can automatically normalize tweets (i.e., replace user mentions and Uniform Resource Locators (URLs) with special tokens "@USER" and "HTTPURL" and translate emotion icons into text strings), no cleaning process was conducted before the training steps. The accuracy of each model was measured by three indices: recall (i.e., the extent to which a model can identify all relevant cases), precision (i.e., the extent to which the identified cases are correctly categorized), and F1-score (i.e., the harmonic average of precision and recall). The formula of F1-score is as below:

F1-score = 2 × ((precision × recall) / (precision + recall))

One prevalent problem in NLP is data imbalance, which refers to the non-equal

distribution across the target classes in the training dataset. In this study, as the initial round of training accuracy scores was not satisfactory due to the inadequate amount of positive training items, one way to solve this problem is to implement data augmentation by adding more positive samples - here, positive means samples coded as 1 (present). Since most models trained in the first round have high enough recall but low precision, the models should be able to identify most positive cases yet could make some mistakes for items with lower predicted probability of the positive category (i.e., "logit" in machine learning's vocabulary). Thus, I applied the first round of models to predict all items and ranked the predicted results by the positive logits in descending order. I then reviewed the tweets from the highest logits until the classification does not make sense. These items were added back to the training set of each issue to enhance the training dataset, so that the positive/negative ratio is more balanced. The final macro average validation accuracy scores (F1-scores) of personal tweets models range from .89 to .99. Table 3.5 details the sample size of the training data and the accuracy scores and for each issue.

Similarly, the two types of media agenda were computed using supervised machine learning with DistillBERT, a lighter variation of the original BERT model (Sanh et al., 2020). This model can achieve 95% of BERT's performance with only around half the number of parameters of the BERT base model, which makes it especially useful in small text classification tasks like the current one (Sanh, 2020). A standard cleaning process was conducted by removing URLs, RTs, mentioned usernames, and special characters. Hashtags were kept as they might express issue-related meanings, yet the

hashtag mark (#) was removed so that the hashtag content can be treated as the other words. The same two-step training strategy was used to improve the accuracy. The final macro average validation accuracy scores (F1-scores) of news tweets models range from .87 to .99 (see Table 3.6 for more detailed accuracy information).

As the accuracy scores of issue 11 (terrorism) and issue 12 (gun/gun control) were not as desired, I used the lexicon method to identify news headlines and news tweets mentioning these two issues. The lexicon method, or dictionary-based method, is widely used in computer content analysis. A dictionary is built by assigning a list of relevant and defining keywords into predetermined categories. Computers then automatically detect if one of the keywords occurs in the text to determine whether the text belongs to a category (Riffe et al., 2014). This approach is sometimes criticized since the construction of the dictionary could introduce subjectivity and that word meanings could be ambiguous in different contexts. Nevertheless, it was shown to have high reliability because less human bias is involved when the computers categorize only based on the dictionary (Riffe et al., 2014). Specific to these two issues, terrorism and gun, they have very clear and unique keywords that can be used to identify the occurrence of the issues. Thus, the lexicon method is particularly useful here.

For issue 11, the keywords used to search were (terror* OR "ISIS") AND (America OR Biden OR Trump OR U.S.) NOT terrorize. Similarly, these Boolean logic search terms were used to detect issue 12: gun* OR second amendment OR 2nd amendment OR shot* OR shooting* OR AK-47 OR AK47 OR rifle OR NRA OR firearm NOT flu shot* NOT first shot* NOT second shot* NOT vaccine shot*. To calculate the

accuracy, a random sample of 100 tweets each issue (50 positive samples and 50 negative samples) was coded manually by a student coder to compare with the computer-detected results. Table 3.6 displays the intercoder reliability (Krippendorff's α) of these two issues.

	Validation loss	# of epochs	Negative			Positive			Weighted average F1-score
			Precision	Recall	F1-score	Precision	Recall	F1-score	
Economy in general (1)	.177	150	.987	.960	.973	.662	.863	.749	.954
Unemployment/jobs (2)	.104	150	.988	.984	.986	.932	.950	.941	.978
Taxes (3)	.078	150	.997	.980	.988	.892	.984	.936	.981
Foreign trade/policy (4)	.072	150	.996	.985	.990	.844	.948	.893	.983
Healthcare (5)	.164	150	.985	.963	.974	.872	.947	.908	.960
Education (6)	.047	150	.990	.999	.994	.989	.881	.932	.989
Environment (7)	.089	50	.993	.980	.986	.876	.953	.913	.977
Race relations/racism (8)	.137	80	.985	.959	.972	.824	.928	.873	.955
Immigration (9)	.254	150	.997	.918	.956	.433	.959	.597	.934
Politics/Government (10)	.270	40	.888	.887	.888	.895	.896	.896	.892
Terrorism (11)	.133	52	.995	.954	.974	.612	.932	.739	.957
Guns/gun control (12)	.074	100	.996	.982	.989	.701	.921	.797	.981
Drugs (13)	.103	100	.993	.989	.991	.793	.852	.821	.984
Religion/morality (14)	.070	50	.995	.981	.988	.905	.971	.937	.980
Media/Internet (15)	.137	100	.976	.981	.979	.903	.882	.892	.964
Crime (16)	.097	100	.981	.987	.984	.840	.790	.814	.970
Gender equality/abortion (17)	.080	70	.986	.986	.986	.873	.873	.873	.974
Military (18)	.060	40	.993	.982	.987	.867	.945	.904	.978
LGBT rights (19)	.049	100	.996	.992	.994	.916	.961	.938	.990

Table 3.5. Validation accuracy from machine learning of the personal tweets dataset.

Note. Learning rate of issue 14 and issue 18 = .0001. All other issues' learning rate = .001. Batch size = 8. Test set = 30%.

	Validation loss	# of epochs	Negative			Positive			Weighted average F1-score/Krippendorff's α
			Precision	Recall	F1-score	Precision	Recall	F1-score	
Economy in general (1)	.152	50	.984	.963	.974	.795	.899	.844	.956
Unemployment/jobs (2)	.134	25	.983	.969	.976	.772	.864	.815	.958
Taxes (3)	.068	100	.989	.989	.989	.852	.852	.852	.979
Foreign trade/policy (4)	.123	30	.993	.965	.979	.765	.945	.846	.964
Healthcare (5)	.175	25	.949	.966	.958	.907	.862	.884	.937
Education (6)	.038	50	.993	.993	.993	.939	.939	.939	.988
Environment (7)	.070	50	.992	.993	.993	.824	.800	.812	.986
Race relations/racism (8)	.122	35	.981	.973	.977	.820	.865	.841	.960
Immigration (9)	.094	100	.991	.976	.984	.758	.897	.822	.971
Politics/Government (10)	.307	40	.807	.944	.870	.947	.817	.877	.874
Terrorism (11)	NA	NA	NA	NA	NA	NA	NA	NA	.950
Guns/gun control (12)	NA	NA	NA	NA	NA	NA	NA	NA	.900
Drugs (13)	.089	100	.996	.984	.990	.776	.933	.847	.982
Religion/morality (14)	.096	50	.988	.988	.988	.791	.791	.791	.978
Media/Internet (15)	.114	40	.982	.987	.984	.880	.846	.863	.972
Crime (16)	.165	40	.983	.968	.975	.759	.854	.804	.957
Gender equality/abortion (17)	.082	50	.993	.992	.993	.781	.806	.794	.986
Military (18)	.079	45	.989	.983	.986	.826	.884	.854	.974
LGBT rights (19)	.021	20	.999	.992	.984	.791	.981	.876	.972

Table 3.6. Validation accuracy from machine learning of the news headlines/tweets dataset.

Note. All learning rate = .0001. Batch size = 8. Test set = 30%. For issue 11 and 12, no training information is provided here as the categorization was conducted using the lexicon method. I used 100 stratified random samples (50 positive samples and 50 negative samples) each that were checked by a student coder to calculate the ICR (Krippendorff's α).

3.2.3. Contingent factors

3.2.3.1 Issue characteristic

The obtrusiveness of each issue was decided based on the previous literature (McCombs, 2004; Winter et al., 1982) and the special situation addressed at the beginning of this chapter about this election period. During this election, the COVID-19 pandemic and its economic impacts, the #Blacklivesmatter movement, as well as the riots related to the election, have made this election period special. The employment status, health, and personal safety of millions of people were affected. Thus, among the 19 issues, issue 1 (General economy), issue 2 (Unemployment/jobs), issue 5 (Healthcare), issue 8 (Race relations/racism), issue 10 (Politics/Government), and issue 16 (Crime) were marked as of higher obtrusiveness, since they are issues that the general public will have direct and firsthand experience with. The rest of the issues, including issue 3 (Taxes), issue 4 (Foreign trade/policy), issue 6 (Education), issue 7 (Environment), issue 9 (Immigration), issue 11 (Terrorism), issue 12 (Guns/gun control), issue 13 (Drugs), issue 14 (Religion/morality), issue 15 (Media/Internet), issue 17 (Gender equality/abortion), issue 18 (Military), issue 19 (LGBT rights) are among the lower obtrusive issues. I then compared the numbers of issues that show significant agenda-setting results between the higher and lower obtrusiveness groups.

3.2.3.2 Media characteristics

Based on a Pew report about digital-native news outlets (Barthel & Stocking, 2020), I categorized the 27 news outlets by whether they are digital-native (see Table 7).

The political orientation of each studied news media was decided based on the Media

Bias Ratings provided by AllSides, which is dynamically calculated based on a blind bias

survey, media's own disclosure, third-party research, independent reviews, and so on

(*How AllSides Rates Media Bias*, 2016). The 27 outlets were categorized as mainstream,

conservative, or liberal news media.

3.2.3.3 Individual characteristics

As mentioned in the survey data collection section, a series of personal

characteristics, including opinion leadership, social capital, and demographic factors

(age, gender, race, household income, and education level) were collected through the

survey and the Twitter data scraping process. Again, all of the participants were divided

into two groups based on each of the characteristics to compare the agenda-setting effects

between them.

3.3. Data Analysis

As stated previously, the three main goals of this research are to compare the two

versions of the public agenda, contrast the two versions of the media agenda, and explore

the direction and strength of the potential two-way agenda-setting effects. To achieve the

three goals, I utilized three statistical analysis methods: order-rank correlation,

hierarchical linear regression, and Granger causality tests.

First, to compare the aggregate-level of agendas (RQ1, RQ2, and H3a-b), order-

rank correlation (i.e., Spearman's correlation) indices were calculated between the four

types of agendas. When aggregating the personal tweets and the two news datasets, I

divided the count of the relevant items about each issue by the total number of items

published by an individual or a media outlet and took the average for each issue. In this way, I can take the individual and cross-media difference on overall publishing frequency into account so as to focus on the relative issue salience. Significant and high correlation indicates that the two agendas show overall high overlap in terms of the relative issue salience.

Second, to understand how self-censorship is related to the public agenda disparity (H1) and how the media characteristics influence the media agenda differences (H2) at an aggregate level, I divided the public and media agenda by the studied characteristics and calculated the order-rank correlation numbers between the broken-down agendas.

Third, I took a step further to look at individual-level differences between the two versions of public agenda — what people think and what people tweet (H1). Following the method of Shehata and Stromback (2013), 19 sets of hierarchical linear regressions were conducted to examine for each issue, (1) what the main effect of people's perceived issue importance is on their relative Twitter expression frequency (i.e., the number of tweets about an issue/the total number of tweets within the three months) and (2) whether WTSC significantly moderates the relationship between people's perceived issue importance and Twitter expression. Here, perceived issue importance was treated as a personal characteristic. Due to the cross-sectional nature of the datasets, the regression coefficients can only imply correlation without any direction, not causality. Reversing the IV and DV does not change the significance of the coefficients.

Fourth, to understand the temporal patterns among the three types of agendas

reflected by datasets that have timestamps (personal tweets, news headlines, and news tweets), multivariate Granger causality tests were conducted among the three for each issue to examine the direction and strength of the effects (H4a-b, RQ3, and RQ4). Granger causality is a commonly used method to examine the temporal relationships between different agendas in agenda-setting studies (e.g., Guo & Vargo, 2017; Meraz, 2011). The idea of the Granger causality test is to compare two models: One that only uses the past values to predict Y and one that uses both the previous values of X and Y to predict the future Y values. X is considered to "Granger-cause" Y if the latter model shows a better fit than the former based on the Wald test result (Granger, 1969). One thing to note is that Granger causality tests can only indicate temporal relationships between time series but do not guarantee any causality. According to the previous literature (Buhl et al., 2018; Harder et al., 2017), agenda-setting effects happen within hours on news websites and social media where news is updated almost instantly. Thus, the optimal lag was determined based on information criteria including AIC, HQIC, and SBIC, with a maximum value set as 6 hours following Buhl et al. (2018). The shortest time lag indicated by any of the three criteria was adopted. Here, to rule out the influence of the daily fluctuation of the number of items (personal tweets, news headlines, and news tweets) that was caused by exogenous factors (e.g., weekends, holidays, or special events), I used the sum of the daily percentages of each issue in the analyses. Therefore, the daily percentages of news items and personal tweets were aggregated by hour, which led to 3,505 time points (from 7/29/2020 0:00 to 12/22/2020 0:00). 19 Granger causality Wald tests, each containing three time series, were executed to reveal the overall agenda-

setting relationships among the social media public agenda and the two versions of media agenda. In addition, to answer RQ2 from a time-series perspective, similar Granger causality tests were conducted between the two versions of media agenda, with personal tweets controlled to eliminate the potential confounding effect (i.e., both versions of media agenda could be affected by personal tweets at the same time). A majority rule was used to determine the direction of agenda-setting effects following Guo and Zhang (2020). In other words, if one direction has 10 or more issues that show significant Granger causality results out of the 19 issues, this direction will be regarded as showing a strong enough agenda-setting effect. If both directions have no more than 10 significant issues, the direction with more significant issues will be regarded as relatively stronger.

Lastly, more Granger causality tests were carried out to explore the differentiated agenda-setting relationships among various user groups and media with different characteristics. To examine whether the difference between the two versions of the media agenda is conditional on media type from a time-series perspective (H2), I conducted the same Granger causality tests on digital-native media and non-digital-native media and compared the number of significant issues. To test H5, I compared the average number of significant issues between the higher and lower obtrusive issue groups. As for H6a-b, the total number of significant issues was calculated and compared between the two media groups, which were categorized based on the two media characteristics (see section 3.2.3.2). While the higher number of issues with significant Granger causality results implies a stronger agenda-setting effect, the majority rule was still adopted to identify strong agenda-setting relationships. Similarly, the time series of the social media public

agenda was broken down by individual characteristics (H7a-c; see 3.2.3.3). Each

characteristic entered the Granger causality tests to examine the nuanced differences

between the participants' groups. Finally, 12 (1 overall + 3 media characteristics + 8

individual characteristics) * 19 (issues) = 228 Granger causality tests were conducted.

CHAPTER 4 Results

Based on empirical datasets collected during the 2020 US presidential election, this study mainly examined three key questions: (1) whether and how two versions of public agenda are different from each other; (2) whether and how two versions of media agenda are different from each other; and (3) whether and how the two-way agenda-setting effects exist between the public and the media agenda.

Overall, the empirical results confirmed the existence of a multi-version, two-way, yet imbalanced agenda-setting pattern. The two versions of the public agenda are fairly different, while the two versions of the media agenda largely resemble each other. A closer look shows that while self-censorship only marginally moderated the difference between the two versions of public agenda on several issues, media with various characteristics indeed had distinct patterns in terms of their headlines-tweets correspondence. The agenda-setting analyses verified the existence of a bi-directional relationship between the public agendas and media agendas, with the traditional direction still stronger than the reverse in general. The results also revealed differentiated agenda-setting direction and strength among different social groups and different media outlets.

4.1 Comparing Between the Two Versions of Public Agenda

RQ 1 asks if the two versions of public agenda — the one represented by self-reported perceived issue importance through a survey and the one represented in social media expression — are different from each other. Spearman's correlation results show that the two versions of the public agenda from the same group of people did not significantly correlate with each other ($rs(18) = .193$, $p = .428$; also shown in Table 4.1).

Table 4.2 displays the salience rankings of the two versions of the public agenda. Issue 5

(healthcare), issue 2 (unemployment/jobs), and issue 1 (general economy) are the top

three most important issues reported by the participants, whereas the most discussed

	Survey	Personal tweets	News headlines	News tweets
Survey	1			
Personal tweets	.193	1		
News headlines	.499*	.470*	1	
News tweets	.465*	.465*	.847***	1

Table 4.1. Spearman's correlation results between the four types of agenda.

Note. $^†p <.10$, $^*p <.05$; $^{**}p <.01$; $^{***}p <.001$

Issues	Survey means	Survey ranking	Person tweets percentages means	Personal tweets ranking
Issue 1 (General economy)	6.06	3	.019	6
Issue 2 (Unemployment/jobs)	6.08	2	.011	12
Issue 3 (Taxes)	5.5	10	.009	18
Issue 4 (Foreign trade/ policy)	5.17	14	.010	13
Issue 5 (Healthcare)	6.27	1	.036	4
Issue 6 (Education)	5.96	4	.010	16
Issue 7 (Environment)	5.89	5	.014	11
Issue 8 (Race relations/racism)	5.88	6	.041	2
Issue 9 (Immigration)	5.41	11	.039	3
Issue 10 (Politics/Government)	5.74	7	.111	1
Issue 11 (Terrorism)	5.27	13	.017	8
Issue 12 (Guns/gun control)	5.51	9	.009	19
Issue 13 (Drugs)	5.08	15	.010	15
Issue 14 (Religion/morality)	4.28	19	.023	5
Issue 15 (Media/Internet)	4.95	17	.017	7
Issue 16 (Crime)	5.54	8	.016	9
Issue 17 (Gender equality/ abortion)	5.33	12	.015	10
Issue 18 (Military)	4.95	18	.009	17
Issue 19 (LGBT rights)	4.99	16	.010	14

Table 4.2. Issue salience calculations and the corresponding ranking of the two versions of the public agenda.

issues on Twitter among this sample are issue 10 (politics/government), issue 8 (race relations/racism), and issue 9 (immigration). The least important issues and the least posted issues are also distinctive: issue 14 (religion/morality), issue 18 (military), issue 15 (media/Internet) were scored in the survey as relatively not as important to the society during this election, while issue 12 (guns/gun control), issue 3 (taxes), and issue 18 (military) surprisingly gained the smallest number of tweets.

As mentioned in Chapter 3, regression analyses were also conducted to examine if the two versions of the public agenda align at an individual level. Block 4 in Table 4.3 indicates the results. With the overall number of tweets, demographic variables, and news consumption variables controlled, only on issue 14 (religion/morality; $\beta = .054, p < .05$) and issue 19 (LGBT rights, $\beta = .077, p < .05$) that we can see a significant and positive relationship between perceived issue importance and Twitter expression frequency. In other words, people who believed that these two issues are more important to society today also talked relatively more about them on their Twitter accounts. Issue 1 (general economy; $\beta = .042, p < .1$), issue 5 (healthcare; $\beta = .043, p < .1$), issue 8 (race relations/racism; $\beta = .044, p < .1$) also show agenda correspondence at a .1 significance level. No significant correlations were found for the other issues.

	Issue 1 (General economy)	Issue 2 (Unemployment/ jobs)	Issue 3 (Taxes)	Issue 4 (Foreign trade/policy)	Issue 5 (Healthcare)	Issue 6 (Education)
Block 1: All tweets count						
All tweets count (in three months)	.701***	.627***	.552***	.560***	.694***	.554***
R2	.491***	.393***	.304***	.313***	.482***	.307***
Block 2: Demographics variables						
Age	.089***	.090**	.124***	.107***	.113***	.014
Gender (compare to males)						
Female	-.063**	-.010	-.042	-.071*	-.024	.008
Other	-.057*	-.047†	-.041	-.043	-.049†	-.044
Race (compare to White/Caucasian)						
Black/African American	-.026	-.025	-.024	.026	-.021	.039
Hispanic/Latino	-.055*	-.051†	-.050†	-.029	-.024	-.007
Asian	-.013	-.027	-.012	-.002	-.014	-.004
Native American	-.006	-.009	-.003	-.002	-.006	.003
Pacific Islander	.001	.013	.005	.006	.012	.016
Other	.018	.043	.013	.005	.023	.029
Household income	.011	.004	.013	.026	-.002	-.047
Education level	.043	.032	-.017	.016	.048†	.084*
△R2	.026***	.021	.025**	.023**	.025***	.010
Block 3: News consumption						
Traditional news consumption	-.056†	-.041	-.004	-.045	-.023	-.022
Online news consumption	.054†	.035	.027	.010	.011	-.081*
△R2	.002	.001	.001	.001	.000	.007*
Block 4: Focal variables						
Willingness to self-censor (WTSC)	-.068**	-.075**	-.065*	-.065*	-.049*	.000
MIP	.042†	.024	.026	.023	.043†	.003
△R2	.006**	.007*	.005†	.005†	.004*	.000

Block 5: Interaction term

WTSC × MIP		-.191	-.153	-.011	-.227†	-.174	-.207
△R2		.001	.000	.000	.002†	.001	.001
Total R2		.526***	.422***	.334***	.344***	.512***	.326***

Table 4.3. Hierarchical linear regressions on personal tweets count about the 19 issues (issue 1-6).

Note. Entries are final-entry ordinary least squares (OLS) standardized coefficients (β). p-values are two-tailed. $^\dagger p <.10$, $^* p <.05$; $^{**} p <.01$; $^{***} p <.001$.

	Issue 7 (Environment)	Issue 8 (Race relations/racism)	Issue 9 (Immigration)	Issue 10 (Politics/ Government)	Issue 11 (Terrorism)	Issue 12 (Guns/gun control)
Block 1: All tweets count						
All tweets count (in three months)	.285***	.737***	.775***	.678***	.673***	.723***
R2	.081***	.543***	.601***	.459***	.453***	.522***
Block 2: Demographics variables						
Age	.059	-.015	.118***	.129***	.139***	.092***
Gender (compare to males)						
Female	.028	.022	-.025	-.022	-.039	-.057*
Other	.002	-.012	-.033	-.046	-.033	-.055*
Race (compare to White/Caucasian)						
Black/African American	-.021	.101***	-.015	-.034	.010	.000
Hispanic/Latino	-.007	-.002	-.016	-.064	-.005	-.019
Asian	-.009	-.001	-.021	-.024	-.014	.000
Native American	-.002	-.001	.011	-.005	.025	-.003
Pacific Islander	.001	.002	.008	.006	.007	.017
Other	.004	.032	.022	.015	.015	.04
Household income	-.044	.032	.017	.017	.023	.048†
Education level	.043	-.038	.027	.000	.009	-.025
△R2	.008	.014**	.022***	.031***	.025***	.018***
Block 3: News consumption						
Traditional news consumption	-.011	-.037	-.063*	-.016	-.062†	-.057†
Online news consumption	.020	.001	.035	.024	.063†	.021
△R2	.000	.001	.002†	.000	.003†	.002
Block 4: Focal variables						
Willingness to self-censor (WTSC)	-.045	-.054*	-.048*	-.080**	-.073*	-.068*
MIP	.039	.044†	-.001	.029	.011	-.012
△R2	.004	.005**	.002†	.008**	.005*	.004*

Block 5: Interaction term

WTSC × MIP	-.158	-.130	.024	-.234†	.136	.069
△R2	.001	.001	.000	.002†	.001	.000
Total R2	.094***	.564***	.628	.500***	.487***	.547***

Table 4.3 (cont.). Hierarchical linear regressions on personal tweets count about the 19 issues (issue 7-12).

Note. See above.

	Issue 13 (Drugs)	Issue 14 (Religion/ morality)	Issue 15 (Media/ Internet)	Issue 16 (Crime)	Issue 17 (Gender equality/ abortion)	Issue 18 (Military)	Issue 19 (LGBT rights)
Block 1: All tweets count							
All tweets count (in three months)	.713***	.708*	.633***	.674***	.618***	.645***	.477***
R2	.508***	.502***	.401***	.454***	.381***	.417***	.227***
Block 2: Demographics variables							
Age	-.063*	.104***	.113***	.129***	-.049†	.123***	-.108***
Gender (compare to males)							
Female	-.029	-.035	-.075**	-.016	.011	-.041	-.010
Other	-.009	-.036	-.046†	-.037	-.016	-.043	.158***
Race (compare to White/Caucasian)							
Black/African American	-.010	-.026	-.022	.018	.021	-.021	-.007
Hispanic/Latino	.068**	-.020	-.042	.006	-.013	-.015	-.002
Asian	-.002	-.030	-.018	-.017	.001	-.028	-.008
Native American	-.002	-.001	-.002	.002	-.008	.000	-.012
Pacific Islander	-.009	.004	.004	.011	-.004	.008	-.009
Other	.024	.011	.002	.031	.023	.010	.008
Household income	-.017	-.015	.011	.040	-.005	.030	-.037
Education level	-.030	.052†	-.018	.001	.030	.037	.007
△R2	.014*	.022***	.025***	.022***	.004	.029***	.044***
Block 3: News consumption							
Traditional news consumption	-.058†	.050†	-.047	-.067*	-.026	.006	-.062
Online news consumption	.007	-.009	.027	.049	-.011	-.007	-.032
△R2	.003	.000	.001	.003	.001	.000	.006*
Block 4: Focal variables							
Willingness to self-censor (WTSC)	-.007	-.038	-.058*	-.060*	-.038	-.066*	-.003
MIP	.023	.054*	.031	.036	.034	.015	.077*
△R2	.001	.004*	.004†	.005*	.003	.004*	.005*

Block 5: Interaction term

WTSC × MIP	.059	-.069	-.128	-.102	-.041	-.067	.019
△R2	.000	.000	.001	.000	.000	.000	.000
Total R2	.525***	.528***	.432***	.484***	.389***	.450***	.283***

Table 4.3 (cont.). Hierarchical linear regressions on personal tweets counts about the 19 issues (issue 13-19).

Note. See above.

Hypothesis 1 further investigates if the discrepancies between the two forms of public agenda are conditional on individuals' WTSC. The aggregated results (i.e., Spearman's correlation) suggest that regardless of the level of WTSC, no significant order-rank correlation happens between the two versions of the public agenda (within the high WTSC group: $rs(18) = .208$, $p = 393$; within the lower WTSC group: $rs(18) = .298$, $p = 215$; $z = .272$, $p = .393$; see Table 4.4). The regression entries also demonstrate that WTSC only moderated issue 4 (foreign trade/policy) and issue 10 (politics/government) at the .1 level. The visualization in Figure 4.1 shows that for people who are low and medium in WTSC, the higher perceived importance of the two issues is indeed related to more expression about them on Twitter. Yet, for those who have a high willingness to self-censor, what they think is important might be tweeted even less. No significant interaction relationships were observed on other issues. Thus, H1 should be rejected.

	Survey (lower WTSC)	Survey (higher WTSC)	Personal tweets (lower WTSC)	Personal tweets (higher WTSC)
Survey (lower WTSC)	1			
Survey (higher WTSC)	.970***	1		
Personal tweets (lower WTSC)	.298	.230	1	
Personal tweets (higher WTSC)	.251	.208	.905***	1

Table 4.4. Spearman's correlation results between the two versions of public agenda by WTSC.

Note. $^*p <.05$; $^{**}p <.01$; $^{***}p <.001$
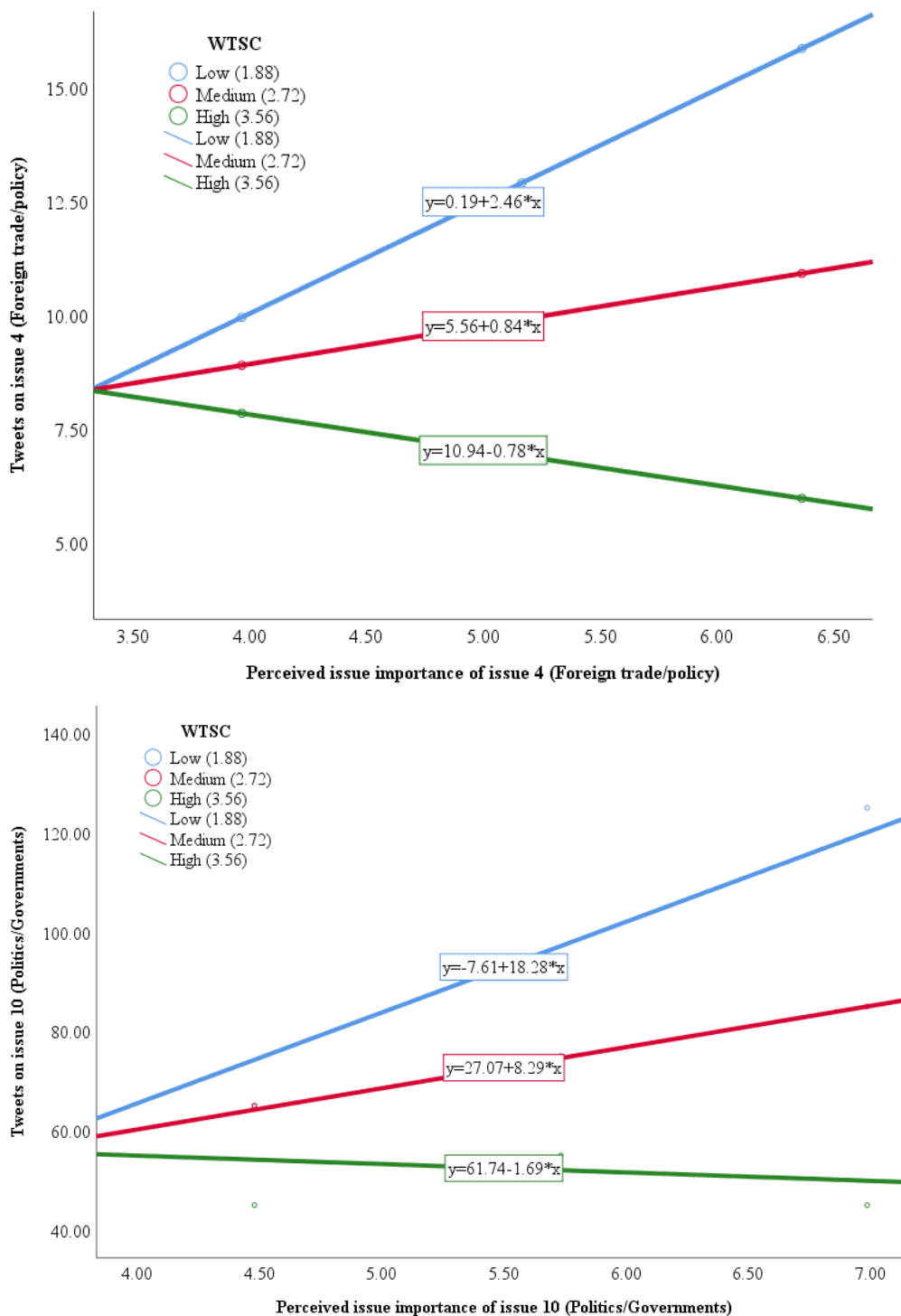
Figure 4.1. The moderating effect of WTSC on the relationship between the perceived issue importance (MIP) and the number of tweets on issue 4 and issue 10.

Note. This visualization uses the "pick-a-point" method, with low = M-1SD, mediu*M* = M, and high = M+1SD.

4.2 Comparing the Two Versions of Media Agenda

After comparing the public agendas, RQ2 compares the two versions of the media agenda reflected by news headlines on media's websites and by media's social media posts. The results in Table 4.1 (p. 70) show high and significant order-rank correlation between them ($rs(18) = .847$, $p < .001$). The time-series analyses confirmed that the two versions of the agenda followed each other closely (see Table 4.6). New tweets Granger-caused news headlines on 15 of the 19 issues, except for issues 9 (immigration), 11 (terrorism), 13 (drugs), 19 (LGBT rights), even with the overtime changes of personal tweets controlled. News headlines followed news tweets on 18 out of the 19 issues (except for issue 9). The optimal lags range from 4 to 5 hours. In short, although on some issues the two versions of media agenda have distinctive salience, the two align with each other on most issues. Table 4.5 displays the issue rankings.

H2 further scrutinizes whether the media type of the studied news media affects the headlines-tweets differences. The aggregated correlation results imply some variations across media with different characteristics (see Table 4.7). Between digital-native and non-digital-native media, the latter had slightly higher correlation ($rs(18) = .856$, $p < .001$) compared to the former ($rs(18) = .819$, $p < .001$), meaning that non-digital-native media publish slightly more similar agenda on their SNS accounts and their websites. However, a significance shows that these two correlation coefficients are not significantly different from each other ($z = .352$, $p = .362$). Thus. H2 was rejected at an aggregate level.

Issues	News headlines				News tweets			
	Counts	Counts ranking	Percentages	Percentages ranking	Counts	Counts ranking	Percentages	Percentages ranking
Issue 10 (Politics/Government)	87,352	1	.249	1	311,833	1	.403	1
Issue 5 (Healthcare)	55,837	2	.144	2	54,285	2	.129	2
Issue 16 (Crime)	37,626	4	.091	4	29,812	4	.084	3
Issue 8 (Race relations/racism)	21,992	6	.060	6	30,129	3	.078	4
Issue 4 (Foreign trade/policy)	36,017	5	.086	5	28,348	5	.069	5
Issue 15 (Media/Internet)	21,346	7	.057	7	23,414	7	.064	6
Issue 1 (General economy)	42,416	3	.093	3	26,460	6	.062	7
Issue 7 (Environment)	18,520	9	.043	9	16,228	8	.039	8
Issue 6 (Education)	9,885	14	.025	14	13,978	9	.035	9
Issue 18 (Military)	11,403	11	.028	12	12,858	10	.033	10
Issue 9 (Immigration)	10,650	12	.030	11	10,791	11	.027	11
Issue 17 (Gender equality/ abortion)	6,626	17	.018	17	10,450	12	.027	12
Issue 2 (Unemployment/jobs)	19,229	8	.050	8	9,693	13	.024	13
Issue 12 (Guns/gun control)	7,867	15	.019	15	7,297	15	.021	14
Issue 19 (LGBT rights)	4,125	18	.011	18	8,058	14	.020	15
Issue 3 (Taxes)	10,186	13	.027	13	6,925	16	.017	16
Issue 13 (Drugs)	13,133	10	.031	10	5,857	17	.015	17
Issue 14 (Religion/morality)	7,449	16	.019	16	5,252	18	.014	18
Issue 11 (Terrorism)	871	19	.002	19	770	19	.002	19

Table 4.5. Issue rankings among news headlines and news tweets.

	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7	Issue 8	Issue 9	Issue 10	Issue 11
	Lag = 4	Lag = 5	Lag = 4	Lag = 5	Lag = 5	Lag = 4	Lag = 4	Lag = 4	Lag = 4	Lag = 4	Lag = 4
NH→PT	15.19***	18.62***	73.23***	7.66**	6.55**	6.87**	9.37**	28.64***	.41	21.50***	.04
NT→PT	.99	3.36†	12.58***	6.51*	44.94***	4.02*	.45	49.45***	2.71	.30	.36
PT→NH	1.55	.07	36.03***	3.65	13.90***	8.65**	.68	7.82**	5.76*	18.42***	.88
NT→NH	9.41**	64.51***	15.51***	4.36*	25.44***	9.45***	28.73***	93.67***	1.32	276.50***	2.96†
PT→NT	.12	.33	11.87***	.16	4.29*	3.37†	1.83	3.64***	1.08	14.50***	1.07
NH→NT	103.22***	284.88***	73.11***	173.16***	408.32***	147.83***	61.81***	92.62***	1.22	26.13***	9.47**

Table 4.6. Granger causality Wald tests results on the overall agendas for the 19 issues (issue 1-11).

Note. $^{†}p <.10$, $^{*}p <.05$; $^{**}p <.01$; $^{***}p <.001$. NH = News headlines; NT = News tweets; PT = Personal tweets.

	Issue 12	Issue 13	Issue 14	Issue 15	Issue 16	Issue 17	Issue 18	Issue 19	Count
	Lag = 4	Lag = 4	Lag = 4	Lag = 4	Lag = 4	Lag = 4	Lag = 4	Lag = 4	
NH→PT	11.96***	.13	5.23*	.06	.21	2.36	6.95**	.96	12
NT→PT	28.13***	.34	3.75†	1.15	32.10***	1.32	42.71***	.00	8
PT→NH	2.68	.50	.22	.55	4.17*	.62	.99	.66	7
NT→NH	111.93***	1.34	4.02*	26.36***	61.64***	6.32*	37.18***	.37	15
PT→NT	14.80***	.50	.45	.01	8.89**	4.83*	8.35**	2.60	7
NH→NT	283.74***	4.41*	27.31***	52.19***	72.64***	87.70***	76.15***	4.08*	18

Table 4.6 (cont.). Granger causality Wald tests results on the overall agendas for the 19 issues (issue 12-19).

Note. See above.

	NT (digital-native)	NT (non-digital-native)	NH (digital-native)
NT (digital-native)	1		
NT (non-digital-native)	.949***	1	
NH (digital-native)	.819***	.918***	1
NH (non-digital-native)	.726***	.856***	.961***

Table 4.7. Spearman's correlations between media that are digital-native and non-digital-native.

Note. $^\dagger p$ <.10, $^*p$ <.05; $^{**}p$ <.01; $^{***}p$ <.001.

	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7	Issue 8	Issue 9	Issue 10
	Lag = 2	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 4**	**Lag = 2**	**Lag = 2**	**Lag = 3**	**Lag = 2**	**Lag = 3**
NT (digital-native)→NH (digital-native)	.99	5.61*	.74	7.22*	2.32	1.99	34.99***	1.67	.09	6.38*
NT (non-digital-native)→ NH (non-digital-native)	12.52***	27.55***	19.88***	1.08	127.27***	64.49***	16.04***	17.56***	.81	133.10***
NH (digital-native)→NT (digital-native)	6.90**	14.78***	.15	.15	18.96***	2.26	22.34***	17.45***	.11	12.63***
NH (non-digital-native)→ NT (non-digital-native)	32.37***	215.62***	58.01***	66.23***	264.53***	7.07***	23.89***	21.64***	.02	115.02***

Table 4.8. Granger causality Wald test results between the two versions of media agenda by media with different media types (issue 1-10).

Note. $^\dagger p$ <.10, $^*p$ <.05; $^{**}p$ <.01; $^{***}p$ <.001. NH = News headlines; NT = News tweets; PT = Personal tweets.

	Issue 11	Issue 12	Issue 13	Issue 14	Issue 15	Issue 16	Issue 17	Issue 18	Issue 19	Count
	Lag = 1	**Lag = 2**	**Lag = 3**	**Lag = 1**	**Lag = 2**	**Lag = 4**	**Lag = 1**	**Lag = 3**	**Lag = 1**	
NT (digital-native)→NH (digital-native)	1.47	.87	.56	.13	.01	.03	1.64	.18	.04	4
NT (non-digital-native) →NH (non-digital-native)	.00	51.59***	.14	2.84†	5.74*	27.70***	2.99†	34.94***	.15	12
NH (digital-native)→NT (digital-native)	.00	13.03***	.08	.95	3.11†	7.78***	.77	6.72**	4.39*	10
NH (non-digital-native)→NT (non-digital-native)	.59	52.64***	13.57***	8.19**	23.23***	49.48***	13.10***	33.11***	.03	16

Table 4.8 (cont.). Granger causality Wald test results between the two versions of media agenda by media with different media types (issue 11-19).

Note. See above.

If taking a closer look at the issue-level comparison between the two versions of the media agenda, the Granger causality results shown in Table 4.8 present a similar pattern with the correlation tests. According to the information summarized in the last column, news websites and Twitter accounts of non-digital-native media followed each other closely on most issues (NT → NH: 12/19 issues; NH → NT: 16/19 issues). Both directions meet the majority rule, which indicates a strong two-way influence. The same high alignment was not found for digital-native media (NT → NH: 4/19 issues; NH → NT: 10/19 issues). Only news tweets followed news headlines on a majority of issues, but not the reverse. Thus, the overall results indicate that although the aggregate correlations were not significantly different by media type, issue-level comparison indeed revealed distinctive patterns, with non-digital-native media having better correspondence. As the direction was the opposite of what was expected, H2 was also rejected at an issue level.

4.3 The Two-way Agenda-setting effects

The third sets of hypotheses and research questions explore the two-way agenda-setting relationships. H3a–b tests if the traditional agenda-setting assumption still stands with this study. Table 4.1 shows significant and moderate correlations between the self-reported issue importance and the two versions of media agenda (with news headlines: $rs(18) = .499, p < .05$; with news tweets: $rs(18) = .465, p < .05$). Both H3a and H3b are supported.

H4a–b further looks at the two-way agenda-setting effects between the media agenda and the SNS public agenda. At the aggregate level, the SNS public agenda (personal tweets) significantly correlate with both versions of media agendas (with news

headlines: $rs(18) = .470$, $p < .05$; with news tweets: $rs(18) = .465$, $p < .05$), which

supports H4a–b. The Granger causality results can be found in the last column of Table

4.8. In general, we can indeed see a mutual influence: News headlines set the agenda for

personal tweets on 12 out of the 19 issues, while the reverse happened on 7 of the 19

issues. Similarly, news tweets Granger caused personal tweets on 8 issues, which is one

issue more than the reverse (7 issues). If using the majority rule, only the route from news

headlines to news tweets (i.e, the traditional direction) showed a strong agenda-setting

effect. Thus, we can only conditionally accept H4a–b.

One thing to note here is that although both versions of public agenda were

moderately and significantly correlated with the media agendas, they did not match with

each other. This situation happens when different parts in the issue order ranks of survey

version and personal tweets version of public agenda show relatively stronger monotonic

relationship with the media agenda (i.e., the issue ranking of the two media agendas).

Table 4.9 shows a comparison of the issue ranking across the four agendas. For instance,

while the ranking of personal tweets resembles the one of news tweets on the top of the

list, the bottom parts are more similar between survey ranking and news tweets ranking.

Issues	News tweets ranking	News headlines ranking	Survey ranking	Personal tweets ranking
Issue 10 (Politics/Government)	1	1	7	1
Issue 5 (Healthcare)	2	2	1	4
Issue 16 (Crime)	3	4	8	9
Issue 8 (Race relations/racism)	4	6	6	2
Issue 4 (Foreign trade/ policy)	5	5	14	13
Issue 15 (Media/Internet)	6	7	17	7
Issue 1 (General economy)	7	3	3	6
Issue 7 (Environment)	8	9	5	11
Issue 6 (Education)	9	14	4	16
Issue 18 (Military)	10	12	18	17
Issue 9 (Immigration)	11	11	11	3
Issue 17 (Gender equality/ abortion)	12	17	12	10
Issue 2 (Unemployment/jobs)	13	8	2	12
Issue 12 (Guns/gun control)	14	15	9	19
Issue 19 (LGBT rights)	15	18	16	14
Issue 3 (Taxes)	16	13	10	18
Issue 13 (Drugs)	17	10	15	15
Issue 14 (Religion/morality)	18	16	19	5
Issue 11 (Terrorism)	19	19	13	8

Table 4.9. Issue ranking comparison across the two versions of public agenda and two versions of media agenda

As for RQ3, the above outcomes already demonstrated that in general, the traditional direction was slightly stronger. More specifically, the two directions were not disparate much on Twitter: New tweets set the agenda for personal tweets on 8 of 19 issues, whereas the reverse effect was found significant on 7 out of the 19 issues. However, neither exceeded the majority number of issues. When it comes to news headlines, the traditional direction (12/19 issues) is much stronger than the reverse agenda-setting effect (7/19 issues).

Table 4.8 also informs RQ4, which compares the agenda-setting strength between the public agenda and the two versions of the media agenda. Given that the reverse

agenda-setting direction was found significant on 7 issues for both media agendas, no

clear different can be detected in this direction. As for the traditional agenda-setting

direction, the news website version of media agenda had significant agenda-setting

effects on 12 issues, which overweighed the news tweets version (8 issues). In other

words, personal tweets followed news websites' agenda more closely than following

news tweets. Nevertheless, the mutual agenda-setting effects (i.e., the media and the

public set each other's agenda) happened on 6 issues for news tweets, but only on 4

issues for news headlines. In summary, while news websites had a stronger traditional

agenda-setting power, news tweets presented a greater mutual influence with the public

agenda (i.e., personal tweets here).

4.4 Contingent Factors on the Agenda-setting Relationships

The final group of hypotheses examines the issue-, media-, and individual-level of

contingent factors and their impact on the two-way agenda-setting effects. First, H5

hypothesized different agenda-setting patterns between obtrusive and unobtrusive issues.

Table 4.10 displays the comparison of the numbers of issues that have significant agenda-

setting effects in all directions. In general, we can observe a stronger two-way agenda-

setting relationship among obtrusive issues compared to non-obtrusive issues: For all four

directions, more than half of the obtrusive issues showed significant Granger causality

results, whereas non-obtrusive issues only met the majority rule on one direction - news

headlines to personal tweets. The percentages of significant Granger causality issues in

each type are higher on obtrusive issues than the non-obtrusive ones, regardless of the

directions. Thus, the results are consistent with the cognitive priming hypothesis (see

section 2.4.3). H5 was supported.

	Obtrusive issues (6 issues)		Non-obtrusive issues (13 issues)	
	# of significant issues	% of significant issues	# of significant issues	% of significant issues
NH→PT	5	.833	7	.538
NT→PT	3	.500	5	.385
PT→NH	4	.667	3	.231
PT→NT	4	.667	3	.231

Table 4.10. Numbers and percentages of significant Granger causality tests between the media and the public agendas.

Second, H6a-b asks about the two media characteristics. Table 4.11 summarizes the broken-down agenda-setting results. Overall, non-digital-native news tweets were found to have a balanced and stronger two-way agenda-setting relationship with personal tweets (both directions have 8 significant issues) than their digital-native counterparts. News headlines from digital-native and non-native media, however, performed similarly. Additionally, no consistent pattern was found in terms of the two-way agenda-setting effects across political orientations: While mainstream news headlines and news tweets set the agenda for personal tweets on slightly more issues than the other two types (NH → PT: 6 issues; NT → PT: 8 issues), conservative media followed personal tweets a little bit more closely (PT → NH: 5 issues; PT → NT: 8 issues). None of the directions, however, meet the majority rule. Thus, H6a-b was rejected.

Third, the final hypothesis inspects the influence of individual characteristics. To recap, the comparison was conducted by conducting Granger causality tests on various participant groups. In terms of demographic differences, the female, older, white, and lower-income population showed slightly stronger two-way agenda-setting relationships

(i.e., had more significant issues) with the two versions of the media agenda compared to their counterparts (see Table 4.12). Specifically, only the news tweets to personal tweets direction showed a strong enough agenda-setting effect among females (12/19 significant issues), meaning that female users' expressions on Twitter were more likely to be influenced by the media agenda represented by news tweets. The same level of strong agenda-setting was not found among any other gender groups or any other directions. Thus, gender was proved to be a contingent factor in at least the relationship between news and personal tweets. No directions met the majority rule when breaking down participants by age groups. Between white and non-white participants, only the former followed the agendas reflected in both news headlines and news tweets in their own tweets for a majority of social issues (both 10/19 issues). When it comes to household income, the lower-income group's agenda was set by news tweets, but not news headlines (10/19 issues). The same effects did not stand for people with higher income. Finally, for education level, the well-educated group followed news headlines more closely while the lower-education group followed new tweets on more issues (12 out of the 19). Higher education level was also able to strengthen the reverse agenda-setting effects (see Table 4.12), although the effect seems to be minimal. H7a is thus supported.

Finally, people with lower opinion leadership, no matter measured by the PS scale or the number of Twitter followers, had a stronger two-way agenda-setting relationship with the two media sources (see Table 4.13). A closer look can reveal that the traditional agenda-setting direction was found significant on the majority of issues (11 of the 19 issues) for both news headlines and news tweets. The reverse agenda-setting effects were

also marginally stronger among the group of lower opinion leadership, although none of the relationships achieved the majority of issues in the Granger causality tests. Likewise, those with lower social capital followed the news agenda more closely on most issues (NT → NH: 12/19 issues; NH → NT: 13/19 issues). Yet, in the reverse direction, the lower social capital group only set the agenda on slightly more issues (8/19 issues) than the higher social capital group (4/19 issues) for news tweets, but not for news headlines, for which both groups had similar weak effects (lower social capital: 3/19 issues; higher social capital: 4/19 issues). As clear variations by people's opinion leadership and social capital were found, we could accept H7b and H7c as well.

	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7	Issue 8	Issue 9	Issue 10
1. By whether digital-native	**Lag = 2**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 4**	**Lag = 2**	**Lag = 2**	**Lag = 3**	**Lag = 2**	**Lag = 3**
NH (digital-native)→ PT	.12	.19	21.55***	.91	.24	5.17*	.90	1.71***	5.38*	3.22†
NH (non-digital-native)→PT	2.80†	5.47	31.76***	.41	4.29*	6.00*	2.32	5.94*	.62	91.90***
NT (digital-native)→PT	.03	3.00	.11	.17	.92	.48	1.26	4.72*	.12	1.49
NT (non-digital-native)→PT	.13	12.52	9.41**	5.11*	49.18***	4.58*	2.53	16.66***	2.72†	1.43
PT→NH (digital-native)	.14	.09	1.92***	1.00	.02	3.10†	.05	9.97**	2.45	1.05
PT→NH (non-digital-native)	.00	.64	14.41***	.88	12.79***	6.84**	.98	2.69	3.80†	1.70
PT→NT (digital-native)	.33	.04	1.97	1.32	2.85†	.00	1.54	12.87***	.00	18.61***
PT→NT (non-digital-native)	1.78	.02	9.14**	.70	1.65	6.41*	1.31	22.18***	1.58	7.91**
2. By political orientation	**Lag = 2**	**Lag = 2**	**Lag = 2**	**Lag = 2**	**Lag = 3**	**Lag = 1**	**Lag = 2**	**Lag = 2**	**Lag = 4**	**Lag = 3**
NH (mainstream)→ PT	3.48†	.34	25.62***	.10	1.17	4.27*	2.10	9.12**	1.49	73.69***
NH (conservative)→PT	.15	.17	18.85***	.43	11.20***	.00	1.02	11.24***	2.11	7.56**
NH (liberal)→PT	.17	.08	2.89***	1.49	5.07*	.60	.37	4.82*	.43	.75
NT (mainstream)→ PT	.08	3.25†	11.97***	7.78**	17.20***	6.99**	6.69**	11.76***	1.21	1.05
NT (conservative)→PT	1.21***	31.42***	1.10	1.71	14.07***	.12	.16	16.75***	1.21	18.53***
NT (liberal)→PT	.70	3.20†	.03	.60	1.50	.35	1.90	5.21*	.16	1.17
PT→NH (mainstream)	.54	2.95†	27.87***	1.71	.30	.07	.71	9.64**	1.60	11.81***
PT→NH (conservative)	1.10	1.73	18.90***	.02	4.37*	.42	.01	12.89***	.13	.11
PT→NH (liberal)	2.44	.00	9.80**	.10	.01	.72	.00	.85	1.77	.26
PT→NT (mainstream)	.14	.90	14.79***	.38	.37	5.06*	1.93	11.76***	.85	.87
PT→NT (conservative)	.25	.07	.07	9.73**	15.14***	11.08**	2.09	21.51***	.66	19.49***
PT→NT (liberal)	6.25*	1.35	8.23**	.76	7.44**	.01	.01	3.29†	.20	4.17*

Table 4.11. Granger causality Wald test results between the personal tweets and media with different characteristics (issue 1-10).

Note. †$p <.10$, *$p <.05$; **$p <.01$; ***$p <.001$. NH = News headlines; NT = News tweets; PT = Personal tweet.

	Issue 11	Issue 12	Issue 13	Issue 14	Issue 15	Issue 16	Issue 17	Issue 18	Issue 19	Count
1. By whether digital-native	**Lag = 1**	**Lag = 2**	**Lag = 3**	**Lag = 1**	**Lag = 2**	**Lag = 4**	**Lag = 1**	**Lag = 3**	**Lag = 1**	
NH (digital-native)→ PT	.60	3.84[*]	1.44	.29	.09	.00	1.04	1.79	.01	6
NH (non-digital-native)→PT	3.40[†]	8.34[**]	.90	2.60	.67	2.56	1.88	.60	3.61[†]	6
NT (digital-native)→PT	1.39	2.89[†]	.05	1.58	1.00	1.93	6.50[*]	1.54	.65	2
NT (non-digital-native)→PT	.01	4.37[***]	.12	3.65[†]	.08	3.27[***]	1.42	44.19[***]	.92	8
PT→NH (digital-native)	.43	6.37[*]	.08	.11	.13	2.27	.09	.80	1.39	3
PT→NH (non-digital-native)	.36	2.89[†]	.69	.47	1.28	.01	.14	5.92[*]	.00	4
PT→NT (digital-native)	.82	.70	.01	1.20	.62	.37	3.43[†]	1.50	.81	2
PT→NT (non-digital-native)	2.05	13.62[***]	.91	11.26[***]	.04	15.69[***]	1.56	16.78[***]	1.00	8
2. By political orientation	**Lag = 1**	**Lag = 2**	**Lag = 3**	**Lag = 1**	**Lag = 2**	**Lag = 6**	**Lag = 1**	**Lag = 2**	**Lag = 1**	
NH (mainstream)→ PT	5.43[*]	12.79[***]	.53	4.46	1.13	2.49	.02	.01	2.60	6
NH (conservative)→PT	.01	1.72	.64	.16	.02	7.27[**]	.03	.03	.29	5
NH (liberal)→PT	.33	.27	1.37	1.60	.09	2.36	5.36[*]	14.19[***]	.04	5
NT (mainstream)→ PT	.27	39.98[***]	.01	3.80[†]	.00	7.21[**]	2.01	1.59[***]	1.46	8
NT (conservative)→PT	.03	3.63[†]	.31	.34	.69	3.10	.04	4.13[*]	.20	6
NT (liberal)→PT	.01	.28	.54	.72	1.17	6.82[**]	4.10[*]	5.12[*]	1.87	4
PT→NH (mainstream)	1.27	3.68[†]	1.43	1.62	.56	.72	.63	2.23	.63	3
PT→NH (conservative)	.00	3.88[*]	.21	.09	6.15[*]	.59	1.67	3.40[†]	.51	5
PT→NH (liberal)	.30	.69	.19	.42	.01	.31	.20	7.96[**]	.78	2
PT→NT (mainstream)	1.26	11.04[***]	.51	12.20[***]	.42	17.53[***]	.68	7.23[**]	.66	7
PT→NT (conservative)	1.04	2.42	.66	.09	13.01[***]	15.81[***]	.62	12.96[***]	1.15	8
PT→NT (liberal)	.98	1.42	.08	.85	3.04[†]	29.79[***]	9.82[**]	4.63[*]	.91	7

Table 4.11 (cont.). Granger causality Wald test results between the personal tweets and media with different characteristics (issue 11-19)

Note. See above.

	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7	Issue 8	Issue 9	Issue 10
1. By gender	**Lag = 2**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 4**	**Lag = 2**	**Lag = 2**	**Lag = 3**	**Lag = 2**	**Lag = 3**
NH→PT (males)	$3.78^{\dagger}$	5.77^{*}	22.79^{***}	.04	28.63^{***}	5.66^{*}	1.11	.42	.92	17.76^{***}
NT→PT (males)	4.86^{*}	2.93^{***}	.57	6.55^{**}	$3.17^{\dagger}$	$2.85^{\dagger}$	.50	.05	7.39^{**}	19.95^{***}
NH→PT (females)	.04	.38	47.29^{***}	.60	.15	5.52^{*}	2.29	19.09^{***}	.19	189.80^{***}
NT→PT (females)	14.18^{***}	.07	15.26^{***}	.20	1.90	3.02^{*}	5.41^{*}	39.01^{***}	4.71^{*}	44.50^{***}
NH→PT (other)	1.10	$3.49^{\dagger}$	.00	.13	$3.51^{\dagger}$	$3.01^{\dagger}$	8.77^{**}	6.26^{*}	1.51	32.72^{***}
NT→PT (other)	1.41	1.03	1.38	2.34	5.23^{*}	5.14^{*}	1.04	6.47^{*}	.74	12.96^{***}
PT (males) →NH	.39	4.39^{*}	2.04	1.82	21.86^{***}	11.36^{***}	2.34	1.30	7.71^{**}	1.55
PT (females) →NH	3.46	7.00^{**}	33.66^{***}	.13	.93	1.15	.71	8.20^{**}	.21	7.66^{**}
PT (other) →NH	.59	.01	.00	2.11	$3.48^{\dagger}$	.12	2.59	1.36	.41	5.37^{*}
PT (males) →NT	.29	.17	$3.01^{\dagger}$	1.23	.00	2.24	.03	.50	$3.20^{\dagger}$	8.40^{**}
PT (females) →NT	12.02^{***}	.15	8.44^{**}	.06	2.24	2.45	5.25^{*}	45.53^{***}	$2.96^{\dagger}$	2.01
PT (other) →NT	$3.30^{\dagger}$	.53	.04	.23	1.71^{***}	.20	1.03	2.48	.31	$2.78^{\dagger}$
2. By age	**Lag = 4**	**Lag = 5**	**Lag = 3**	**Lag = 3**	**Lag = 4**	**Lag = 4**	**Lag = 4**	**Lag = 5**	**Lag = 2**	**Lag = 3**
NH→PT (older)	14.58^{***}	18.91^{***}	43.29^{***}	.21	2.00	$3.13^{\dagger}$	4.78^{*}	17.53^{***}	.35	81.23^{***}
NT→PT (older)	1.14	2.65	1.92^{***}	2.48	41.16^{***}	9.20^{**}	.75	56.67^{***}	2.01	$3.66^{\dagger}$
NH→PT (younger)	.86	.06	1.51^{***}	1.42	.00	8.86^{**}	1.69	4.43^{*}	7.16^{**}	9.40^{**}
NT→PT (younger)	.77	4.05^{*}	1.04	2.03	.32	5.31^{*}	2.11	12.67^{***}	6.48^{*}	$3.13^{\dagger}$
PT (older) →NH	1.40	.44	17.64^{***}	.40	9.43^{**}	.43	.28	14.00^{***}	4.53^{*}	2.36
PT (younger) →NH	.10	8.44^{**}	1.95	6.25^{*}	1.71	15.12^{***}	28.73^{***}	11.10^{***}	1.10	.08
PT (older) →NT	.05	1.05	1.43^{***}	$2.84^{\dagger}$	1.23	$3.61^{\dagger}$	.74	2.16^{***}	.00	7.62^{**}
PT (younger) →NT	.05	.00	5.29^{*}	.17	.37	4.52^{*}	1.73	6.18^{**}	.02	.78
3. By race	**Lag = 4**	**Lag = 5**	**Lag = 3**	**Lag = 4**	**Lag = 4**	**Lag = 3**	**Lag = 4**	**Lag = 5**	**Lag = 2**	**Lag = 3**
NH→PT (white)	16.80^{***}	24.57^{***}	48.36^{***}	2.28	.50	.59	5.41^{*}	25.96^{***}	.21	7.90^{***}
NT→PT (white)	1.31	2.18	1.49^{***}	12.15^{***}	35.24^{***}	$3.54^{\dagger}$	1.84	56.14^{***}	5.62^{*}	9.97^{**}
NH→PT (non-white)	.11	.02	14.19^{***}	41.74^{***}	11.09^{***}	9.76^{**}	3.97^{*}	8.06^{**}	.26	43.21^{***}
NT→PT (non-white)	.02	1.25	.01	1.17	$3.50^{\dagger}$	.32	.51	1.17^{***}	.52	21.06^{***}

PT (white) →NH	1.17	1.13	12.46***	2.09	1.32***	3.38†	.39	2.36***	5.77*	3.63†
PT (non-white) →NH	.45	4.66*	7.23**	2.81†	.49	.64	.31	.22	.66	2.91†
PT (white) →NT	1.07	.00	7.57**	4.85*	2.61	2.03	1.10	26.00***	.00	7.75**
PT (non-white) →NT	2.10	1.11	1.78	.14	1.16	.02	.78	11.33***	4.21*	2.23
4. By household income	**Lag = 4**	**Lag = 4**	**Lag = 3**	**Lag = 4**	**Lag = 4**	**Lag = 3**	**Lag = 4**	**Lag = 5**	**Lag = 2**	**Lag = 3**
NH→PT (higher income)	18.67***	1.16	42.25***	.03	2.08	.54	1.10	16.73***	.15	45.80***
NT→PT (higher income)	1.16	13.95***	12.20***	.55	33.71***	5.63*	2.49	21.76***	3.60†	6.82**
NH→PT (lower income)	1.22	6.41*	26.29***	.04	3.07†	8.46**	1.21***	14.66***	2.67	62.45***
NT→PT (lower income)	6.28*	4.48*	1.82	5.23*	7.64**	.52	5.69*	29.44***	.03	2.57
PT (higher income) →NH	1.10	.12	7.43**	.14	2.25	.07	.48	11.23***	3.11†	4.14*
PT (lower income) →NH	.52	2.52	11.91***	.23	8.91***	.39	.24	1.88	3.13†	1.58
PT (higher income) →NT	.06	.00	.49	4.27*	5.80*	1.68	.53	8.56**	.27	2.82†
PT (lower income) →NT	.65	.07	1.98***	.11	.06	.06	6.68**	22.17***	1.17	8.25**
5. By education level	**Lag = 4**	**Lag = 4**	**Lag = 3**	**Lag = 4**	**Lag = 4**	**Lag = 4**	**Lag = 4**	**Lag = 5**	**Lag = 2**	**Lag = 3**
NH→PT (higher education level)	7.89**	4.62*	38.92***	21.43***	2.03	11.89***	5.13*	22.54***	5.18*	73.91***
NT→PT (higher education level)	3.39†	3.36†	3.86***	5.23*	2.74***	17.42***	.11	45.84***	1.96	2.48
NH→PT (lower education level)	6.93**	1.36	24.13***	.81	3.04†	1.13	4.46*	11.41***	1.77	36.29***
NT→PT (lower education level)	8.99**	17.230***	.16	7.25**	16.90***	5.19*	2.98†	16.08***	.69	5.76*
PT (higher education level) →NH	2.50	.01	18.14***	1.32	.98	2.37***	.23	24.83***	.01	2.92†
PT (lower education level) →NH	.05	1.03	5.63*	1.90	12.14***	1.25	.56	.23	11.24***	3.00†
PT (higher education level) →NT	.75	.39	1.54***	1.48	2.62	9.66**	.57	31.81***	1.75	5.30*
PT (lower education level) →NT	1.80	.91	2.12	2.94†	1.23	2.81†	1.63	1.53***	.05	5.11*

Table 4.12. Granger causality Wald test results between the media agenda and social groups with different demographics (issue 1-10).

Note. Same as Table 4.11.

	Issue 11	Issue 12	Issue 13	Issue 14	Issue 15	Issue 16	Issue 17	Issue 18	Issue 19	Count
1. By gender	**Lag = 1**	**Lag = 4**	**Lag = 2**	**Lag = 1**	**Lag = 2**	**Lag = 6**	**Lag = 2**	**Lag = 3**	**Lag = 1**	
NH→PT (males)	3.92*	1.87	.13	6.44*	.22	.20	.81	.61	3.23†	7
NT→PT (males)	.33	1.19	.07	12.82***	.54	9.63**	.62	29.99***	.63	8
NH→PT (females)	.08	26.50***	3.12†	5.45*	1.73	.74	.08	4.55*	.26	7
NT→PT (females)	.17	86.58***	.51	4.61*	1.25	18.59***	17.53***	18.53***	.01	12
NH→PT (other)	3.17†	.82	.10	.53	.13	.60	7.00**	.17	.09	4
NT→PT (other)	.39	1.22	.11	1.16	.73	.52	1.32	.61	.81	4
PT (males) →NH	.27	.55	.50	1.65	.25	.27	3.23†	5.41*	3.49†	5
PT (females) →NH	.63	6.76**	.11	.97	1.46	5.26*	.28	.28	3.38†	6
PT (other) →NH	.23	3.60†	3.06**	.82	1.65	2.97†	.11	2.03	.25	2
PT (males) →NT	.72	1.16	.98	16.58***	.20	1.44	1.57	8.22**	3.33†	3
PT (females) →NT	4.24*	55.22***	.09	.10	.53	8.96**	4.94*	17.83***	.01	9
PT (other) →NT	.39	1.98	2.39	.01	1.36	1.24	1.06	.83	.97	1
2. By age	**Lag = 1**	**Lag = 4**	**Lag = 1**	**Lag = 2**	**Lag = 3**	**Lag = 5**	**Lag = 2**	**Lag = 4**	**Lag = 1**	
NH→PT (older)	7.65**	7.69**	.10	3.17†	1.62	1.40	.25	4.98*	.20	9
NT→PT (older)	.77	.77	.29	14.21***	2.06	52.13***	14.38***	41.13***	.53	8
NH→PT (younger)	.02	.03	.49	.24	.00	2.42	.14	.27	2.82†	5
NT→PT (younger)	.29	1.99	5.90*	3.00†	.04	6.06*	.04	1.69***	1.60	7
PT (older) →NH	1.34	1.29	.17	1.47	.51	6.46*	7.92**	4.37*	.86	7
PT (younger) →NH	.24	.74	2.85†	1.54	.10	.07	.14	.23	.86	5
PT (older) →NT	1.48	1.38	2.85†	3.55†	.17	1.72***	8.42**	6.47*	.06	6
PT (younger) →NT	1.74	.23	.64	.18	1.08	4.28*	1.70	1.99	3.40†	4
3. By race	**Lag = 1**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 3**	**Lag = 6**	**Lag = 2**	**Lag = 4**	**Lag = 1**	
NH→PT (white)	5.47*	9.38**	2.97	2.46	.63	2.03	2.01	4.86*	4.51*	10
NT→PT (white)	.64	18.18***	1.36	.97	.64	29.40***	1.36***	45.96***	.10	10
NH→PT (non-white)	.04	2.55	.00	.79	1.28	.06	.02	2.81†	.12	7
NT→PT (non-white)	.29	9.37**	1.28	26.67***	4.20*	9.08**	2.04	3.80†	.07	6

	Lag = 1	Lag = 4	Lag = 3	Lag = 2	Lag = 3	Lag = 6	Lag = 2	Lag = 4	Lag = 1	
PT (white) →NH	.63	.47	.48	.61	.60	5.50*	1.44	3.97*	1.63	6
PT (non-white) →NH	.06	3.88*	.24	.01	.02	.53	1.54	.31	1.08	3
PT (white) →NT	1.57	4.76*	.00	3.41†	.19	8.51**	5.22*	7.17**	1.63	8
PT (non-white) →NT	1.31	14.12***	1.44	.53	.07	2.20	.98	1.27	.21	3
4. By household income	**Lag = 1**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 3**	**Lag = 6**	**Lag = 2**	**Lag = 4**	**Lag = 1**	
NH→PT (higher income)	.01	3.58†	.16	4.16*	1.84	.39	.33	5.16*	.29	6
NT→PT (higher income)	.09	2.96†	.03	14.73***	2.15	11.95***	2.56	29.53***	.74	9
NH→PT (lower income)	8.95**	9.87**	3.55†	.26	.21	.09	6.46*	2.43	3.00†	9
NT→PT (lower income)	.18	39.72***	.14	.68	.73	2.89***	12.77***	17.52***	1.96	10
PT (higher income) →NH	.22	.42	.55	.00	2.14	2.99†	5.77*	.72	.30	4
PT (lower income) →NH	.45	12.73***	.27	1.02	.13	1.91	.13	4.67*	.04	4
PT (higher income) →NT	1.37	5.19*	1.91	.00	.36	.50	3.55†	1.70	4.71*	5
PT (lower income) →NT	1.45	11.45***	.00	7.62**	.01	9.11**	2.51	9.16**	.06	8
5. By education level	**Lag = 1**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 3**	**Lag = 6**	**Lag = 2**	**Lag = 4**	**Lag = 1**	
NH→PT (higher education level)	.38	1.81	.01	.23	2.13	4.51	.83	4.43*	1.01	10
NT→PT (higher education level)	.02	31.69***	.00	2.98†	1.59	28.87*	5.27*	31.37***	2.07	9
NH→PT (lower education level)	6.17**	11.85***	2.89†	3.46†	.08	.51	.44	3.21†	1.92	7
NT→PT (lower education level)	.57	3.76*	.07	6.98**	.92	11.76***	7.17**	15.90***	3.11†	12
PT (higher education level) →NH	.29	1.34	.00	.00	.47	7.64**	7.97**	.12	.58	5
PT (lower education level) →NH	.35	1.40	1.10	.88	.07	.51	.22	6.37**	.00	4
PT (higher education level) →NT	2.40	8.01**	3.80†	.48	.38	6.18*	7.31**	1.83	2.35	7
PT (lower education level) →NT	.59	7.23**	.13	3.82	1.00	3.94*	.50	7.44**	.18	5

Table 4.12 (cont.). Granger causality Wald test results between the media agenda and social groups with different demographics (issue 11-19).

Note. Same as Table 4.11.

	Issue 1	Issue 2	Issue 3	Issue 4	Issue 5	Issue 6	Issue 7	Issue 8	Issue 9	Issue 10
1. By PS	**Lag = 4**	**Lag = 5**	**Lag = 3**	**Lag = 4**	**Lag = 4**	**Lag = 3**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 3**
NH→PT (higher PS)	.63	.02	39.22***	3.48†	.46	8.80**	5.03*	.42	3.63†	62.97
NT→PT (higher PS)	1.83	1.82	.03	.11	.53	2.04	1.97	5.84*	4.64*	55.31
NH→PT (lower PS)	17.02***	2.13***	38.90****	.19	4.64*	5.83*	6.44*	16.56***	.05	84.69
NT→PT (lower PS)	4.47*	2.32	7.35**	5.10*	4.12***	1.83	.09	19.57***	.58	6.30*
PT (higher PS) →NH	.05	8.02**	27.16***	.56	1.86	.26	.05	3.06†	2.39	8.13**
PT (lower PS) →NH	1.86	.33	12.15***	.02	8.04**	.15	.64	5.75*	3.90*	3.39†
PT (higher PS) →NT	.02	.25	2.88†	1.57	.98	1.07	4.46*	11.95***	.57	.06
PT (lower PS) →NT	.11	.21	8.63**	3.35	5.15*	.32	.68	19.69***	.66	9.36**
2. By followers	**Lag = 4**	**Lag = 4**	**Lag = 3**	**Lag = 3**	**Lag = 4**	**Lag = 3**	**Lag = 4**	**Lag = 3**	**Lag = 1**	**Lag = 3**
NH→PT (more followers)	.44	1.99	.09	2.43	2.22	.43	.96	.29	.40	12.14***
NT→PT (more followers)	.05	8.21**	.99	1.58	.13	.24	1.20	.20	1.51	11.65***
NH→PT (less followers)	15.52***	5.67*	55.44***	.04	4.54*	11.56***	1.96***	15.12***	3.39†	11.01***
NT→PT (less followers)	1.04	17.72***	8.75**	4.91*	39.65***	2.32	.22	25.73***	1.36	1.32
PT (more followers) →NH	.10	.19	.13	.88	.24	.95	.07	.20	.83	12.73***
PT (less followers) →NH	1.60	.36	22.54***	.00	9.38**	.02	.80	9.21**	.37	4.97*
PT (more followers) →NT	.10	1.67	1.61	3.57†	.02	.02	.40	.66	.26	.29
PT (less followers) →NT	.11	.02	11.25***	2.92†	3.55†	.55	2.26	29.75***	.35	9.30**
3. By social capital	**Lag = 4**	**Lag = 4**	**Lag = 3**	**Lag = 4**	**Lag = 4**	**Lag = 3**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 3**
NH→PT (higher SC)	.76	1.31	8.06**	1.42	.26	8.10**	11.00***	5.64*	93.13***	.01
NT→PT (higher SC)	4.06*	.10	.05	.81	.00	.34	15.46***	3.67†	79.67***	.13
NH→PT (lower SC)	15.85***	7.75**	49.09***	.11	4.59*	5.88*	8.39**	.15	79.26***	5.14*
NT→PT (lower SC)	5.02*	18.64	8.66**	5.40*	42.55***	2.31	14.09**	.85	7.22**	.45
PT (higher SC) →NH	.36	.66	12.77***	.02	.01	.77	21.57***	3.99*	18.59***	.14
PT (lower SC) →NH	1.20	.17	16.57***	.01	1.14***	.43	2.15	3.17†	2.92†	1.09
PT (higher SC) →NT	.28	1.58	5.42*	.17	1.45	.23	8.31**	.05	.00	1.14
PT (lower SC) →NT	.01	.27	8.26**	2.77†	5.21*	.73	23.24***	1.08	9.53†	1.76

Table 4.13. Granger causality Wald test results between the media agenda and social groups with different levels of opinion leadership and social capital (issue 1-10).

Note. Same as Table 4.11.

	Issue 11	Issue 12	Issue 13	Issue 14	Issue 15	Issue 16	Issue 17	Issue 18	Issue 19	Count
1. By PS	**Lag = 1**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 3**	**Lag = 6**	**Lag = 2**	**Lag = 4**	**Lag = 1**	
NH→PT (higher PS)	.04	1.07	.24	.67	2.06	7.91**	.11	2.34	.87	4
NT→PT (higher PS)	.01	2.06	7.41**	.00	.98	7.32**	.13	1.10***	.22	5
NH→PT (lower PS)	6.04*	1.97***	2.70	5.26*	.97	.13	1.11	6.20*	1.87	11
NT→PT (lower PS)	.19	26.73***	.53	12.38***	2.09	27.21***	14.57***	39.85***	.64	11
PT (higher PS) →NH	.23	.00	1.16	2.49***	.22	.01	.37	.00	1.52	4
PT (lower PS) →NH	1.26	3.30†	.22	1.79	.34	4.72*	2.53	3.99*	.04	6
PT (higher PS) →NT	1.46	.87	4.20*	1.04	2.72†	.85	3.63†	6.96**	9.79**	5
PT (lower PS) →NT	1.57	14.62***	.00	5.98*	.00	8.07**	2.91†	5.46*	.25	8
2. By followers	**Lag = 1**	**Lag = 4**	**Lag = 3**	**Lag = 2**	**Lag = 4**	**Lag = 6**	**Lag = 2**	**Lag = 4**	**Lag = 1**	
NH→PT (more followers)	.44	.10	6.87**	.57	1.00	.05	1.42	.16	.23	3
NT→PT (more followers)	.96	.03	.46	.35	.50	.73	.33	1.08	.16	2
NH→PT (less followers)	4.71*	12.04***	1.32	3.73†	1.11	.22	1.08	7.77**	2.60	11
NT→PT (less followers)	.20	28.26***	.02	1.69***	2.18	32.05***	11.94***	47.37***	.20	11
PT (more followers) →NH	.54	.05	1.14	2.43	.45	9.63**	.35	13.79***	.36	3
PT (less followers) →NH	.66	2.64	.60	.45	.65	3.40	2.69	3.69†	.24	4
PT (more followers) →NT	.80	1.32*	.13	.01	.07	.22	.51	.03	.04	1
PT (less followers) →NT	2.85†	15.48***	.53	3.86*	.13	9.08**	5.69*	8.05**	1.80	8
3. By social capital	**Lag = 1**	**Lag = 4**	**Lag = 6**	**Lag = 2**	**Lag = 3**	**Lag = 6**	**Lag = 2**	**Lag = 4**	**Lag = 1**	
NH→PT (higher SC)	4.77*	4.77*	2.78†	1.31	2.19	18.73***	.18	1.51	1.31	8
NT→PT (higher SC)	1.91	1.91	.72	3.83*	2.37	2.06	.85	4.74*	.04	5
NH→PT (lower SC)	7.91**	7.91**	18.88***	5.41*	2.02	.40	1.14	6.98**	1.60	13
NT→PT (lower SC)	26.37***	26.37***	.45	17.01***	1.96	31.25***	12.52***	43.60***	.09	12
PT (higher SC) →NH	.01	.01	.52	1.41	1.32	.65	1.47	2.36	.67	4
PT (lower SC) →NH	2.99†	2.99†	1.30	1.30	2.02	3.59†	1.48	4.81*	.00	3
PT (higher SC) →NT	2.60	2.60	.01	1.79	.14	.53	5.10*	1.97	6.69***	4
PT (lower SC) →NT	12.46*	12.46***	.22	6.09*	.12	8.33**	2.12	9.36**	.14	8

Table 4.13 (cont.). Granger causality Wald test results between the media agenda and social groups with different levels of opinion leadership and social capital (issue 11-19).

Note. Same as Table 4.11.

CHAPTER 5 Discussion

Building on the agenda-setting theory, public opinion research, and political expression literature, this dissertation theorizes and empirically examines a multi-version two-way agenda-setting framework, which has three claims: (1) the two versions of public agenda are distinctive from each other; (2) the two versions of media agenda are highly connected yet differentiate on some specific issues; and (3) mutual agenda-setting relationships exist between the social media public agenda and the two forms of media agenda, with the traditional direction stronger than the reverse. Based on four matched datasets collected during the 2020 US presidential election period — a representative survey among Twitter users, their personal tweets, headlines on news websites, and the news tweets published on the corresponding news organizations' accounts — this dissertation also examines how issue-, individual-, media-level factors could moderate the three features.

5.1 The Multi-version Agendas

5.1.1 Divergent Public Agendas

This dissertation first challenged an assumption in the traditional agenda-setting theory — there is only one unified public agenda. Analysis results based on a representative survey and tracking data of 854 Twitter users showed that the two commonly used operationalizations of the public agenda — the self-reported issue importance and the frequency of SNS expression — presented very distinctive agendas at both the aggregate level and issue level. The issue-level analyses showed that out of the 19 issues, the two agendas significantly correlate to each other on only two highly

personal issues (i.e., issue 14 religion/morality and issue 19 LGBT rights). As indicated

by the top issues, the self-reported public agenda tended to prioritize issues that are

relevant to the daily life of all members of the society, whereas the SNS version of the

public agenda focused on more controversial issues, such as politics, racism, and

immigration, which are also more established political issues.

Additionally, this paper also explored a potential factor behind the difference

between "what people think" and "what people tweet" — self-censorship. The results,

however, indicated that WTSC, a commonly used construct to measure self-censorship as

a personal trait, did not sufficiently explain the differences between the two versions of

public agenda. Only on two more politically sensitive issues (issue 4 Foreign trade/policy

and issue 10 Politics/Government) that people with higher WTSC were less likely to

speak out on social media even if they indicated that the issues were important in the

survey. Neither of the moderating effects was statistically significant if using a .05 cutoff

line.

The insignificant results can be attributed to multiple reasons. First,

operationalizing self-censorship as a personal characteristic activated in a face-to-face

setting when facing a known group of audiences, like what Hayes et al. (2005) did, may

not be applicable anymore to the computer-mediated communication environment on

SNSs, where people's expression is constrained by technological affordances and their

audiences more fluid. For instance, Das and Kramer (2013) found that for Facebook

users, their motives of self-censoring are not limited to those related to fear of isolation,

as assumed in the WTSC scale, but also include self-presentation and technological

constraints. On SNSs, the obscured nature of the viewership and the high searchability of content lead to "context collapse," meaning that different social contexts can overlap (Marwick & boyd, 2011). In this case, it is difficult for users to have an accurate estimation of the audiences' view and self-censor accordingly. Thus, we should expect that when SNS users are deciding what to post on the public or semi-public SNS platforms, other heuristics are also at work. Future research should expand the theorization and operationalization of self-censorship to take both the technological aspects (e.g., platform affordances and platform moderation) and other social heuristics (e.g., community norms and consistency of self-presentation) into consideration.

Second, the two versions of the agenda have divergent theoretical meanings: While the MIP questions ask about the most important issues to the *society*, the SNS expressions might be a closer reflection of the most important issues to *oneself* (Zhang et al., 2012). As introduced in Chapter 3, the year 2020 was largely defined by the COVID-19 pandemic, which raised huge concerns about people's health and heavily struck the economy and job market. Thus, it is natural that these three were among the most important issues in the survey: When the target audiences are not one's contacts, the participants are likely to think about issues that are not just relevant to themselves, but will impact the majority of the population, even if some participants might not be, say, unemployed. On the other hand, SNSs expressions are essentially a performance and a process of constructing one's networked identity (Papacharissi, 2013). Therefore, when choosing what issues to express opinions about on SNSs, people may not necessarily pick those important to the society, but those that are consistent with their online self-

presentation. The differences displayed in Table 4.2 also showed that the top issues (e.g., healthcare, unemployment, economy, and education) in the survey version are relatively more obtrusive, or more relevant to lay people's daily life. The most discussed issues among personal tweets, on the contrary, are less obtrusive to the majority of the population. Issues such as race, politics, and immigration, for many people, cannot be directly experienced in their everyday life. While this dissertation did not indicate a "better" version of the public agenda, I do want to encourage future researchers and journalists to recognize and carefully differentiate the theoretical values of both versions. For instance, future studies could try to empirically test whether issue obtrusiveness is a factor behind the discrepancies.

Third, an individual-level analysis may not be adequate to compare the two versions of the agenda. Although the participants responded to the survey independently, their SNS behaviors were largely influenced by other actors in their networks. SNS users will respond to their friends, comment on news tweets, express opinions on "trending" topics[2], or participate in hashtag activisms. These interactions, on the one hand, will inflate the amount of discussion around issues that are more "commentable," just as what Rogstad (2016) found in their study. Controversial issues, such as politics and racism, are more likely to initiate conversations, compared to those that are more fact-based or require professional knowledge to debate on (e.g., economy and military). On the other

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[2] Trending topics here refers to topics on Twitter Trends, a list of topics that are popular in that moment. Twitter's algorithm determines Trends for each user based on their followings, location, and interests. Therefore, different users might be exposed to different Trends (*Twitter Trends FAQ – Trending Hashtags and Topics*, n.d.).

hand, the networked nature of SNS expressions enables strategic and organized inflation of certain issues, which has been used as a tool of many online activisms (Bennett & Segerberg, 2012). When Twitter is flooded with similar content by several or even one user(s), it does not make sense to use these posts to represent what is regarded as important among the wider population. Therefore, I call for further data cleaning and network-level analyses, so that we can capture individuals' opinions if they are not affected by network factors and compare this processed version of agenda to the survey results. The following table summarizes the differences between the two versions of agenda.

	Survey version	SNS version
Population	Traditionally more accessible survey population	Population with higher socioeconomic status and better Internet skills
Theoretical meaning	Socially important issues	Personally important issues
Mode of communication	One direction communication	Interactive communication
Target audiences	The researchers	SNS friends/strangers
Issue preferences	Issues that impact more people's life	Issues that are more "commentable"
Other influencing factors	Response rate, sampling biases, survey design, and social desirability, etc.	Data collection channels, platform moderation, self-presentation strategies, and other actors and activisms, etc.

Table 5.1. Comparison between the two versions of public agenda.

Last but not least, platform moderation might be another unexamined factor behind the gap between the two public agendas. Not all published SNS posts can be observed and collected by researchers and journalists. Gillespie (2018) pointed out that SNS platforms, including Twitter, moderate the overall agenda by removing or filtering posts that do not meet the community guidelines, which are sometimes problematic and constantly changing. SNS data collected via various channels, including APIs and third-party platforms, may also present different agendas compared to data collected through full access (i.e., the "fire hose"), as they might use different sampling strategies that are unknown to the public (Lomborg & Bechmann, 2014). These problems can partially be avoided in this study because I collected the data almost instantly after the participants filled the survey without any sampling. However, platform censorship can still happen in between the original posting time and data collection time. Some researchers (e.g., Chen et al., 2021) have begun to examine the statistical comparability across various data sources. To the author's knowledge, no studies yet have compared the content analysis results of public agendas when using different SNS data collection conduits. Given that news organizations are using various data analytical platforms to understand the social media public opinion (McGregor, 2019), one important direction of future research is to empirically inspect how the data collection and presentation methods of those platforms would potential bias journalists' understanding of the public agenda, and to what extent they would deviate from the self-reported issue importance among the public.

These discrepancies provide an alert to public opinion researchers and journalists who use SNS data to inform public opinion. In the democratic context, accurate public

opinion flection is the foundation of a well-informed citizenry (Dahl, 2020). The journalistic reporting on public opinion also provides citizens some basic understanding of the opinion environment, which can lead to either spiral of silence or more courage to speak out (Noelle-Neumann, 1993). Thus, even though SNS data is easy to access and analyze, especially for newsrooms that require high timeliness, journalists should be extra cautious when interpreting the results as the public agenda and provide full information about the potential biases introduced by the aspects mentioned above. For instance, they should try to identify organized and/or repeated posting and understand how social activisms and other actors would bias the results presented on social media analytical platforms. Journalists should also be careful about the description they use when citing the SNS public agenda: Instead of saying "the public believes" or "this is the opinion of the public," they should use more rigorous phrases like "a sample of Twitter users expressed" or "this is the opinion of Facebook users with specific characteristics."

One final note is that, with the popularity of using SNSs to reflect public opinion in journalism and other industries, the two versions of public agenda might also be more and more interconnected: If people believe that their social media expressions will be picked up by journalists, they might intentionally post more about issues that they believe should be highlighted (e.g., repeat posts/organized mass posting). The realization of the potential audiences among ordinary users may disproportionally increase or decrease the salience of certain issues. Future research could further investigate this trend by interviewing people about their posting intentions and conducting longitudinal studies on the discrepancies between the two versions of the public agenda.

Overall, the results of this dissertation revealed that what people tweet cannot be simply equated to what people think. This key finding also provides us a normative warning: While the early social media researchers celebrated their democratization potential via civic deliberation (e.g., Papacharissi, 2002; Yang, 2009), the results here indicated that social media are not the wonderland that we imaged. If the conversation is the soul of democracy, just as Shah (2016) argued, then it is important to figure out what prevents us from talking about issues that we believe are important. As this study examined a discrete group of participants and only focused on one platform, we are unable to tell whether the differences were due to the opinion environment that one experiences or due to technical difficulties. Future research should carefully distinguish "we do not want to talk about these issues" and "we cannot talk about these issues" when exploring the public opinion biases on social media.

5.1.2 Similar Media Agendas

While the two versions of the public agenda largely diverged from each other, this dissertation revealed high alignment between the two versions of the media agenda at the aggregate level and issue level. Besides the high correlation, the findings also demonstrated mutual Granger causality results on 15 of 19 issues and one-way relationships on 3 of 19 issues. That is to say, the high similarity was not found only on issue 9 (immigration), which was a less covered issue. As for the three issues (11 (terrorism), 13 (drugs), 19 (LGBT rights) on which only news headlines on the websites led news tweets, the lack of mutual influence can be explained by the fact that news

websites normally publish more items than the corresponding Twitter accounts (see

section 2.3.1). The three issues, as shown in Table 4.5 (p. 84), are also among the less

reported issues.

The close connection between the two versions can reflect the increasingly tighter

and higher-level collaboration of the news production team and social media team in

newsrooms. Earlier observations (e.g., Elizabeth, 2017; Gleason, 2010; Ju et al., 2014)

illustrated that social media editors still could not organically integrate into many

newsrooms. When news organizations started to extend their online presence to SNSs, we

could see a high level of agenda alignment between their websites and social media

accounts, because newsrooms back then simply duplicate all headlines from the websites

indiscriminately most of the time (Armstrong & Gao, 2010). It is worth noting that the

high correspondence still holds today when social media content has been largely

diversified. From a preliminary observation of the news tweets dataset used in this study,

I found that news organizations mainly tweeted in five different forms: (1) headlines and

URLs, (2) snippets of website articles, (3) quotes from website articles, (4) interactive

content to engage users, and (5) traffic-driving posts. Examples of the five types can be

found in Table 5.2.

News tweets type	Example
Headlines and URLs	*Officer hit by bullet during "ambush" actually shot himself, say police https://t.co/ONkYaiUJEm*
Snippets of website articles	*A Florida teacher's aide who was dedicated to working with special needs students, and her brother, a paramedic, died from the coronavirus one day apart, their father said in a series of Facebook posts. https://t.co/1mnXo1cX0y*
Quotes from website articles	*"Economic inequality costs the average working person $42,000 annually" (@TheHillOpinion) https://t.co/rHuHTP6MHS https://t.co/C8pIP3v4PL*
Interactive content	*Caption this https://t.co/vnpvyLT1BD*
Traffic driving posts	*RT @USER This Thursday we'll be live streaming the #RNCConvention2020! DON'T MISS IT! #RNCCrowderStream https://t.co/uCmyaOjfiz*

Table 5.2. Five types of news tweets.

Even with the statistically high similarity between the two media agendas, we could still see several discrepancies. For instance, issue 1 (general economy) and issue 2 (unemployment/jobs) ranked high on news websites (ranked No.3 and No.8 respectively) but relatively low on Twitter (ranked No.7 and No.13 respectively). The differences might be because the two issues require more numbers and analyses. Thus, the website articles about them are harder to be transferred to short tweets.

This dissertation also revealed that whether media is digital-native will affect the extent to which their two platforms assemble each other in terms of the issue salience. Opposing to the previous assumption, non-digital-native media actually had better alignment between the two versions of the agenda. Two potential reasons are behind this result. First, digital-native media that solely rely on online traffic for profit might have a

more independent social media team to create content that can fit the platform culture

better, whereas social media teams in organizations that are based on traditional media

forms only consist of editors who do not produce exclusive content. Thus, the latter's

SNS posting would have a higher dependency on their website agenda. Second, while

legacy media tend to keep their social media presence professional, digital-native media

normally present a less serious and more interactive/conversational persona. For example,

@BreitbartNews would post tweets like "Here we go. https://t.co/3Rt1UXeWXy" and

"Ummmm https://t.co/49ogYt77MQ." A follow-up content analysis of the types, as well

as a headline-level comparison, can help us to better understand why the two types of

media were different from each other.

5.2 The (Yet) Imbalanced Two-way Agenda-setting Relationships

Finally, the dissertation proposed and empirically proved a two-way agenda-

setting framework. The results confirmed that the media agenda measured by headlines

from news websites and the public agenda measured by personal tweets were connected

on most issues — some sort of agenda-setting effect existed on 15 out 19 issues (see

Table 4.8; pp. 86-87). Further, reciprocal effect was found on four issues, including issue

3 (taxes), issue 5 (healthcare), issue 8 (race relations/racism), issue 10

(politics/government). Between the media agenda measured by news tweets and personal

tweets, the mutual agenda-setting relationship was found on 6 issues, which is slightly

stronger than news headlines. These findings are consistent with the recent intermedia

agenda-setting studies that examined the relationship between the agenda on SNSs, which

was problematically treated as "media," and on traditional news media (e.g., Chen et al.,

2019; Harder et al., 2017; Vargo & Guo, 2017). These studies collectively presented a "bottom-up trend": The traditionally elite legacy media were no longer the exclusive agenda-setters; They are increasingly following the agenda incubated in the participatory culture on SNSs.

This dissertation develops this line of research by disentangling ordinary people's expression from the hodgepodge of SNS actors, which include news media, politicians, celebrities, and other organizational actors. As discussed in Chapter 2, we should not simply analyze the agenda-setting relationship between the social media public and various news media under the existing frameworks of IAS or agenda-building, as the public is essentially different from media outlets or professional/organizational actors. I call for revitalizing the term "reverse agenda-setting," the reverse salience transfer from the public to the media, to differentiate from the two frameworks mentioned above. This theoretical argument also should remind journalists to carefully distinguish different types of SNS accounts when using social media posts as public opinions, just as Zhang and Guo (2019) and Guo and Zhang (2020) suggested.

A closer look at the results, however, revealed that the two agenda-setting directions — from the media to the public and the reverse — are relatively weak and imbalanced: Only the traditional agenda-setting effect of news headlines met the majority rule. The traditional direction is still stronger than the reverse for both versions of the media agenda. This pattern matches what Shehata and Stromback (2013) argued in their paper: We are not (yet) in a new era of minimal effect. When considering all types of professional news media, they still have a strong media effect on the public, either in

terms of their perceived issue importance or their SNS expressions. I here suggest the

future researchers conduct a systematic literature review of the effect sizes reported in

studies that compared the two directions in the past years so that we can have a more

thorough understanding of where the trend goes.

Theoretically, this dissertation adds to the hybrid media system theory (Chadwick,

2017) by emphasizing the ordinary users' role and by clarifying the information flow

between individuals and news media. It also connects the agenda-setting theory with

civic engagement literature by revealing an information cycle — A less discussed conduit

of civic engagement revealed here is through the issue salience transfer from the

accumulated SNS expressions to news media. From there, the "media power" of news

organizations could help to transfer news coverage to policy changes (Couldry & Curran,

2003). To sum, we understand and change the world that is constructed by ourselves and

summarized by the news media.

5.3 The differentiated agenda-setting power

In addition to the general two-way relationships, this dissertation also took a step

further to look at some potential contingent factors, including variables at issue, media,

and individual levels. The issue-level analysis led to results that verified the cognitive

priming hypothesis and rejected the need for orientation hypothesis (see section 2.4.3):

The two-way agenda-setting effects were stronger on high obtrusive issues. In other

words, both the public and newsrooms are more likely to follow each other's agenda on

issues that can be directly experienced in people's daily life. The potential psychological

mechanism is that people are more likely to be influenced when they invest more cognitive efforts on issues that they were exposed to previously (Chen, 2009).

Given the same issues, the agenda-setting relationships were not significantly conditional on media characteristics. Although the Twitter accounts of non-digital-native media set the public's agenda on slightly more issues, none of the directions presented results that met the majority rule. The marginal difference may be due to the fact non-digital-native media are mostly elite, established, legacy media, which in nature gained more public attention and could invest more resources in observing the public agenda. No consistent patterns were found when comparing media with different political orientations. Future studied could try to examine more media characteristics and their interaction effects to further explore the conditional agenda-setting effects.

Different from media characteristics, comparison by individual characteristics disclosed strong and interesting differences in the effects. The findings indicated that females, white people, and people with lower income and lower education levels were more vulnerable to the agenda-setting effects of news media, especially news tweets. However, the reverse direction was not conditional on any of the personal characteristics, indicating that among the studied population, no evidence was found on the existence of a new "digital divide" in terms of reverse agenda-setting power.

One surprising finding was that it was among participants with lower opinion leadership and lower social capital that we could observe a stronger traditional agenda-setting effect. One potential reason is that the surveyed individuals were not necessarily opinion leaders, since those highly influential people are less likely to be voluntarily

included in survey panels. Given that the reverse direction was not conditional on either opinion leadership or social capital, this result may simply imply that opinion leaders tended to have a relatively independent agenda. Additionally, if getting back to the two-step reverse agenda-setting process proposed by Brosius and Weimann (1996), while the opinion leaders did not influence the media agenda directly, they might still be the indirect agenda-setter via influencing the rest members of the public. Future analyses could reach out to a specific group of opinion leaders and consider the indirect route of agenda-setting.

5.4 Methodological innovations

Alongside the theoretical contributions, this dissertation also made some methodological innovations. First, I connected individual-level survey data and digital texts, which enables a connection between people's online and offline activities, as well as their attitudes and actual behaviors. Many previous studies (e.g., Barnidge et al., 2018; Chan et al., 2012; Gil de Zúñiga et al., 2014) overly relied on self-reported data to represent people's online expression, which, on the one hand, can be largely biased as people's memory is not perfect, and on the other hand, normally provide only information about expression frequency, not the specific content. By connecting the two types of data, we can also connect the two analysis methods: Survey and automated content analysis. As Neuman et al. (2014) stated:

Big data methodologies do not represent a panacea or a substitute for carefully designed surveys, experiments, and content analyses. Instead they represent a complement, an additional resource for better understanding a fast-changing public

sphere. (p. 210)

The design of combining of traditional survey method and big data method in this dissertation, thus, should inform the future direction of social media research.

Second, this dissertation applied state-of-the-art machine learning models for content analysis. Since the analyses involved millions of news headlines, news tweets, and personal tweets, it is beyond the capability of manual content analysis. Deep learning models that can take the contexts into consideration, like DistillBERT and BERTweet, could be essential tools for communication researchers who are inevitably facing the diverse and large digital text data that are accumulating every second. The steps described in Chapter 3 should help future researchers to adopt these tools and to build standardized procedures.

Third, I analyzed the relationships addressed in each research question and hypothesis from both the aggregate and issue/individual levels. Although plenty of agenda-setting studies followed the Acapulco typology coined by McCombs (2004), hardly did they compare multiple levels in one study. The results of this dissertation showed consistent patterns between the aggregate- and issue/individual-level analyses. Since the two levels of analysis have different theoretical meanings, I encourage future researchers to provide both to complement each other.

5.5 Limitations and Future Directions

Like most research, this study is not without limitations. First, the generalizability of the results is limited. Although being representative, the sample size of surveyed

individuals is relatively small given the large cross-individual variation among Twitter users. Since I started from survey participants and only collected personal tweets of those who successfully provided qualified responses, both datasets might be influenced by the biases introduced by the response rate. For instance, the final sample may be skewed towards people who have more leisure time to fill a survey and those who are more willing to disclose their Twitter handles. Thus, it is unlikely that I would get participants who are individuals with top social influence. Most respondents were of small and similar influence in their social networks, which could be one of the reasons that I did not find significant differences between participants with high and low opinion leadership. As it is almost impossible to calculate an accurate response rate of an online survey and to validate the characteristics of people who were not included (Glynn et al., 2015; Shah et al., 2015), I cannot be sure about how the potential biases could skew the results. Future research could try to replicate the study with a larger sample size and/or reverse the order of data collection (i.e., try to collect social media posts from a wide range of users and reach out to them for the survey later).

Second, another limitation is the data analysis process is about account validation. In this dissertation, participants fill in their Twitter handles willingly. Although different strategies were adopted, such as warning the respondents that they should fill in the active account owned by themselves and search for the handle right after, I still cannot guarantee that the individual-account matching was 100% accurate: People could lie or own multiple accounts. One theoretically more precise way to get people's social media handles is asking them to authorize a custom application that is connected to the target

SNS platform via APIs. This method was used by Ferrucci et al. (2019) and Wells and Thorson (2017). However, the availability of such an authentication process is largely determined by platform policies. For instance, Wells and Thorson (2017) noticed that the functionality they used to collect data was disabled by Facebook even before the study was published. Also, it is more of an ethical concern as getting authentication from participants will enable the researchers to access information beyond what is needed for the research and introduce potential confidentiality problems. Thus, the data collection method here is a hard balance between accuracy and replicability/being more ethical.

Besides data collection, several limitations exist in the measurements. First, although common practice in agenda-setting studies, forcing all digital texts into 19 issues is a rather arbitrary choice. As McCombs et al. (2014) argued, the rapidly changing public attention nowadays has dramatically increased the size of the issue agenda on social media. Harder et al. (2017) also proposed a "news story" approach, in which "story" is a smaller unit of analysis compared to the issue. Nevertheless, with such a fine granularity, a high degree of alignment between two very large sets of issues/stories becomes unlikely (McCombs et al., 2014). This dissertation has shown that high correspondence existed at a coarse level. It tells us how much the media and the public can tell each other "what to think about," but cannot provide information about how the "what to think" part works. Future research could try to use finer units (i.e., more issues/stories) or conduct second- and third-level agenda-setting analyses to see if the same pattern persists.

Second, when considering the contingent factors, this dissertation used binary

divisions for all variables. This process transferred some continuous variables to categorical ones, which enables us to see the differences more clearly, yet sacrificed the nuanced distinctions within each category. This measurement strategy was decided because after the dimensionality reduction of time-series analysis, the N for analysis was only 19. Future research could test the same relationships using parametric analyses with a big enough sample size.

Third, this dissertation used close-ended MIP questions to measure the public agenda. Similar to the problem in analyzing the news agenda, close-ended questions limited the participants' choice and could be artificial. Although the list of issues came from the established Gallup polls, there might still be missing issues that were important to the participants. Thus, future studies could supplement the close-ended questions with open-ended ones and conduct content analyses on respondents' answers.

Fourth, the wording of the MIP questions could influence the results. Although inherited from classic designs, the MIP questions have received criticisms as, for instance, its wording shift attention away from the participants' personal consequences (Bartle & Laycock, 2012). Additionally, as mentioned above, asking about the most important problem to the society will lead to different answers compared to when we ask "what is the most important issue to you." (Zhang et al., 2012) Thus, a future methodological exploration should be empirically comparing responses to four different ways of asking about important issues: close-ended social issues, close-ended personal issues, open-ended social issues, and open-ended personal issues.

This dissertation presented quantitative evidence to support the proposed multi-

version two-way agenda-setting framework. While the quantitative results were better at answering the "what" questions, following up with more qualitative studies can help us to better understand the "how" and "why" questions. For instance, future scholars could interview ordinary users about the reasons behind their non-expression or interview social media editors about the factors that they have in mind when deciding what to post on SNSs. Researchers could also conduct field observations in newsrooms to understand how the social media teams work and how their job is influenced by the public agenda on SNSs.

In summary, this study proposed a multi-version two-way agenda-setting framework, which challenged the unified agenda and one-way effect assumptions hidden in the traditional agenda-setting theory. It also backed the theoretical framework by empirical evidence based on four datasets — two public agendas and two media agendas — collected during the 2020 US presidential election. Overall, the results indicated (1) two distinctive public agendas, (2) two similar media agendas, and (3) an imbalanced two-way relationship. The dissertation also revealed the moderating effect of media type on the discrepancies between the media agendas and the differentiated agenda-setting effects conditional on issue and individual characteristics. Besides the theoretical and methodological contributions, this dissertation also provided implications for journalists and social media editors on their daily information collecting and content publishing strategies.

After almost 50 years since the initial proposal of the agenda-setting theory, researchers have casted doubt on media's exclusive gatekeeping role and proposed that

we are entering "a minimal effect era." (Bennett & Iyengar, 2008). The results of this dissertation did not disprove the traditional agenda-setting effect but added a layer to it — the reverse agenda-setting effect. Afterall, the core of the agenda-setting theory is salience transfer. It does not necessarily limit the agenda-setter to news media alone. With the emergence of the Internet and the hybrid media system (Chadwick, 2017), many actors, including the citizens, can become equal contributors to the information flow as news media. This theoretical extension of the identity of agenda-setters gives new life to this longstanding theory and accordingly encourages more future studies on this multi-version two-way agenda-setting framework.

APPENDIX

Table 1. Items in scales used in the analyses

Variables	Items	Cronbach's α	M	SD	Valid N
Traditional news consumption	Printed newspaper		2.38	1.23	854
	Printed news magazine		2.19	1.15	854
	Television news (cable or local network news)	.774	3.57	1.19	854
	Radio		2.73	1.17	854
Online news consumption (How often do you get news from the following online media platforms?)	Online news websites		3.30	1.14	849
	Citizen journalism sites (nonprofessional journalism, e.g., blogs)		2.11	1.17	849
	Facebook		2.84	1.29	849
	Twitter	.840	3.62	1.09	849
	Reddit		2.02	1.22	849
	YouTube		2.72	1.33	849
	Snapchat		1.84	1.24	849
	Instagram		2.40	1.37	849
	News app		2.64	1.33	849
Willingness to self-censor (For each statement, please indicate to what extent you agree with the statement.)	It is difficult for me to express my political opinions if I think others won't agree with what I say		2.51	1.29	854
	There have been many times when I thought that the content others posted was wrong but I didn't let them know		3.51	1.22	854
	When I disagree with others, I'd rather go along with them than argue about it	.771	2.39	1.18	854
	It is easy for me to express my political opinion when it is visible to people who I think will disagree with me (Reversed)		2.94	1.31	854
	It is safer to keep quiet than publicly speak an opinion that you know most others don't share		2.65	1.23	854
	If I disagree with others, I have no problem letting them know it (Reversed)		2.34	1.17	854

PS scale (To what extend do you agree with the following statement?)	I usually count on being successful in everything I do		3.53	1.16	852
	I am rarely unsure about how I should behave		3.29	1.31	852
	I like to assume responsibility		3.71	1.06	852
	I like to take the lead when a group does things together		3.31	1.23	852
	I enjoy convincing others of my opinions	.852	3.47	1.10	852
	I often notice that I serve as a model for others		3.17	1.16	852
	I am good at getting what I want		3.42	1.05	852
	I am often a step ahead of others		3.40	1.07	852
	I own many things others envy me for		2.53	1.27	852
	I often give others advice and suggestions		3.76	1.01	852
Social capital (Please rate to what extent you agree with the following statements regarding your social connections)	I have strong personal relationships with my family members		3.86	1.22	854
	I have strong personal relationships with my close friends		4.03	1.10	854
	I have people in life who would help me if I needed it, no matter what	.790	4.16	1.05	854
	I like to keep a large network of acquaintances		3.16	1.29	854
	I have a large network of people with whom I am friendly		3.47	1.23	854
	I feel like I am part of my community		3.48	1.19	854

BIBLIOGRAPHY

Allport, F. H. (1937). Toward a science of public opinion. *Public Opinion Quarterly*, *1*(1), 7–23.

Althaus, S. L., & Tewksbury, D. (2002). Agenda-setting and the "new" news: Patterns of issue importance among readers of the paper and online versions of the New York Times. *Communication Research*, *29*(2), 180–207.

Araujo, T., & van der Meer, T. G. (2020). News values on social media: Exploring what drives peaks in user activity about organizations on Twitter. *Journalism*, *21*(5), 633–651. Communication & Mass Media Complete.

Armstrong, C. L., & Gao, F. (2010). Now Tweet This: How News Organizations Use Twitter. *Electronic News*, *4*(4), 218–235. https://doi.org/10.1177/1931243110389457

Arora, A., Bansal, S., Kandpal, C., Aswani, R., & Dwivedi, Y. (2019). Measuring social media influencer index — insights from Facebook, Twitter and Instagram. *Journal of Retailing and Consumer Services*, *49*, 86–101. https://doi.org/10.1016/j.jretconser.2019.03.012

Auxier, B. E., & Andersen, M. (2021). *Social Media Use in 2021*. https://www.pewresearch.org/internet/2021/04/07/social-media-use-in-2021/

Avendaño, M. M. D. (2010). Information sources in the Spanish social media during the "Three Days of March" (11-13 March 2004). *Revista Latina de Comunicación Social*, *65*, 1–15. Communication & Mass Media Complete.

Barnidge, M., Huber, B., de Zúñiga, H. G., & Liu, J. H. (2018). Social Media as a Sphere for "Risky" Political Expression: A Twenty-Country Multilevel Comparative Analysis. *The International Journal of Press/Politics*, *23*(2), 161–182. https://doi.org/10.1177/1940161218773838

Barthel, M., & Shearer, E. (2015, August 19). How do Americans use Twitter for news? *Pew Research Center*. https://www.pewresearch.org/fact-tank/2015/08/19/how-do-americans-use-twitter-for-news/

Barthel, M., & Stocking, G. (2020, July 14). Key facts about digital-native news outlets amid staff cuts, revenue losses. *Pew Research Center*. https://www.pewresearch.org/fact-tank/2020/07/14/key-facts-about-digital-native-news-outlets-amid-staff-cuts-revenue-losses/

Bartle, J., & Laycock, S. (2012). Telling more than they can know? Does the most important issue really reveal what is most important to voters? *Electoral Studies*, *31*(4), 679–688. https://doi.org/10.1016/j.electstud.2012.07.005

Bennett, W. L., & Iyengar, S. (2008). A New Era of Minimal Effects? The Changing Foundations of Political Communication. *Journal of Communication*, *58*(4), 707–731. https://doi.org/10.1111/j.1460-2466.2008.00410.x

Bennett, W. L., & Segerberg, A. (2012). The logic of connective action: Digital media and the personalization of contentious politics. *Information, Communication & Society*, *15*(5), 739–768.

Bishop, G. F. (2004). *The Illusion of Public Opinion: Fact and Artifact in American Public Opinion Polls*. Rowman & Littlefield Publishers.

Blumler, J. G. (1979). The role of theory in uses and gratifications studies. *Communication Research*, *6*(1), 9–36.

Bond, R. M., Fariss, C. J., Jones, J. J., Kramer, A. D. I., Marlow, C., Settle, J. E., & Fowler, J. H. (2012). A 61-million-person experiment in social influence and political mobilization. *Nature*, *489*(7415), 295–298. https://doi.org/10.1038/nature11421

boyd, danah, & Crawford, K. (2012). CRITICAL QUESTIONS FOR BIG DATA: Provocations for a cultural, technological, and scholarly phenomenon. *Information, Communication & Society*, *15*(5), 662–679. https://doi.org/10.1080/1369118X.2012.678878

boyd, danah, & Ellison, N. B. (2007). Social network sites: Definition, history, and scholarship. *Journal of Computer-Mediated Communication*, *13*(1), 210–230.

Brosius, H.-B., & Weimann, G. (1996). Who sets the agenda? Agenda-setting as a two-step flow. *Communication Research*, *23*(5), 561–580.

Bucher, T., & Helmond, A. (2017). The affordances of social media platforms. *The SAGE Handbook of Social Media*, 233–253.

Buhl, F., Günther, E., & Quandt, T. (2018). Observing the Dynamics of the Online News Ecosystem: News diffusion processes among German news sites. *Journalism Studies*, *19*(1), 79–104. https://doi.org/10.1080/1461670X.2016.1168711

Calvillo, D. P., Ross, B. J., Garcia, R. J. B., Smelter, T. J., & Rutchick, A. M. (2020). Political Ideology Predicts Perceptions of the Threat of COVID-19 (and Susceptibility to Fake News About It). *Social Psychological and Personality Science*, *11*(8), 1119–1128. https://doi.org/10.1177/1948550620940539

Camaj, L. (2014). Need for orientation, selective exposure, and attribute agenda-setting effects. *Mass Communication & Society*, *17*(5), 689–712.

Castells, M. (2007). Communication, power and counter-power in the network society. *International Journal of Communication*, *1*, 238–266.

Castells, M. (2013). *Communication Power*. OUP Oxford.

Ceron, A., Curini, L., & Iacus, S. M. (2016). First- and second-level agenda setting in the Twittersphere: An application to the Italian political debate. *Journal of Information Technology & Politics*, *13*(2), 159–174. https://doi.org/10.1080/19331681.2016.1160266

Chadwick, A. (2017). *The hybrid media system: Politics and power*. Oxford University Press.

Chan, M., Wu, X., Hao, Y., Xi, R., & Jin, T. (2012). Microblogging, online expression, and political efficacy among young Chinese citizens: The moderating role of information and entertainment needs in the use of Weibo. *Cyberpsychology, Behavior, and Social Networking*, *15*(7), 345–349.

Chen, H.-T., Guo, L., & Su, C. C. (2020). Network agenda setting, partisan selective exposure, and opinion repertoire: The effects of pro-and counter-attitudinal media in Hong Kong. *Journal of Communication*, *70*(1), 35–59.

Chen, K., Duan, Z., & Yang, S. (2021). *Twitter as Research Data: Tools, Costs, Skillsets and Cautions*. the 71st International Communication Association (ICA) Annual Conference, Virtual.

Chen, X. (2009). *Issue obtrusiveness in the agenda-setting process of national network television news* [Ph.D., Syracuse University]. http://www.proquest.com/docview/305083839/abstract/EB9041C2A8CA4B1CPQ /1

Chen, Z., Su, C. C., & Chen, A. (2019). Top-down or Bottom-up? A Network Agenda-setting Study of Chinese Nationalism on Social Media. *Journal of Broadcasting & Electronic Media*, *63*(3), 512–533. Communication & Mass Media Complete.

Conway-Silva, B. A., Filer, C. R., Kenski, K., & Tsetsi, E. (2018). Reassessing Twitter's agenda-building power: An analysis of intermedia agenda-setting effects during the 2016 presidential primary season. *Social Science Computer Review*, *36*(4), 469–483.

Coombs, S. L., & MacKuen, M. (1981). *More Than News: Media Power in Public Affairs*. Beverly Hill, CA: Sage.

Couldry, N., & Curran, J. (2003). *Contesting media power: Alternative media in a networked world*. Rowman & Littlefield.

Dahl, R. A. (2020). *On democracy*. Yale university press.

Das, S., & Kramer, A. (2013). *Self-Censorship on Facebook*. 8.

Devlin, J., Chang, M.-W., Lee, K., & Toutanova, K. (2019). BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding. *ArXiv:1810.04805 [Cs]*. http://arxiv.org/abs/1810.04805

Dubois, E., Gruzd, A., & Jacobson, J. (2020). Journalists' Use of Social Media to Infer Public Opinion: The Citizens' Perspective. *Social Science Computer Review*, *38*(1), 57–74. https://doi.org/10.1177/0894439318791527

Duggan, M., & Smith, A. (2016, October 25). The political environment on social media. *Pew Research Center*. http://www.pewinternet.org/2016/10/25/the-political-environment-on-social-media/

Elizabeth, J. (2017, November 14). After a decade, it's time to reinvent social media in newsrooms. *American Press Institute*. https://www.americanpressinstitute.org/publications/reports/strategy-studies/reinventing-social-media/

Ferrucci, P., Hopp, T., & Vargo, C. J. (2019). Civic engagement, social capital, and ideological extremity: Exploring online political engagement and political expression on Facebook. *New Media & Society*, 1461444819873110.

Freelon, D., Mcllwain, C., & Clark, M. (2016). Quantifying the power and consequences of social media protest. *New Media & Society*.

Gallup Inc. (2021). *Most Important Problem*. https://news.gallup.com/poll/1675/Most-Important-Problem.aspx

Gearhart, S., & Zhang, W. (2014). Gay Bullying and Online Opinion Expression: Testing Spiral of Silence in the Social Media Environment. *Social Science Computer Review*, *32*(1), 18–36. https://doi.org/10.1177/0894439313504261

Gil de Zúñiga, H., Jung, N., & Valenzuela, S. (2012). Social media use for news and individuals' social capital, civic engagement and political participation. *Journal of Computer-Mediated Communication*, *17*(3), 319–336. https://doi.org/10.1111/j.1083-6101.2012.01574.x

Gil de Zúñiga, H., Molyneux, L., & Zheng, P. (2014). Social media, political expression, and political participation: Panel analysis of lagged and concurrent relationships. *Journal of Communication*, *64*(4), 612–634.

Gilberg, S., Eyal, C., McCombs, M., & Nicholas, D. (1980). The state of the union address and the press agenda. *Journalism Quarterly*, *57*(4), 584–588.

Gillespie, T. (2018). *Custodians of the Internet: Platforms, Content Moderation, and the Hidden Decisions That Shape Social Media*. Yale University Press.

Gleason, S. (2010). Harnessing Social Media—News outlets are assigning staffers to focus on networking. *American Journalism Review*. https://ajrarchive.org/Article.asp?id=4860&id=4860

Glynn, C. J., Herbst, S., Lindeman, M., O'Keefe, G. J., & Shapiro, R. Y. (2015). *Public Opinion*. Taylor & Francis Group. http://ebookcentral.proquest.com/lib/bu/detail.action?docID=1181617

Golan, G. J. (2006). Inter-media agenda setting and global news coverage: Assessing the influence of the New York Times on three network television evening news programs. *Journalism Studies*, *7*(2), 323–333.

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society*, 424–438.

Groshek, J., & Groshek, M. C. (2013). Agenda Trending: Reciprocity and the Predictive Capacity of Social Networking Sites in Intermedia Agenda Setting across Topics over Time. *Media and Communication*, *1*(1), 15–27. https://doi.org/10.17645/mac.v1i1.71

Guess, A. M., Barberá, P., Munzert, S., & Yang, J. (2021). The consequences of online partisan media. *Proceedings of the National Academy of Sciences of the United States of America*, *118*(14). https://doi.org/10.1073/pnas.2013464118

Guo, L. (2016). A theoretical explication of the Network Agenda Setting Model. In L. Guo & M. McCombs (Eds.), *The power of information networks* (pp. 3–18). Routledge.

Guo, L. (2019). Media Agenda Diversity and Intermedia Agenda Setting in a Controlled Media Environment: A Computational Analysis of China's Online News. *Journalism Studies*, *20*(16), 2460–2477. https://doi.org/10.1080/1461670X.2019.1601029

Guo, L., Mays, K., Zhang, Y., Wijaya, D., & Betke, M. (2021). What makes gun violence a (less) prominent issue? A computational analysis of compelling arguments and

selective agenda setting. *Mass Communication and Society*, *24*(5), 651–675. https://doi.org/10.1080/15205436.2021.1898644

Guo, L., & Vargo, C. (2017). Global intermedia agenda setting: A big data analysis of international news flow. *Journal of Communication*, *67*(4), 499–520.

Guo, L., & Zhang, Y. (2020). Information Flow Within and Across Online Media Platforms: An Agenda-setting Analysis of Rumor Diffusion on News Websites, Weibo, and WeChat in China. *Journalism Studies*, *21*(15), 2176–2195. https://doi.org/10.1080/1461670X.2020.1827012

Haarsager, S. (1991). Choosing silence: A case of reverse agenda setting in depression era news coverage. *Journal of Mass Media Ethics*, *6*(1), 35–46.

Halpern, D., Valenzuela, S., & Katz, J. E. (2017). We face, I tweet: How different social media influence political participation through collective and internal efficacy. *Journal of Computer-Mediated Communication*, *22*(6), 320–336. https://doi.org/10.1111/jcc4.12198

Han, J. (Karen), Lee, S., & McCombs, M. (2017). The attribute agenda-setting influence of online community on online newscast: Investigating the South Korean Sewol ferry tragedy. *Asian Journal of Communication*, *27*(6), 601–615. Communication & Mass Media Complete.

Harbers, F. (2016). Time to engage: De Correspondent's redefinition of journalistic quality. *Digital Journalism*, *4*(4), 494–511.

Harder, R. A., Sevenans, J., & Van Aelst, P. (2017). Intermedia agenda setting in the social media age: How traditional players dominate the news agenda in election times. *The International Journal of Press/Politics*. https://doi.org/10.1177/1940161217704969

Hargittai, E. (2020). Potential Biases in Big Data: Omitted Voices on Social Media. *Social Science Computer Review*, *38*(1), 10–24. https://doi.org/10.1177/0894439318788322

Hayes, A. F., Glynn, C. J., & Shanahan, J. (2005a). Willingness to self-censor: A construct and measurement tool for public opinion research. *International Journal of Public Opinion Research*, *17*(3), 298–323.

Hayes, A. F., Glynn, C. J., & Shanahan, J. (2005b). Validating the Willingness to Self-Censor Scale: Individual Differences in the Effect of the Climate of Opinion on Opinion Expression. *International Journal of Public Opinion Research*, *17*(4), 443–455. https://doi.org/10.1093/ijpor/edh072

Hayes, A. F., Scheufele, D. A., & Huge, M. E. (2006a). Nonparticipation as self-censorship: Publicly observable political activity in a polarized opinion climate. *Political Behavior*, *28*(3), 259–283.

Hayes, A. F., Scheufele, D. A., & Huge, M. E. (2006b). Nonparticipation as self-censorship: Publicly observable political activity in a polarized opinion climate. *Political Behavior*, *28*(3), 259–283.

Herbst, S. (1998). *Reading public opinion: How political actors view the democratic process*. University of Chicago Press.

Hermida, A. (2012). Social Journalism: Exploring how Social Media is Shaping Journalism. In E. Siapera & A. Veglis (Eds.), *The Handbook of Global Online Journalism* (pp. 309–328). Wiley-Blackwell. https://doi.org/10.1002/9781118313978.ch17

Hong, C., Chen, Z. (Fay), & Li, C. (2017). "Liking" and being "liked": How are personality traits and demographics associated with giving and receiving "likes" on Facebook? *Computers in Human Behavior*, *68*, 292–299. https://doi.org/10.1016/j.chb.2016.11.048

How AllSides Rates Media Bias: Our Methods. (2016, August 10). AllSides. https://www.allsides.com/media-bias/media-bias-rating-methods

Jenkins, H. (2006). *Convergence culture: Where old and new media collide*. NYU Press.

Jenkins, H., Ford, S., & Green, J. (2013). Spreadable Media. In *Spreadable Media*. New York University Press. https://www.degruyter.com/document/doi/10.18574/9780814743515/html

Jones-Jang, S. M., Hart, P. S., Feldman, L., & Moon, W.-K. (2020). Diversifying or Reinforcing Science Communication? Examining the Flow of Frame Contagion Across Media Platforms. *Journalism & Mass Communication Quarterly*, *97*(1), 98–117. Communication & Mass Media Complete.

Ju, A., Jeong, S. H., & Chyi, H. I. (2014). Will Social Media Save Newspapers?: Examining the effectiveness of Facebook and Twitter as news platforms. *Journalism Practice*, *8*(1), 1–17. https://doi.org/10.1080/17512786.2013.794022

Jurkowitz, M., & Mitchell, A. (2020, April 1). Cable TV and Coronavirus: How Americans perceive the outbreak and view media coverage differ by main news source. *Pew Research Center's Journalism Project*. https://www.journalism.org/2020/04/01/cable-tv-and-covid-19-how-americans-perceive-the-outbreak-and-view-media-coverage-differ-by-main-news-source/

Klašnja, M., Barberá, P., Beauchamp, N., Nagler, J., & Tucker, J. A. (2018, September 27). *Measuring Public Opinion with Social Media Data*. The Oxford Handbook of Polling and Survey Methods. https://doi.org/10.1093/oxfordhb/9780190213299.013.3

Kramer, A. D. I., Guillory, J. E., & Hancock, J. T. (2014). Experimental evidence of massive-scale emotional contagion through social networks. *Proceedings of the National Academy of Sciences of the United States of America*, *111*(24), 8788–8790. https://doi.org/10.1073/pnas.1320040111

Kwak, H., Lee, C., Park, H., & Moon, S. (2010). What is Twitter, a social network or a news media? *Proceedings of the 19th International Conference on World Wide Web*, 591–600.

Lariscy, R. W., Avery, E. J., Sweetser, K. D., & Howes, P. (2009). An examination of the role of online social media in journalists' source mix. *Public Relations Review*, *35*(3), 314–316. https://doi.org/10.1016/j.pubrev.2009.05.008

Levenson, E. (2021, April 21). How Minneapolis Police first described the murder of George Floyd, and what we know now—CNN. *CNN*. https://www.cnn.com/2021/04/21/us/minneapolis-police-george-floyd-death/index.html

Lippman, W. (1922). *Public opinion*. Harcourt, Brace and Company San Diego, CA, USA:

Lippmann, W. (1922). *Public opinion*. Macmillan.

Lomborg, S., & Bechmann, A. (2014). Using APIs for Data Collection on Social Media. *Information Society*, *30*(4), 256–265. https://doi.org/10.1080/01972243.2014.915276

Lowery, S. A., & DeFleur, M. L. (1995). *Milestones in Mass Communication Research: Media Effects* (3rd edition). Pearson.

Lukito, J., Suk, J., Zhang, Y., Doroshenko, L., Kim, S. J., Su, M.-H., Xia, Y., Freelon, D., & Wells, C. (2020). The wolves in sheep's clothing: How Russia's internet research agency tweets appeared in US News as Vox Populi. *The International Journal of Press/Politics*, *25*(2), 196–216.

Luo, Y. (2014). The Internet and agenda setting in China: The influence of online public opinion on media coverage and government policy. *International Journal of Communication*, *8*(24).

Lutz, C., & Hoffmann, C. P. (2017). The dark side of online participation: Exploring non-, passive and negative participation. *Information, Communication & Society*, *20*(6), 876–897.

MacKuen, M. B. (1979). *Social communication and the mass policy agenda* [PhD Dissertation]. University of Michigan.

Madsen, V. T., & Verhoeven, J. W. M. (2016). Self-censorship on Internal Social Media: A Case Study of Coworker Communication Behavior in a Danish Bank. *International Journal of Strategic Communication*, *10*(5), 387–409. https://doi.org/10.1080/1553118X.2016.1220010

Marwick, A. E., & boyd, D. (2011). I tweet honestly, I tweet passionately: Twitter users, context collapse, and the imagined audience. *New Media & Society*, *13*(1), 114–133.

McCombs, M. (2004). *Setting the agenda: The mass media and public opinion*. Polity Press.

McCombs, M. (2014). *Setting the agenda* (2nd ed.). Polity Press.

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

McCombs, M. E., Shaw, D. L., & Weaver, D. H. (2014). New Directions in Agenda-Setting Theory and Research. *Mass Communication and Society*, *17*(6), 781–802. https://doi.org/10.1080/15205436.2014.964871

McGregor, S. C. (2019). Social media as public opinion: How journalists use social media to represent public opinion. *Journalism*, *20*(8), 1070–1086. https://doi.org/10.1177/1464884919845458

Melek, G. (2017). A Study on Hürriyet and Twitter Within the Framework of Intermedia Agenda-Setting. *Journal of Communication Theory & Research*, *2016*(44), 17–41. Communication & Mass Media Complete.

Meraz, S. (2011a). The fight for 'how to think': Traditional media, social networks, and issue interpretation. *Journalism*, *12*(1), 107–127. Communication & Mass Media Complete.

Meraz, S. (2011b). Using time series analysis to measure intermedia agenda-setting influence in traditional media and political blog networks. *Journalism & Mass Communication Quarterly*, *88*(1), 176–194. https://doi.org/10.1177/107769901108800110

Meraz, S. (2011c). Using time series analysis to measure intermedia agenda-setting influence in traditional media and political blog networks. *Journalism & Mass Communication Quarterly*, *88*(1), 176–194.

Messing, S., & Westwood, S. J. (2014). Selective Exposure in the Age of Social Media: Endorsements Trump Partisan Source Affiliation When Selecting News Online. *Communication Research*, *41*(8), 1042–1063. https://doi.org/10.1177/0093650212466406

Messner, M., Linke, M., & Eford, A. (2012). Shoveling tweets: An analysis of the microblogging engagement of traditional news organizations. *International Symposium on Online Journalism Isojorg*, *2*(1), 74.

Miller, M. M., Andsager, J. L., & Riechert, B. P. (1998). Framing the candidates in presidential primaries: Issues and images in press releases and news coverage. *Journalism & Mass Communication Quarterly*, *75*(2), 312–324.

Mitchell, A., Jurkowitz, M., Oliphant, J. B., & Shearer, E. (2021, February 22). How Americans Navigated the News in 2020: A Tumultuous Year in Review. *Pew Research Center's Journalism Project*. https://www.journalism.org/2021/02/22/how-americans-navigated-the-news-in-2020-a-tumultuous-year-in-review/

Murphy, J., Link, M. W., Childs, J. H., Tesfaye, C. L., Dean, E., Stern, M., Pasek, J., Cohen, J., Callegaro, M., & Harwood, P. (2014). Social Media in Public Opinion Research: Executive Summary of the Aapor Task Force on Emerging Technologies in Public Opinion Research. *Public Opinion Quarterly*, *78*(4), 788–794. https://doi.org/10.1093/poq/nfu053

Navigating the challenges of digital advertising during a global pandemic. (2020). The Nielsen Company. https://www.nielsen.com/us/en/insights/article/2020/navigating-the-challenges-of-digital-advertising-during-a-global-pandemic

Nee, R. C. (2013). Creative destruction: An exploratory study of how digitally native news nonprofits are innovating online journalism practices. *International Journal on Media Management*, *15*(1), 3–22.

Neuman, R. W., Guggenheim, L., Jang, S. M., & Bae, S. Y. (2014). The dynamics of public attention: Agenda-setting theory meets big data. *Journal of Communication*, *64*, 193–214.

Newman, N. (2009). *The rise of social media and its impact on mainstream journalism* [Working Paper]. Reuters Institute for the Study of Journalism.

http://www.sssup.it/UploadDocs/6635_8_S_The_rise_of_Social_Media_and_its_Impact_on_mainstream_journalism_Newman_07.pdf

Newman, N., Fletcher, R., Schulz, A., Andi, S., & Nielsen, R. K. (2020). *Reuters Institute Digital News Report 2020* (p. 112).

Nguyen, D. Q., Vu, T., & Nguyen, A. T. (2020). BERTweet: A pre-trained language model for English Tweets. *ArXiv:2005.10200 [Cs]*. http://arxiv.org/abs/2005.10200

Noelle-Neumann, E. (1993). *The spiral of silence: Public opinion — Our social skin*. University of Chicago Press.

Noelle-Neumann, E. (1985). Identifying opinion leaders. *38th ESOMAR Conference, Wiesbaden*, 3–12.

Ognyanova, K., Lazer, D., Robertson, R. E., & Wilson, C. (2020). Misinformation in action: Fake news exposure is linked to lower trust in media, higher trust in government when your side is in power. *Harvard Kennedy School Misinformation Review*. https://doi.org/10.37016/mr-2020-024

Palser, B. (2009). Hitting the tweet spot: News outlets should use Twitter to reach elusive and valuable audiences. *American Journalism Review*, *31*(2), 54–55.

Papacharissi, Z. (2002). The virtual sphere: The internet as a public sphere. *New Media & Society*, *4*(1), 9–27.

Papacharissi, Z. (2013). A Networked Self Identity Performance and Sociability on Social Network Sites. In *Frontiers in new media research* (p. 207).

Parmelee, J. H. (2014). The agenda-building function of political tweets. *New Media & Society*, *16*(3), 434–450. https://doi.org/10.1177/1461444813487955

Paulussen, S., & Harder, R. A. (2014). Social Media References in Newspapers: Facebook, Twitter and YouTube as sources in newspaper journalism. *Journalism Practice*, *8*(5), 542–551. https://doi.org/10.1080/17512786.2014.894327

Peil, C., & Sparviero, S. (2017). Media convergence meets deconvergence. In *Media convergence and deconvergence* (pp. 3–30). Springer.

Pew Research Center. (2019). *Demographics of Social Media Users and Adoption in the United States*. Pew Research Center. https://www.pewresearch.org/internet/fact-sheet/social-media/

Prior, M. (2013). Media and political polarization. *Annual Review of Political Science*, *16*, 101–127.

Ragas, M. W., Tran, H. L., & Martin, J. A. (2014). Media-induced or search-driven? A study of online agenda-setting effects during the BP oil disaster. *Journalism Studies*, *15*(1), 48–63.

Riffe, D., Lacy, S., & Fico, F. (2014). *Analyzing media messages: Using quantitative content analysis in research*. Routledge.

Rogstad, I. (2016). Is Twitter just rehashing? Intermedia agenda setting between Twitter and mainstream media. *Journal of Information Technology & Politics*, *13*(2), 142–158.

Rothgerber, H., Wilson, T., Whaley, D., Rosenfeld, D. L., Humphrey, M., Moore, A., & Bihl, A. (2020). *Politicizing the COVID-19 Pandemic: Ideological Differences in Adherence to Social Distancing*. PsyArXiv. https://doi.org/10.31234/osf.io/k23cv

Ruths, D., & Pfeffer, J. (2014). Social media for large studies of behavior. *Science*, *346*(6213), 1063–1064. https://doi.org/10.1126/science.346.6213.1063

Salleh, S. M. (2017). From Survey to Social Media: Public Opinion and Politics in the Age of Big Data. *Advanced Science Letters*, *23*(11), 10696–10700. https://doi.org/10.1166/asl.2017.10133

Sanh, V., Debut, L., Chaumond, J., & Wolf, T. (2020). DistilBERT, a distilled version of BERT: Smaller, faster, cheaper and lighter. *ArXiv:1910.01108 [Cs]*. http://arxiv.org/abs/1910.01108

Santana, A. D., & Hopp, T. (2016). Tapping Into a New Stream of (Personal) Data: Assessing Journalists' Different Use of Social Media. *Journalism & Mass Communication Quarterly*, *93*(2), 383–408. https://doi.org/10.1177/1077699016637105

Sayyadiharikandeh, M., Varol, O., Yang, K.-C., Flammini, A., & Menczer, F. (2020). Detection of Novel Social Bots by Ensembles of Specialized Classifiers. *Proceedings of the 29th ACM International Conference on Information & Knowledge Management*, 2725–2732. https://doi.org/10.1145/3340531.3412698

Schoenbach, K., & Semetko, H. A. (1992). Agenda-setting, agenda reinforcing or agenda-deflating? A study of the 1990 German national election. *Journalism Quarterly*, *69*, 837–846.

Schuman, H., & Scott, J. (1987). Problems in the Use of Survey Questions to Measure Public Opinion. *Science*, *236*(4804), 957–959. https://doi.org/10.1126/science.236.4804.957

Seguin, C. (2016). Cascades of Coverage: Dynamics of Media Attention to Social Movement Organizations. *Social Forces*, *94*(3), 997–1020. https://doi.org/10.1093/sf/sov085

Shah, D. V. (2016). Conversation is the soul of democracy: Expression effects, communication mediation, and digital media. *Communication and the Public*, *1*(1), 12–18. https://doi.org/10.1177/2057047316628310

Shah, D. V., Cappella, J. N., & Neuman, W. R. (2015). Big Data, Digital Media, and Computational Social Science: Possibilities and Perils. *The ANNALS of the American Academy of Political and Social Science*, *659*(1), 6–13. https://doi.org/10.1177/0002716215572084

Shaw, D. L., Minooie, M., Aikat, D., & Vargo, C. J. (2019). *Agendamelding: News, Social Media, Audiences, and Civic Community* (C. Bronstein, D. Perlmutter, P. M. Poindexter, & R. Waters, Eds.; 1st edition). Peter Lang Inc., International Academic Publishers.

Shearer, E. (2018). *Social media outpaces print newspapers in the U.S. as a news source*. Pew Research Center. https://www.pewresearch.org/fact-tank/2018/12/10/social-media-outpaces-print-newspapers-in-the-u-s-as-a-news-source/

Shearer, E., & Grieco, E. (2019). *Americans Are Wary of the Role Social Media Sites Play in Delivering the News*. Pew Research Center. https://www.journalism.org/2019/10/02/americans-are-wary-of-the-role-social-media-sites-play-in-delivering-the-news/

Shehata, A., & Stromback, J. (2013). Not (yet) a new era of minimal effects: A study of agenda setting at the aggregate and individual levels. *International Journal of Press/Politics*, *18*(2), 234–255.

Shirky, C. (2011). The political power of social media: Technology, the public sphere, and political change. *Foreign Affairs*, 28–41.

Sleeper, M., Balebako, R., Das, S., McConahy, A. L., Wiese, J., & Cranor, L. F. (2013). The post that wasn't: Exploring self-censorship on Facebook. *Proceedings of the 2013 Conference on Computer Supported Cooperative Work - CSCW '13*, 793. https://doi.org/10.1145/2441776.2441865

Soroka, S. N. (2002). Issue Attributes and Agenda-Setting by Media, the Public, and Policymakers in Canada. *International Journal of Public Opinion Research*, *14*(3), 264–285. https://doi.org/10.1093/ijpor/14.3.264

Stromback, J., & Kiousis, S. (2010). A new look at agenda-setting effects—Comparing the predictive power of overall political news consumption and specific news

media consumption across different media channels and media types. *Journal of Communication*, *60*(2), 271–292.

Stroud, N. J. (2011). *Niche news: The politics of news choice*. Oxford University Press on Demand.

Tufekci, Z. (2017). *Twitter and tear gas: The power and fragility of networked protest*. Yale University Press.

Twitter Trends FAQ – trending hashtags and topics. (n.d.). Retrieved August 12, 2021, from https://help.twitter.com/en/using-twitter/twitter-trending-faqs

@TwitterIR. (2021). *Q4 and Fiscal Year 2020 Letter to Shareholders*. Twitter. https://s22.q4cdn.com/826641620/files/doc_financials/2020/q4/FINAL-Q4'20-TWTR-Shareholder-Letter.pdf

Valente, T. W., & Pumpuang, patchareeya. (2007). Identifying opinion leaders to promote behavior change. *Health Education & Behavior*.

Van den Heijkant, L., Van Selm, M., Hellsten, I., & Vliegenthart, R. (2019). Intermedia Agenda Setting in a Policy Reform Debate. *International Journal of Communication (19328036)*, *13*, 1890–1912. Communication & Mass Media Complete.

van Deursen, A. J., & van Dijk, J. A. (2014). The digital divide shifts to differences in usage. *New Media & Society*, *16*(3), 507–526. https://doi.org/10.1177/1461444813487959

van Dijk, J., & Hacker, K. (2003). The Digital Divide as a Complex and Dynamic Phenomenon. *The Information Society*, *19*(4), 315–326. https://doi.org/10.1080/01972240309487

Vargo, C., & Guo, L. (2017). Networks, big data, and intermedia agenda-setting: An analysis of traditional, partisan, and emerging online U.S. news. *Journalism & Mass Communication Quarterly*. https://doi.org/10.1177/1077699016679976

Walgrave, S., Lefevere, J., & Nuytemans, M. (2009). Issue ownership stability and change: How political parties claim and maintain issues through media appearances. *Political Communication*, *26*(2), 153–172.

Wall, M. (2015). Citizen Journalism: A retrospective on what we know, an agenda for what we don't. *Digital Journalism*, *3*(6), 797–813. https://doi.org/10.1080/21670811.2014.1002513

Wanta, W. (1997). *The public and the national agenda: How people learn about important issues*. Lawrence Erlbaum.

Weaver, D. H., Graber, D. A., McCombs, M., & Eyal, C. H. (1981). *Media agenda-setting in a presidential election: Issues, images, and interest.* Praeger.

Weaver, D. H., & Willnat, L. (2020). Changes in U.S. Journalism. In S. Allan, C. Carter, S. Cushion, L. Dencik, I. Garcia-Blanco, J. Harris, R. Sambrook, K. Wahl-Jorgensen, & A. Williams (Eds.), *The Future of Journalism: Risks, Threats and Opportunities* (1st ed., pp. 181–192). Routledge. https://doi.org/10.4324/9780429462030-19

Weimann, G. (1991). The influentials: Back to the concept of opinion leaders? *Public Opinion Quarterly*, *55*(2), 267–279.

Wells, C., & Thorson, K. (2017). Combining big data and survey techniques to model effects of political content flows in Facebook. *Social Science Computer Review*, *35*(1), 33–52.

Winter, J., & Eyal, C. (1981). Agenda setting for the civil rights issue. *Public Opinion Quarterly*, *45*, 376–383.

Winter, J. P., Eyal, C. H., & Rogers, A. H. (1982). Issue-Specific Agenda-Setting: The Whole as less than the Sum of the Parts. *Canadian Journal of Communication*, *8*(2). https://doi.org/10.22230/cjc.1982v8n2a268

Wold, S. (2020). *COVID-19 is changing how, why and how much we're using social media*. https://www.digitalcommerce360.com/2020/09/16/covid-19-is-changing-how-why-and-how-much-were-using-social-media/

Wu, D., & Coleman, R. (2009). Advancing agenda-setting theory: The comparative strength and new contingent conditions of the two levels of agenda-setting effects. *Journalism & Mass Communication Quarterly*, *86*(4), 775–789.

Yang, G. (2008). The Rise of Internet Activists in China. *EAI Background Brief*. http://www.eai.nus.edu.sg/BB388.pdf

Yang, G. (2009). *The power of the Internet in China: Citizen activism online*. Columbia University Press.

Yun, G. W., Morin, D., Park, S., Joa, C. Y., Labbe, B., Lim, J., Lee, S., & Hyun, D. (2016). Social media and flu: Media Twitter accounts as agenda setters. *International Journal of Medical Informatics*, *91*, 67–73. https://doi.org/10.1016/j.ijmedinf.2016.04.009

Zhang, G., Shao, G., & Bowman, N. D. (2012). What Is Most Important for My Country Is Not Most Important for Me: Agenda-Setting Effects in China. *Communication Research*, *39*(5), 662–678. https://doi.org/10.1177/0093650211420996

Zhang, Y. (2020a). *From media power to people's power: A systematic literature review on the reverse agenda-setting effect of ordinary people's discussions on social network sites*. International Association for Media and Communication Research (IAMCR) 2020 Annual Conference, Virtual.

Zhang, Y. (2020b). When politics intervene in non-political news flow: Trans-regional intermedia agenda-setting between Mainland China, Hong Kong, and Taiwan on online air pollution news. *The Agenda Setting Journal*, *4*(2), 173–194. https://doi.org/10.1075/asj.18019.zha

Zhang, Y., Guo, L., Gil de Zúñiga, H., Xie, T., & Zhang, R. J. (2021). Demographic inequalities or personality differences? Exploring six types of social media usage divides in Mainland China. *The Social Science Journal*, 1–17. https://doi.org/10.1080/03623319.2020.1851952

Zhu, J.-H., & Boroson, W. (1997). Susceptibility to agenda setting: A cross-sectional and longitudinal analysis of individual differences. *Communication and Democracy: Exploring the Intellectual Frontiers in Agenda-Setting Theory*, 69–84.

Zucker, H. (1978). The Variable Nature of News Media Influence. *Annals of the International Communication Association*, *2*(1), 225–240. https://doi.org/10.1080/23808985.1978.11923728

Zuckerman, E., Matias, J. N., Bhargava, R., Bermejo, F., & Ko, A. (2019). Whose Death Matters? A Quantitative Analysis of Media Attention to Deaths of Black Americans in Police Confrontations, 2013–2016. *International Journal of Communication*, *13*(0), 27.

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