Election-Related Talk and Agenda Setting-Effects on Twitter: A Big Data Analysis of Salience Transfer at Different Levels of User Participation

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Abstract

This study explores frequency of election-related chatter as an antecedent to agenda setting. In this study, we conduct a longitudinal analysis of 38 million tweets from the 2012 election. Users who participate more in election-related talk align more with partisan media more than less active users. Users who participate less align less with partisan media and more with mainstream media. Overall, agenda-setting relationships differ by participation in election-related talk, with more active users exhibiting a greater agenda-setting effect across all media types. This study provides evidence that as Twitter users talk more about the election, they appear to do so in more homophilous information environments. These environments can alter their perceived importance of issues to match more partisan media. This study echoes previous research that has shown large conversations on Twitter to be more akin to partisan information.

Keywords: Twitter; agenda setting; big data; political communication; computational social science

"The agenda-setting role of the media links journalism and its tradition of storytelling to the arena of public opinion, a relationship with considerable consequences for society" (McCombs, 2014, p. 17). In today's digital age, journalism and public opinion are more closely linked than ever. On social media platforms like Twitter, public opinion is shared alongside news. This computer-mediated service offers an equal space to journalists and the public alike. While journalists play an influential role on Twitter (Ausserhofer & Maireder, 2013; Parmelee & Bichard, 2012), public opinion has worked through social media to sway the media agenda as well (Graeff, Stempeck & Zuckerman, 2014).

Yet, the ways in which people use social media are not homogeneous. Who people follow on social media can dictate the types of content they share (Weeks & Holbert, 2013). Similarly, word-of-mouth research shows that people rely on and trust their friends' opinions a great deal (i.e. Brown & Reingen, 1987; Brown, Broderick & Lee, 2007; Dichter, 1966). Recent studies on agenda setting as it relates to Twitter (Parmelee, 2013; Vargo, Guo, McCombs & Shaw, 2014) show that salience can be transferred within the social network. However, authors note that the degree to which those agendas are transferred varies from person to person.

What remain to be explored are antecedents to agenda setting within socially networked spaces. The variance of frequency of Twitter use is startlingly wide (Stieglitz & Dang-Xuan, 2012). Here we examine how frequency of election-related talk affects the agenda-setting relationship between Twitter users and left-leaning, right-leaning, and center media. Uncovering behaviors that predict the extent to which one's agenda is set by the media, especially partisan media, has important implications for politics. For instance, people partially rely on issues they perceive to be salient as heuristics when making electoral decisions (Bélanger & Meguid, 2008). By better understanding how social media users craft issue agendas, we can envision how social media usage alters the observed experience on social media platforms. Utilizing computational methods, this study investigates how different users of Twitter correlate with partisan media. We take the 2012 presidential election as a case study, providing insight into how the behaviors of Twitter users result in different observed media effects.

Agenda Setting and Online Media

At first blush, it appeared that web-based news might disrupt the media's ability to set the public agenda (Wanta & Ghanem 2007). For example, Althaus and Tewksbury (2002) took advantage of the dawn of web-based news to compare the agenda-setting effects of the *New York Times*' print edition and web edition. Following a weeklong experiment, they found that print readers modify their agendas differently than online readers. Because readers of online news have more control over their news exposure and consumption, they can and do develop different perceptions over the importance of certain issues as compared to print readers.

Althaus and Tewksbury (2002) showed that audiences use the personalizing and selective affordances of web-based news to create their own issue agendas. Social media promised to fracture the dominant mass media model, putting content creation and distribution in the hands of the public. Social media allow users to be selective in the content they receive. They also allow for the selective filtering of news stories they do not prefer. Taken together, this reopened the question of whether mass media effects would remain dominant in the years to come. After all, some users, especially millennials and other digital natives, now rely exclusively on their online networks to deliver the news to them (Bakshy et al., 2012).

Scholarship on the agenda-setting power of traditional media on social media suggests that the era of uniform effects are over. In some situations, the media may have an agenda-setting effect over other media. Blogs can possess an agenda-setting power (Drezner & Farrell, 2004;

Lewis, 2009). Woodly (2008) observed that political journalists are influenced by blogs. Additionally, political tweets may act as part of the agenda-building process (Parmelee, 2013).

Other scholars have noted that the agenda-setting influence is now complex with no one actor dominating influence. In a study of political blogs and mainstream media, Meraz (2009) found that traditional media is just one of many forces amid a sea of competing influences. Other scholars have found evidence of social media sharing influence with more traditional forms of media (Jungherr, 2014; Neuman et al. 2014; Wallsten, 2007).

However, several studies argue that traditional media still control the majority of the agenda online (Lee, 2007; Scharkow & Vogelgesang, 2011; Weeks & Southwell, 2010). What has changed are the effects' sizes. Traditional media's influence now appears to be much more conditional and limited. Vargo, Basilaia, and Shaw (2015) suggest that the media lead for ongoing issues (i.e. the mortgage and housing crisis), but that effect is diminished for event-driven news (i.e. the BP oil spill). Ceron (2014) observed that traditional mass media retain their first-level agenda setting power, but found vast differences between social and traditional media at second-level, or attribute, agenda setting. Guo and Vargo (2015) add further nuance and observed that first-level (issue) agenda setting can vary by media, with certain media owning issues better than others.

Vargo et al. (2014) added the important distinction of media type. They observed that the media's intended audience (a.k.a. reach) altered the agenda-setting effect. "Horizontal" media, or media geared toward specific audiences, had smaller agenda-setting effects than "vertical" media (e.g., media that attempted to reach broader audiences). While these concepts appear to be related, the authors did not specifically analyze partisanship. It is logical to conclude that partisan media cater to specific audiences while traditional media aim for broader audiences. However, partisanship specifically has been linked to a new paradigm shift in news preferences (Hollander, 2008; Westlund & Fardigh, 2011, 2015). By directly analyzing partisanship in an agenda-setting context, we aim to bridge the literature in this regard.

Since at least the mid-20th century, the U.S. media have aimed for objectivity, which has become a well-documented journalistic norm (see Schudson, 2001). However, the rise of cable news and the web (Stroud, 2011) has led to the emergence of partisan media outlets like the Huffington Post and The Drudge Report. As a result, this shift has disrupted news preferences (Iyengar & Hahn, 2009; Stroud, 2010). It begs to reason then that the agenda-setting effect of partisan media may now be substantial.

In this study we examine media not in the aggregate, but by partisan association. To expand partisanship to the realm of the media effects, this study groups media by partisan affiliation. Those media outlets still aiming for normative objectivity are represented by mainstream or center media. Examining each end of the ideological spectrum, this study identifies left-leaning and right-leaning media. Because the public increasingly turns to partisan outlets (Stroud, 2011), we expect these partisan media to display significant agenda-setting effects on Twitter users. This study will add further nuance to the agenda-setting theory by addressing partisanship in regards to the agenda-setting effect.

RQ1: What is the relative influence of a) left-leading media, b) right-leaning media, and c) center media on the issue agenda of Twitter users?

Homophilous Information Environments

All agenda setting studies, if not all media effects research, assume some level of interest on the part of the audience. In the world of specialized news, interest drives audience behavior and choices to a great degree (e.g. Schoenbach & Weaver, 1985). The current news media environment is saturated and specialized. The amount of content is so great that even the most highly interested person can only consume a fraction of all the available information available. Audiences must choose sources (Mutz & Martin, 2001). These decisions allow users to craft their digital news environment. Twitter users tend to undergo social conformity to match the opinions of their friends, often sharing untrustworthy information (Yoo, Choi, Choi & Rho, 2014). Emerging research suggests this leads to more homophilous information environments. Network analysis studies of Twitter reveal that is a highly polarized space, where users are unlikely to be exposed to cross-ideological political views. Conversations cluster around political topics and are highly homogenous (Conover, Ratkiewicz, Francisco, Gonçalves, Menczer & Flammini, 2011; Himelboim, McCreery & Smith, 2013; Smith, Raine, Shneiderman & Hilemboim, 2014). Homophily is not unique to Twitter and can be a natural behavior in networks (McPherson, Smith-Lovin & Cook, 2001). However, the idea of homogenous networks of information seems to oppose the idea of large agenda-setting effects. The seminal agenda-setting studies relied on heterogeneity, or crosscutting exposure to all different types of political viewpoints through unbiased news coverage.

Research has shown that more active users on Twitter act out of the need for camaraderie (Chen, 2011). Those that are more active on Twitter are not talking to themselves in isolation, but do it to connect to others and larger conversations, fulfilling social connection needs (Han, Min & Lee, 2015). Politically active users on Twitter have also been shown to express a political identity in their tweets (Conover et al., 2011). In knowing that larger conversations tend to be homogenous, we surmise that active users of Twitter are more active in homophilous information environments. Therefore, the sheer desire to be active in political conversations on Twitter may drive users to engage with more partisan media.

In this study we investigate the propensity to engage in election-related talk on Twitter as a determent factor of the agenda-setting effect. That is, we suspect that the more users participate in election-related talk, the more likely they are to discuss the same issues mentioned by more partisan media. If this is the case, relative issue saliences for these partisan media should more closely correlate to those who more actively talk about the election on Twitter.

H1: When compared to a) Twitter users who exhibit low levels of election-related talk, the agenda-setting effect of *left-leaning media* will be greater for b) moderate-level users and strongest for c) high-level users.

H2: When compared to a) Twitter users who exhibit low levels of election-related talk, the agenda-setting effect of *right-leaning media* will be greater for b) moderate-level users and strongest for c) high-level users.

Method

To explore the relationship between election-related activity levels, partisanship, and agenda setting on Twitter, we leverage a large data set of tweets from the 2012 U.S. general election. We utilize computer-assisted content analysis to identify media types and then issues. Time-series analyses are then used to examine how behavior on Twitter predicts the extent to which media set the agenda of users.

Data Capture: The Twitter API

Twitter actively discourages the unpaid direct solicitation of users. Accounts that attempt to contact large number of users are banned. However the open-access API (or Application Programming Interface) allows the collection of observed behaviors. So while choices and motivations cannot be calculated via traditional survey methods, measures can be inferred from the actual behavior of Twitter users. We argue that these behaviors offer a chance to examine a different form of public opinion. In our data set of over 1 million Twitter users, each user has left markers of behavioral residue vis-à-vis their tweets.

Instead of the traditional multi-database approach used for agenda-setting studies, Twitter data enables us to perform a content analysis that measures both the media(s) agenda and a public agenda. Thirty-eight million public tweets were captured from August 1 to November 28, 2012—three weeks after the Election Day in the United States, November 6. These micro-blog posts were retrieved from public Twitter accounts via the Twitter streaming API, which allows for keyword search queries (Twitter, 2013). Specifically, tweets that included a candidate's name were retrieved. Except during periods of high traffic, such as debates and on Election Day, the API retrieved an exhaustive amount of tweets. In all, the data here is the work of 1,048,575 Twitter users.

Media selection: left-leaning, right-leaning and center media

The specific media choices for this study closely follow those from the 40-year agenda-setting anniversary study in 2008 (Shaw & Weaver, 2014). While Shaw and Weaver labeled traditional newspapers and television networks as either "horizontal" or "vertical," here we were interested in partisanship exclusively. Vargo et al. (2014) took the media studied by Shaw and Weaver in 2008 (2014) and identified the corresponding Twitter accounts as they existed during the 2012 election. From those we manually identified the media by partisan affiliation. As such, two coders sorted the newspapers, talk shows, and cable news networks into three groups: center, left-leaning, and right-leaning. If a researcher was unsure if a media was leaning in either direction, the researcher consulted the media's Wikipedia page to see if any assertions to partisanship were made. Given the apparent nature of the media, the two coders had perfect agreement.

Once media were sorted into the three groups, tweets from each group were fetched. This was done my pulling any tweets that originated from accounts owned by the media or directly associated with it (i.e., professional accounts from journalists). In all, 54 newspapers and broadcast news networks were chosen to represent the centered media issue agenda.[1] The left-leaning media data was constructed from MSNBC, its television shows, and the reporters it listed on its official Twitter page. In addition, the official Twitter accounts from the leading seven Democratic talk shows were added. A total of 65 different sources were chosen to represent left-leaning media.[2] For the right-leaning media, FoxNews, its shows, and all of the reporters listed on its Twitter page were chosen, and the leading seven Republican talk shows and their Twitter accounts were also added. In all, 49 different sources were chosen to represent right-leaning media.[3]

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[1] Center media Twitter usernames: CBS, USATODAY, Denverpost, Newsday, Sfchronicle, CCTimes, WSJ, Detnews, Njdotcom, SFGate, HoustonChron, Ajc, DispatchAlerts, nydailynews, starledger, Oregonian, Azcentral, Freep, Nytimes, startelegram, PBS, baltimoresun, GlobeMetro, Ocregister, Stltoday, PhillyDailyNews, chicagotribune, Guardiannews, orlandosentinel, TelegraphNews, PhillyInquirer, Cincienquirer, Insidebayarea, PilotNews, TheBuffaloNews, PlainDealer, clevelanddotcom, Latimes, PioneerPress, theobserver, StarTribune, CNN, Mercnews, PittsburghPG, Usweekly, Suntimes, courierjournal, MiamiHerald, sacbee_news, Washingtonpost, TB_Times, dallasnews, Nbc, Seattletimes.

[2] Left-leaning media Twitter usernames: maracamp, AlexWitt, CackalackyJD, mitchellreports, CaseySez, craigmelvin, MHarrisPerry, TheLastWord, mikescotto, nick_ramsey, morningmika, VeronicaDLCruz, stevebenen, JoshuaChaffee, Melissa_Ryerson, maddow, TheRevAl, MaddowGuestList, cesinnyc, joytamika, WillieGeist, Toure, MaddowAux, giff18, edshow, Lawrence, secupp, MaddowApp, NowWithAlex, msnbc, hardball_chris, PoliticsNation, MaddowBlog, RichardLui, TheDailyShow, chrislhayes, leanforward, Hardballvideo, JansingCo, andersoncooper, JoeNBC, msnbcvideo, Hardball, dailyrundown, AC360, chucktodd, MHPshow, SteveKornacki MorningMusiQ, piersmorgan, ThomasARoberts, upwithchris, thecyclemsnbc, BillKarins, KeithOlbermann, tamronhall, digimuller, BashirLive, Morning_Joe, WeGotEd, alexwagner, negannyc, newsnation, cgodburn, ProducerGuy1.

[3] Right-leaning media Twitter usernames: FoxNews, NickKalmanFN, Kilmeade, janicedeanfox, Jennafnc, TeamCavuto, JudgeJeanine, ClaytonMorris, AlanColmes, foxandfriends, SpecialReport, jonathanserrie, RickLeventhal, ShannonBream, foxnewspolitics, kirstenpowers10, edhenryTV, adamhousley, drmannyonFOX, Limbaugh, ShiraBushFNC, kimguilfoyle, HARRISFAULKNER, gretawire, oreillyfactor, OliverNorthFNC, caseystegall, marthamaccallum, megynkelly, IngrahamAngle, HeatherChilders, RickFolbaum, GeraldoRivera, BretBaier, glennbeck, ChrisLaibleFN, lauraingle, Andylevy, seanhannity, DaveRamsey, NicoleBuschFN, MikeEmanuelFox, Greggutfeld, Sdoocy, FaithManganFN, JoyLinFN, MollyLineNews, JonScottFNC, BillHemmer.

Issue Selection

The top issues were derived using term-frequency lists from the entire Twitter corpus. Words appearing the most often were sorted into issue construct lists. Keywords were identified through a qualitative assessment of a random sample of media and public tweets. Two researchers then examined all words that occurred more than 1,000 times. In all, 144 unique words specific to the issues arose. Those words were placed into issue constructs. Each tweet was then queried using a python script that used exact, windowed matching. If an exact word from a Tweet matched a word in an issue construct, it was annotated as mentioning that issue. The matching issue constructs were modified and improved using a random, stratified, and representative sample of tweets for each issue construct. Three iterative rounds were performed. The computer-assisted content analysis was then compared to the results of a manual content analysis of the same tweets. The computer-assisted search results agreed with human content analysis 91 percent of the time with no query scoring below 82 percent. The keyword lists were then verified as representative constructs for those issues during the 2012 election.

The most salient issues from the election were chosen. This was done to ensure the time series data had enough data points to establish relationships. The most popular constructs were: economy, foreign policy, individual liberties, federal programs, immigration, education, environment and big government. Note that this study only chose ongoing issues and events. Ongoing issues differ from temporal events in time series analysis of issue salience.

Activity Groups

To establish election-related activity counts for each user, the total number of tweets retrieved for each non-media user was tallied. Groupings were then created with regards to the distribution of number of messages received across all users. We aimed to create groups that expressed the different levels of activity, while ensuring that each grouping had enough of a proportion of the entire population to allow an Auto Regressive Integrated Moving Average (ARIMA) analysis. The first group, *low frequency* users, contains users who tweeted about the election up to 16 times in the election season – one tweet a week. In all, low frequency users accounted for 45.7% of the total (N= 479,575). Moderate frequency users were defined at those who tweeted between 17 and 130 times – up to once a day. Moderate frequency users accounted for 48.8% of users (N= 511,562). High frequency users were defined at those who sent more than 131 tweets. This group accounts for 5.5% of the users (n=57,438). It is important to acknowledge that users who did not Tweet about the election were not included in this dataset. Reports indicate that 40% of Twitter users never tweet but simply read, and the average user tweet twice per day (Bennett, 2013). As such these findings only pertain to those who engage in some political talk on Twitter.

Daily issue counts by groups

In all, six groups of two different types of Twitter data were created. Three groups were established for media (left-leaning, center, and right-leaning). Three groups were also established for users by election-related activity level (low, moderate, and high). Each group consisted of a list of username ids. These ids were unique, but anonymous. For each group, issue counts were generated by day using the established 2012 election issue construct lists mentioned earlier. The result was a time series that depicted the issue salience for each day of analysis. The data was then entered into the SPSS statistics package for ARIMA analysis.

ARIMA analysis

We used ARIMA to address the time series data, which we chose over Ordinary Least Squares (OLS) regression mainly due to ARIMA's ability to forecast time-series data. Ongoing political issues (such as the economy) are usually more episodic. As such, fitting a single line usually does not capture the rise and fall of agendas over time. In a multiple regression model, the variable of interest is forecasted using a linear combination of predictors. In an autoregression (AR) model, the variable of interest is forecasted using a linear combination of past values of multiple variables. By incorporating the moving average (MA) model, past errors (a.k.a. shocks) are entered into the model as explanatory variables, controlling for normal variation in tweets. In this analysis, the dependent variable is used as evidence against itself. In addition media salience was entered to explore what additional explanatory power it could offer. In this way we control for past values and error terms of public salience while addressing the unique explanatory power offered by media salience.

Results

RQ1a asks how the issue agenda of Twitter users is related to the issue agenda of the left-leaning media. Our ARIMA analysis indicates that left-leaning media are associated with Twitter users agendas for several, but not all, issues. As Table 1 shows, the left-leaning media alone was associated with public tweets about education ($R^2 = .476$, $p < .001$) and immigration ($R^2 = .660$, $p < .001$), and combined with the center media to explain public tweets about the environment ($R^2 = .700$, $p < .001$) and federal programs ($R^2 = .472$, $p < .001$). That is, across the time and data examined here, the sole predictor of Twitter users' salience of education and immigration was the left-leaning media. The results suggest that the left-leaning media owned issues traditionally associated with the Democratic Party. **RQ1b** aimed to examine the relationship between the right-leaning media and public issues associated with the Republican

Party. Right-leaning media exclusively owned individual liberties ($R^2 = .683$, $p < .001$) and joined with center media to own big government ($R^2 = .485$, $p < .001$), the economy ($R^2 = .614$, $p < .001$), and foreign policy ($R^2 = .699$, $p < .001$). The findings suggest, across the electoral time period data examined here, that the right-leaning media alone predicted Twitter users' prioritization of individual liberties.

Insert Table 1 about here

As seen in Table 1, all issue agendas of the entire corpus of Twitter users examined here can be predicted by at least one media type on Twitter. Strong agenda-setting relationships exist between media and users on the social networking site. Center media solely defines no single issue. In fact, only three issues, education, immigration, and individual liberties, are most aligned with a single media type. Left-leaning media alone predicted education and immigration, and right-leaning media is solely associated with individual liberties. Beyond that, Twitter users appear to be melding the issue agendas of various media types to build their issue agendas.

H1 and **H2** suggested that compared to a) low frequency users, the predictive power of the agenda-setting relationship will be greater for b) moderate frequency users and best for c) high frequency users across left-leaning media, right-leaning media, and center media types.

Insert Table 2 about here

As seen in Table 2, the center media displayed the most explanatory power for all types of users, predicting four issues for low and moderate frequency users and six issues for high frequency users. Correlations (presented in Table 3), show that low frequency users had weaker correlations with all media types (left-leaning media, $r = .344$, $p < .01$; center media, $r = .407$, $p < .01$; right-leaning media, $r = .279$, $p < .01$) than did moderately active users (left-leaning media, $r = .498$, $p < .01$; center media, $r = .552$, $p < .01$; right-leaning media, $r = .404$, $p < .01$), who had lower correlations still than highly active users of Twitter (left-leaning media, $r = .689$, $p < .01$; center media, $r = .663$, $p < .01$; right-leaning media, $r = .575$, $p < .01$).

In short, support is given to **H1** and **H2**. The more active Twitter users are, the greater the association with left- and right-leaning media types. Across all analyses, the strongest correlation observed is between high frequency users and left-leaning media. Right-leaning media has less of agenda-setting effect, but increased at all levels of user activity. The agenda-setting relationship between Twitter users and the media grows stronger the more users tweet about the election. Additionally, high frequency users' issue agendas were more likely to be explained by all media types.

Both low and moderate frequency tweeters were most strongly correlated with the center media, followed by the left-leaning media. At the high end of the frequency spectrum, partisan media broke past centered media, displaying the strongest correlation with left-leaning media.

Insert Table 3 about here

The final ARIMA models showed relatively similar scales in the time series data (AR = 1 or 2). This means that saliences of issues were relatively dependent on the issue saliences from the day prior, or two days prior. In all cases, the integrated (I) parameter was 0, which suggests that the time series did not need to be differenced and was stationary. This also means the issue saliences observed did not show trends or seasonality. Finally, the majority of moving averages (MA) were either one or zero. A moving-average order of 1 specifies that error terms from the last (1) time period were considered when predicting current values of the series. Additionally, in all 32 ARIMA models run here, the Ljung-Box Q statistic was not significant ($p < .10$), from which we can conclude that the ARIMA models used eliminated autocorrelation among residuals. In all, the public issue saliences appeared to most often correlate with data from the previous day. This suggests that the agenda-setting effect takes no longer than 24-hours to materialize on Twitter.

Discussion

The findings here stem from a large data set containing tweets about the 2012 U.S. presidential election. Computational social science methods allowed a chance to listen to a portion of the public conversation about politics.

When Considering All Twitter Users as a Whole

First, our findings suggest that the media are able to set the agenda for users on Twitter. Overall, center media, or mainstream media, were the strongest predictor for Twitter users as a whole. But mainstream media alone were not alone in their role as agenda setters. The left-leaning and right-leaning media exerted considerable influence over users. For several issues, Twitter user agendas were tied to multiple media types. The customizing affordances of social media sites allow users to curate a media environment where they can minimize dissonance.

In this study, our findings suggest that partisan media are able to more closely set the agenda of all Twitter users for issues they relate to ideologically (Budge & Farlie, 1983; Petrocik, 1996; Petrocik, Benoit & Hansen, 2003). For example, our ARIMA analysis of all Twitter users shows that right-leaning media was the only predictor for individual liberties, while the left-leaning media predicted Twitter user's agendas for education and immigration. And while the center media were paired with either the right-leaning or left-leaning media to explain the public's agenda for the remaining five issues, the mainstream media alone explained no single issue. This confirms what other studies have found: the Twitterverse is a particularly partisan space.

Considering Twitter Users By Levels of Activity

When Twitter users were split into groups based on levels of activity, the pattern that emerges differs significantly from Twitter users in the aggregate. The strongest agenda-setting relationship in the data set is found between the most frequent users of Twitter and the left-leaning media. Right-leaning media had the lowest correlation, with center media falling in the middle. This suggests that the agendas of more active users of Twitter are not only partisan, but also more liberal.

The more people participate in election-related talk on Twitter, the higher the correlation they display with media agendas, especially those of partisan media. One might expect the center media to have the widest reach and thus the largest influence, but our findings suggest that active users of Twitter may be participating in more homophilous information environments.

The Partisan Nature of Twitter News Agendas

We uncover several markers of the partisan news agenda of both Twitter as a whole and of its users: highly active users exhibit stronger correlations to partisan news agendas, and the issues themselves appear to be controlled by the partisan media traditionally associated with those issues. This large-scale empirical test of agenda setting further explicates how media effects play out with various media types and different segments of audiences. In short, our findings suggest that for social media, media effects vary by *how often* people engage (e.g., here post). This finding is analogous to many other media effect studies (see for example Scheufele & Tewksbury, 2007).

Future research should assess exactly how partisan the actors on Twitter are and examine how that correlates with frequency of use on Twitter. Only then will we be able to tell if the Twitter users examined here are engaging in selective approach (Garrett & Stroud, 2014). Political sentiments influence one's media exposure patterns (Stroud, 2011), but what remains to be explored is whether they also influence frequency of use on social media sites (like Twitter). And, do those in turn predict the strength of the agenda-setting relationship between partisan or center media? With the foundation this article has laid, future research can address these questions.

We hope future research will investigate other observed behaviors on social media, and how those behaviors alter media-related effects. For instance, any number of behaviors, such as whom a user follows, or the civility in which a user discusses issues, could alter the agenda-setting correlation with certain media types. Further studies could seek to validate this finding on other social media platforms where content is public, but the nature of interaction is fundamentally different, such as Reddit or Facebook group pages.

In taking up the case of Twitter, which holds a special place in the U.S. electoral context, more research is needed to explain exactly *how* the relationships that we identify here manifest. In particular, some of the behaviors unique to Twitter, like retweets, may in fact be the mechanism(s) by which media agendas transfer to the public. Twitter data also allow us to examine whom users follow – in particular, future research should examine the extent to which the media accounts users follow relate to their particular issue agenda. In sum, an examination of the *ways* in which the public and the press interact on Twitter offers the possibility of illuminating the nature of political communication and agenda building on the site.

Limitations

The manner in which newspapers seem to be using Twitter appears to be similar to the way they implement Really Simple Syndication (RSS), which was created to help readers stay up to date with new content that is uploaded to websites. With that said, there appears to be some type of selectivity and special consideration as to what stories appear on an online newspaper's Twitter feed. While this study did not build in the resources to empirically track the different types of articles that were included, coders noticed that newspaper articles included opinion articles as well as blogs that included reader feedback. These types of articles do not appear in more traditional newspaper article databases such as LexisNexis. Because readers now have the option to receive articles via Twitter, it is conceivable to think that readers who access this micro-blog version of the news may be receiving a different blend or frame of news when compared to readers who read that same newspaper's traditional online or print form. Further studies might compare agendas of traditional media versus their socially promoted stories.

This paper was unable to solidly assert causation because it was unable to substantiate the time-order relationship between media and public agendas. This limitation occurred due to the time frame of the analysis being by day. While some ARIMA models suggested that public salience was explained by the previous day's agenda, other models assumed a zero-day lag. Further studies might adopt an alternative measure of public salience with timestamps smaller than one day. "Zooming in" on the data may better show when exactly public opinion shifts, or responds to mainstream news coverage.

Despite these shortcomings, this study lays a much-needed foundation for future research on political communication and Twitter, a key social networking site where U.S. media elites and the public comingle. Our work examines data from 2012. With the 2016 election nearing, we encourage other scholars to replicate this work. Agenda setting studies rarely are longitudinal. As the social media landscape continues to evolve, these findings may too. An extension of this work across time can help us better understand agenda-setting effects within social media, and also the role of Twitter in electoral politics.

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Tables and Figures

Table 1 - Predictors of issue agendas from ARIMA analysis of ungrouped Twitter users

Model ID	**Predictor**	**R^2**	**t**	**Model type[4]**
big govt.	center media	.485	4.145***	(1,0,0)
	right media		2.457***	
economy	center media	.614	6.012***	(0,0,1)
	right media		4.642***	
education	left media	.476	2.658***	(0,0,1)
environment	center media	.700	6.246***	(1,0,0)
	left media		5.096***	
fed. programs	center media	.472	4.261***	(0,0,0)
	left media		3.732***	
foreign policy	right media	.699	2.785***	(0,0,1)
	center media		4.084***	
immigration	left media	.660	5.134***	(1,0,0)
indv. liberties	right media	.683	6.070***	(1,0,1)

* p. < .05 ** p < .005 *** p <.001

Table 2 – Number of issues predicted* from ARIMA analysis by frequency groups

	left media	center media	right media	**total**
low frequency	4	4	3	11
mod. frequency	3	4	2	9
high frequency	6	6	5	17
total	13	14	10	37

*All totals reported in Table 2 are statistically significant at the p < .05 or above. For more detail on the strength of these relationships and ARIMA models, see Appendix A

[4] More detail about the model types can be found in the Results section, page 11.

Table 3 - Bivariate correlations* of frequency of use and media type

	low frequency	**mod. frequency**	**high frequency**
left media	.344	.498	.689
center media	.407	.552	.663
right media	.279	.404	.575

*All values are significant at p < .01 level (two-tailed).

Appendix A – ARIMA analysis from Twitter users grouped by frequency

Model ID	**Predictor**	**R2**	**t**	**Model type**
HF x big govt.	CM x big govt.	.697	3.526***	(1,0,0)
MF x big govt.	CM x big govt.	-1.463	4.331***	(1,0,14)
LF x big govt.	CM x big govt. RM x big govt.	.566	7.608*** 2.348*	(0,0,8)
HF x economy	LM x economy CM x economy RM x economy	.632	2.789* 5.517*** 3.980***	(0,0,1)
MF x economy	CM x economy RM x economy	.545	4.325*** 2.983**	(0,0,1)
LF x economy	LM x economy RM x economy	.502	-2.218* 4.041***	(1,0,0)
HF x education	LM x education RM x education	.548	6.668*** 5.339***	(1,0,0)
MF x education	N/A	.465		(1,0,0)
LF x education	N/A	.472		(1,0,0)
HF x environ.	LM x environ. CM x environ.	.669	3.795*** 2.548*	(1,0,2)
MF x environ.	CM x environ.	.551	4.379***	(1,0,0)
LF x environ.	LM x environ. CM x environ.	.575	2.527* 4.416***	(1,0,0)
HF x fed. prog.	LM x fed. prog. CM x fed. prog. RM x fed. prog.	.681	4.986*** 3.239** 4.918***	(0,0,2)
MF x fed. prog.	LM x fed. prog. CM x fed. prog.	.323	2.444** 4.065***	(1,0,0)
LF x fed. prog.	CM x fed.	.189	3.405***	(1,0,0)

	prog.			
HF x for. policy	CM x for. policy RM x for. policy	.770	5.642*** -2.940**	(0,1,1)
MF x for. policy	LM x for. policy CM x for. policy	.641	3.780*** -6.166***	(1,0,0)
LF x for. policy	LM x for. policy CM x for. policy	.537	6.017*** -5.080***	(1,0,0)
HF x immgrtn	LM x immgrtn CM x immgrtn	.736	5.543*** 5.846***	(1,0,0)
MF X immgrtn	LM x immgrtn	.626	16.165***	(1,0,0)
LF x immgrtn	LM x immgrtn	.354	4.299***	(1,0,0)
HF x indv. lib.	LM x indv. lib. RM x indv. lib.	.857	6.659*** 4.769***	(0,0,2)
MF x indv. lib.	RM x indv. lib	.672	4.397***	(1,0,0)
LF x indv. lib.	RM x indv. lib	.651	3.380***	(1,0,0)

* p. < .05 ** p < .005 *** p <.001