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News and Information Leadership in the Digital Age

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Abstract

This paper examines information networks on social media to draw conclusions about influence relationships among members of the mass media. The project considers social networks and information patterns using Twitter data, first at the newspaper level and second at the journalist level. Using a computational approach, we look for evidence of elite-directed information flows, as well as exploring whether we find evidence of an increase in the democratization of newsmaking. This study finds that elite voices continue to dominate information networks in the digital age; however, it also finds evidence that information can move expeditiously from journalists in local and regional outlets to elite ones, and vice versa. We move further to explore the content of tweets among the journalist network, finding that there are substantial, direct interactions among elite and regional and local journalists. Our results taken together uncover new network patterns and provide novel insight on the role of information technologies in newsmaking in the digital age.

Keywords: information leadership, journalism, newsmaking, social media, imitation journalism, computational methods

News and Information Leadership in the Digital Age

Scholars have argued that certain news outlets and journalists can act as information leaders for others. According to this perspective, journalists borrow from other media sources, and assessments of newsworthiness are driven in part by the behavior of journalists at leading institutions. That is, when members of elite presses such as *The New York Times* or *The Wall Street Journal* publish news and information about an event or issue, other journalists perceive the story to be important. In this framework, journalists are attuned to the gatekeeping behaviors of their colleagues at established news outlets, and they use their peers' assessments routinely as a guide for their own gatekeeping choices. What constitutes the news across an ecosystem is in part driven by publication choices made at prestigious outlets.

An alternative perspective made possible in the digital age points to the role information technologies in opening pathways for the access and dissemination of new information, suggesting the possibility of a less hierarchical structure in newsmaking. The abundance of information available through new media and the convenience of obtaining it means that journalists at all levels can be exposed to a diverse news environment and, moreover, contribute to it. Because members of the mass media are active users of social media, and because social media users can follow the news feeds of anyone of interest, journalists can access information flows that they themselves can utilize to further propagate information. Accordingly, journalists at both elite and non-elite outlets can draw from a variety of perspectives, and the news can reflect greater diversity. Thus we could expect to see less dominance of elite voices in the digital age and a greater democratization of the news.

This study points to the virtues of social media for assessing these questions about news leadership and influence. To investigate the extent to which elite outlets and journalists dominate in the digital age or whether we see a greater democratization in the news, we turn to an analysis of social media data. Here we examine the social networks among media outlets and journalists, and we explore the flows of information across journalists. Using datasets compiled manually of thousands of media outlets and journalists on Twitter, we analyze the social network properties of two networks, one at the newspaper level, and one at the journalist level. To do this, we harvest the follower-followee relationships from two compiled Twitter networks — one of daily newspapers in the United States, and one of journalists in the state of New York, and we subsequently examine measures of centrality that offer an empirical assessment of who occupies the most prominent positions within our networks. For the journalist network, we move further to study the information that is disseminated across entities. We look closely at what information is tweeted (shared), and the degree to which information flows from elites to lesser known journalists, and vice versa. Our results show that while journalists have access to more information than ever before, elites continue to play an important leadership role in the digital age. However, we do find a high degree of connectivity among journalists across outlets both large and small, thus offering a channel for information to travel expediently from one journalist to another. In fact when looking at this channel and investigating the content of the tweets, we find that there is significant evidence of journalists in national, regional, and local outlets communicating with one another and discussing issues and events. Our results shed new light on information leadership and journalism in the digital age.

Studying Opinion Leadership Offline and Online

There are many factors at play when a journalist decides whether an event or issue is newsworthy. Broadly, decisions about newsworthiness can reflect the competing pressures of providing social responsible, quality information that is useful for readers in their day to day lives, and the desire to attract an audience as a means of satisfying advertisers and profitability (see Graber, 2009 and Hamilton, 2004 for a review; for an overview of newsmaking more generally, see Boydston, 2013). As media budgets have been cut drastically in the past decades and digital requirements demand quicker publication cycles, journalists may be even more inclined to rely on the information that originated from sources beyond themselves, including their peers in the profession. Newsgathering is expensive, and evidence has shown that journalists often look to wire services or to other news outlets in their gatekeeping decisions (Graber & Holyk, 2011). One common information shortcut that journalists and news outlets take is to follow the lead of elite outlets (Protest & McCombs, 1991). Doing so provides assurance that the issue or event is newsworthy since it has already been vetted at prestigious organizations. And moreover, it mitigates the initial costs of producing a new report, as the journalist can build on the foundations provided by the elite outlet. Indeed Boczkowski (2010) shows that newsrooms can and do rely on imitation, repurposing news from other journalists to publish.

This pattern of elite-driven agenda setting has been confirmed in numerous situations across diverse types of news content and mediums. A number of these studies have pointed to the influence of *The New York Times* in particular, finding that *NYT*'s stories affected other outlet's coverage of similar topics, including, for example, cocaine coverage in the 1980s (Danielian & Reese, 1989), breast cancer (Corbett & Mori, 1999), and international news (Golan,

2006). The pattern of elite influence has also been demonstrated across medium types. For instance, Hall Jamieson and Capella (2008) find that leading conservative voices such as Rush Limbaugh and *The Wall Street Journal* editorial page influence other conservative media. Although some evidence suggests that newspapers may be losing their agenda setting monopoly across the media market (Meraz, 2009; Meraz, 2011), it remains the case that content from legacy media is that which is most likely to be retweeted (Barthel, Moon, & Mari 2015; Russell et al. 2014), hold influence over both broadcast news (Vliegenthart & Walgrave, 2008) and wire services (Lim, 2006), and matter for campaign blogs (Meraz, 2009; Meraz, 2011).

The implication of this top-down perspective---particularly where high-profile national and international affairs are concerned-- is that coverage of issues and major events will be comparable across news outlets, from local newspapers and television stations to nationally distributed ones (Ryfe, 2006). As journalists borrow from wire services and elite outlets, audiences are exposed to similar reporting on issues and events. In an examination of social media, blogs, and traditional media coverage of 29 key issues, Neuman, Guggenheim, Jang, and Bae (2014) found that issue frames tended to be used similarly across mediums. Scholars have also documented that journalists move quickly to cover the news that competitors are reporting as a phenomena conceptualized as “feeding frenzies” (Sabato, 1991) and “media storms” (Boydston, Hardy, & Walgrave, 2014---although there is less evidence of cohesion on non-salient issues: Layton Atkinson, Lovett, & Baumgartner, 2014; Vliegenthart, & Walgrave, 2008; Soroka, 2002; Boydston, 2013).

In contrast to this top-down approach, the Internet may enable a more democratic and less elite-focused form of news influence that perpetuates multiple agendas rather than enforcing

one elite news agenda. In this model, citizens and journalists at less well-known institutions have greater opportunities to influence the news, and thus the news reflects a greater diversity of voices and perspectives. Digital media make it possible for elite and non-elite voices to offer information that readily reaches others, thus opening the door to a less hierarchical gatekeeping process. This notion is captured by Tewksbury and Rittenberg (2012), who suggest that one normatively positive outcome of the changes brought about by the Internet on newsmaking is that there can be "...an evolving *democratization* [emphasis added] of the creation, dissemination, and consumption of news and information" (p. 197). Less established contributors are given voice and offer new perspectives or cover a diverging set of events, thereby precipitating a wider and richer news agenda. However, for information democratization to occur, there must be networks of communication providing a platform for information to travel from journalist to journalist. Scholars must find evidence that such networks exist and that information is exchanged across them.

The Utility of Social Media for Journalists and Scholars

Social media provide a valuable conduit to assess these long-standing questions related elite dominance and news democratization. Information technologies permit members of the mass media to connect with one another and to find new information in a manner that would have been unthinkable even one decade before. This is particularly true on Twitter, where many journalists are present and where information is publicized to a mass audience, meaning nearly all information is readily accessible, and in real time.

Particularly in an era when media outlets face considerable financial constraints and pressures to cut costs (Compaine & Gomery, 2000; Hamilton, 2004; Graber, 2009), Twitter can

be a valuable and expedient tool for newsmaking (Parmelee & Bichard, 2012; Canter, 2015). Scholars have shown the technology's capacity for finding ideas for news (Willnat & Weaver, 2014), sources and quotes (Broersma & Graham, 2013), and disseminating news (Lasorsa, Lewis, & Holton, 2012). Survey evidence from Willnat and Weaver (2014) demonstrates that a significant number of journalists use Twitter, and more than half (53.8%) do so regularly. Importantly and consistent with the argument here, journalists use Twitter for the purposes of "checking for breaking news" (78.1%) and "checking for what other news organizations do" (73.1%). No other purpose was listed higher than these among journalists in the author's survey. Indeed very recent work shows considerable interconnectivity among media actors on social media, and that media organizations on Twitter can play an important agenda setting role (That journalists follow news organizations and their peers on Twitter is also consistent with a larger body of work on social networks. This research finds that decisions to associate with one another (i.e. follow each other on Twitter) are guided by shared values and interests, a principle known as *homophily* (McPherson, Smith-Lovin, & Cook, 2001; Kossinets, 2006; Bollen et al., 2011). Thus, examining Twitter networks gives us the opportunity to draw conclusions about who journalists consider to be valuable sources of information.

Characterizing the network properties of journalists on Twitter offers new leverage in understanding the extent to which elites dominate the news. In following someone on Twitter, a user creates an actual channel along which information can travel. The list of accounts followed on Twitter represents those whom a given user believes are important. For journalists, as noted above, examining breaking news and checking what other news organizations are doing are important reasons for following others. Journalists, then, may have a unidirectional (I follow her)

or bidirectional relationship (we follow one another) with peers. Elite dominance of the news would suggest that there remain many unidirectional relationships, with elites being followed by lesser known and established individuals, and a lack of reciprocal relationships. A more democratic model would suggest many bidirectional, reciprocal relationships among media members. Using social media network analyses, we provide a visual and quantifiable map of the nature of these relationships among news media outlets and journalists.

Once a network exists, information can travel across it. On Twitter these messages take the form of original tweets (short messages of 140 characters or less) or retweets (in effect, forwarding an existing tweet)---both of which can include mentions of others users and/or hashtags to identify relevant topics within the tweet. Hence scholars can use networks of media members to understand not only who follows whom, but what messages are communicated, and by whom, and topics and issues in these tweets. Therefore we can look to see the extent to which tweets that originate with elites dominate the network, or whether we find evidence that tweets originating from regional and local journalists play an important role. In this paper, we rely upon networks of media outlets and journalists, and the information shared within network of journalists, to answer the following research questions:

Research Question 1 (RQ1): What patterns of networking and information sharing can be observed among news organizations and individual journalists?

Research Question 2 (RQ2): Do the observed patterns mimic or defy conventional understandings of information influence?

Method and Data

Procedure

We consider two legacy media ecosystems in our assessment of information influence, one at the outlet level, and a second at the journalist level. Our study examines first on the

follower-followee network of all daily newspapers in the US, and second, on all newspaper journalists in the state of New York. Our first data collection and analysis at the outlet level draws conclusions about the types of networking behavior news organizations practice, and what communities they form over this medium. We then examine behavior among individual journalists working in the geographically bounded area of New York state. We focus on New York because it is home to an elite publishing hub in New York City and also houses an abundance of more regional and local news outlets. Because we wanted to capture any reciprocity that exists in these networks, our network explicitly excludes any links that exist between journalists in New York and journalists in other locales. The choice of the two networks was also driven by several additional concerns. First, missing data can pose problems for social network analyses. The results of social network analysis are especially sensitive to the data collected and utilized, and missing data can affect how researchers perceive the roles of actors within a network (Scott, 2012), here one of our central tasks. Thus we turned to networks where we can compile complete or near complete data. Second, harvesting follower-followee relationships can be computationally expensive, and so we chose networks where the task was feasible and manageable. Nonetheless, we still examine several thousand individual entities (*nodes*, in the social network parlance) who can have up to millions of followers, and with entities linked by hundreds of thousands of connections (*edges*). Moreover, we analyze the content of a large body of tweets distributed within the network, nearly 900,000, over several months of time.

Our networks testify the extent to which media outlets and journalists are connected to one another, and what positions individuals occupy within the news ecosystem. They allow,

then, for inferences to be drawn about the relationship among elites and regional and local outlets and journalists. To construct the networks, we begin with manual data collection of media outlets and journalists, and their respective Twitter accounts. For our first network, we collected the daily newspapers in the United States. We defined *dailies* as those publishing five or more editions per week. We relied on the 2008 volume of *Editor & Publisher International Yearbook*, corresponding to data for the first full year Twitter was in existence (2007) and thus giving us the widest possible range of daily newspapers represented on Twitter. The source *E&P* represents a compendium of information on print media principally for the use of advertisers, which includes the listing of newspaper names, circulation sizes, distribution areas, and the number of publications per week, for example. From *E&P*, we identified 1365 daily newspapers. Armed with this list, we then captured the Twitter handle for as many outlets as possible through a combination of newspaper website listings of their Twitter handles and from our own detailed Twitter searches, locating a total of 1148 accounts in the autumn of 2013. We then accessed the Twitter programming interface (API) to harvest the followee-follower network among newspapers. Again this is a non-trivial task given that some newspapers such as the *New York Times* and *Wall Street Journal* have millions of followers that need to be processed to determine which of these followers represent other newspapers. If each newspaper followed one another---evidence of true democratization in information flows---the size of the matrix would be 1148 x 1148, or over 1.3 million connections.

For our second network, we collected data on New York journalists in a similar time intensive manner. Using staff listings on each of the newspaper websites in the state, we gathered the names of all journalists involved in newsmaking in some capacity, be they publishers,

editors, staff writers, and/or reporters. (We excluded those who worked in marketing and advertising.) We were able to locate 3817 journalist in the state from these manual searches over several months in the spring of 2015. We subsequently located the Twitter handles and networks of 2849 journalists among 3817 total staff members listed (74.6%). Twitter handles were often posted directly in reporter bios on websites, and we searched for the remaining journalists on Twitter to identify as many as possible. We verified the status of each account by first looking for an occupational reference in the Twitter bio and then looking for tweets of newspaper content. We again used the Twitter API to harvest follower and followee data for each of these journalists.

Locating data for additional or a more exhaustive set of newsmakers (e.g., those working for television news stations, or bloggers, or citizen journalists) cannot be easily accomplished, at least in such a way as to ensure both the validity and reliability of the data. Related, it could be argued that for the first network of newspapers, researchers might focus on the editor(s) or the publisher of daily newspapers rather than the newspaper accounts; however, identifying editors and publishers is not a straightforward task. Many larger outlets employ numerous editors, while some local presses may even consolidate the task of editor and publisher into one person. And again, if social network analyses are conducted on incomplete or inaccurate data, then one can raise concerns about inferences regarding information leadership. Concerning feasibility, while it may be beneficial to expand the dataset beyond legacy media to other forms, both the computational demands increase considerably, as do contractual limitations on the data one can draw from Twitter programming interface (the Twitter API) at any one time.

We first turn to social network analyses for both of these networks, presented in the next section. We visualized and analyzed the resulting networks using a network visualization and computation software, Gephi. Our principle focus is on measures of centrality, which capture the role of any one entity (node) in the system, be it a newspaper outlet or a journalist. Those nodes that score highest on measures of centrality occupy important places within the network. They may be the most followed, for example, or be critical in linking or bridging one set of actors to another. If we find evidence that the central actors are dominated by elite outlets or elite journalists, then we can conclude that elite voices continue to play an important leadership role in the information age. We also examined the connections and the network density to determine how expediently information can travel from one entity to another, which also provides insight on information democratization. If we see dense networks with short paths, we can conclude that there are more opportunities for a diverse set of voices to reach newsmakers at all levels.

To assess information flows, we collected the tweets shared across our second network over the summer of 2015. We captured the dynamics between elites and regional and local journalists by dividing the dataset among those working for the two most prestigious institutions, *The New York Times* and *The Wall Street Journal*, and those working for all other newspapers. To provide some context, 61.9% of those in our network worked for our two elite outlets---and 38.2% for all others newspapers. We then harvested all tweets from these journalists from the period of May 20 to August 19. Together we located 497,140 tweets from elite journalists, and 401,315 from non-elites, for a total of 898,455 tweets. After standard big data pre-processing techniques such as removing stop words and lemmatizing, we examined the content of our nearly

900,000 Tweets. Here we looked for the use of shared hashtags across elites and non-elites reporters, documenting the relative frequencies of usage of the hashtags, and also examined who retweeted or mentioned whom over the course of the period, and the topics and issues raised in these tweets. Our analysis thus makes it possible to determine the degree to which journalists speak to one another and the extent to which information moves across the network, and also importantly, what kind of information. Thus the analysis offers additional insight on whether journalists draw from a variety of perspectives in newsmaking or whether elite views dominate the network.

Results

Information Influencers

Figures 1 and 2 present visualizations of our two social networks, the first of U.S. newspaper outlets (Figure 1) and the second of New York journalists (Figure 2). In both figures, nodes are labeled by the Twitter handle or an abbreviation of the handle to aid visualization (e.g. “nytimes” corresponds to *The New York Times*; *Sulli* corresponds to the handle *Sullivanview*, Margaret Sullivan). The size of the node and label indicates the number of edges (connections to other nodes) and thus the more connections among that node. The location of any given node in two-dimensional geometric space is not critical--rather than number of edges and their direction is of greatest interest, and it signifies importance in the network. Those nodes that have many edges coming in denotes greater numbers of followers on Twitter, or in the parlance of social network analysis, higher in-degree centrality. Also of interest are the broader network properties, such as its density and path length between nodes. Denser networks suggest greater information

democratization, as many media outlets or journalists are connected with one another. Related, shorter path lengths---conceptually similar to the popular idea of degrees of separation---allow for information to flow readily from one node to another, meaning information can travel expeditiously across a network.

[Insert Figure 1 here.]

Turning first to the network of newspapers in the United States, presented in Figure 1, it is apparent from an analysis of network indegree (number of followers/edges flowing in) that the newspapers most followed by other newspapers are the “usual suspects” — *The New York Times* (348 followers), the *Washington Post* (233 followers), *USA Today* (166 followers), and the *Los Angeles Times* (113 followers). These four newspapers are the ones often characterized as “elite media” in mass communication. No other newspaper has more than 100 followers. In fact, 829 newspapers (78%) are followed by fewer than 10 other newspapers. An outdegree analysis (who a given node follows/edges flowing out) shows a similar distribution: Only 281 newspapers follow 10 or more other newspapers, leaving 74 percent of the sample following fewer than 10 of their peers. 553 newspapers follow more accounts than follow them, while 428 are followed by more accounts than they follow. For a closer look at connection patterns, we examined the distribution of in-degree centrality for the whole network; which is shown in Table 1.

[Insert Table 1 here.]

As noted above, most newspapers follow very few other outlets. In fact, 185 (16.4%) do not follow any others. This included a range of small circulation newspapers—some relatively inactive on Twitter—to newspapers with millions of Twitter followers, such as *The New York Times*. At the time our analysis was conducted, the *NYT* followed only those journalists who

wrote for the newspaper. In contrast among national presses, the *Washington Post* followed 23 other outlets, including high circulating newspapers such as the *NYT*, *WSJ*, and *USA Today*, major regional papers such as the *Atlanta Journal-Constitution* and the *Chicago Tribune*, and also local newspapers including the *Milwaukee Journal Sentinel*, the *Roanoke Times*, and the *Toledo Blade*. Overall, using a measure of “who has the most followers,” the four classic elite newspapers dominate the network. However, this domination is by no means universal; the *New York Times* is followed by just less than one-third of the sample, the *Washington Post* and *Wall Street Journal* are followed by less than one-quarter of the sample, and *USA Today* and *Los Angeles Times* are followed by between 10 and 15 percent of the sample. Thus network density is low at .01, and average path length is 4.3---denoting a network where information is not readily shared from one node to another.

We next turn our attention to the analysis of our second network, the New York state newspaper journalists. In Figure 2, one quickly notices the increased network density, in fact four times as large as Network 1 at .04. Here there are a total of 166,542 connections (edges) among NY journalists. In one sense this is a high degree of connectivity, but one should also keep in mind that if every journalist followed every other and there was perfect reciprocity, this value would be 8,116,801. The average degree centrality (measuring all edges flowing in and out across the network) for Figure 2 data is 116.9, representing a high number of followers for each node on average, although there is considerable variance around the mean.

One also sees here that, similar to Figure 1, elite journalists occupy a prominent role in the network. They have the highest in-degree centrality, with Twitter handles for *carr2n* (David Carr, *NYT*—1085 followers, 37.9% of the network), *NickKristof* (Nicholas Kristof, *NYT*---774

followers), and *Sulli* (Margaret Sullivan, *NYT*---703 followers) prominent. From this vantage, again we find evidence of a more top-down perspective. The most followed and influential journalists in the network are immediately recognizable as media elites. However, the average path length for Figure 2 is 2.6. This latter result is especially telling, as it demonstrates that information can diffuse rapidly from one journalist to another. In this sense, there is an increased possibility for information dissemination across all channels in the digital age, permitting greater voice to lesser known members of the news media, and greater democratization of the news.

[Insert Figure 2 here.]

Information Influence Among Journalists: Exploring the Content of Tweets

We now explore the nature of the information that travels across the network of journalists from New York as another means of assessing information influence. Here we ask to what extent information is being passed from elite to non-elite journalists, and vice-versa. As aforementioned, we defined the elite journalists to be those from the *New York Times* and the *Wall Street Journal*, with all other journalists comprising our set of lesser known voices. Our figures present the behavior of elite journalists in black or dark gray, and journalists at regional and local presses (labeled *Others*) in white or light gray.

We turn first to an examination of the hashtags used by elite and others, presented in Figure 3, representing shared issue coverage. Here we present the 50 most frequently used hashtags among the nearly 900,000 tweets collected, and the number of journalists using that particular hashtag in both networks. For example, if 50 local and regional journalists used the hashtag *#mets* in discussions about the professional baseball team, but only 10 elites used it, then

the white bar would be at 50, and the black, at 10. The figure is arranged from the most common hashtags among elite journalists at the top, to the least common among elites at the bottom.

[Insert Figure 3 here.]

As one can see, there are a number of instances of shared hashtag usage among these journalists. Perhaps as the first observation, it should be noted that the hashtags all generally surround issues and events that pertain to the news, but they vary from entertainment to sports to hard news. For example, we see a number of regional and local journalists using the hashtag *#bills*, corresponding to the professional football team in Buffalo, NY, but less frequent usage of this hashtag from elite journalists; alternatively, we see a number of elite journalists using *#china* and less from the others. In general we can identify a pattern that elite voices were more commonly using hashtags corresponding to international affairs (e.g. *#syria*, *#china*, *#irandean*), and non-elites for items of more state and local interest (e.g. *#nyprisonbreak*, *#syracuse*, *#518 baseball*). There is clearly some specialization in the content of information being transmitted, and such specialization can provide insight for local journalists covering national affairs, and for elite journalists covering local issues of importance to their readers. The figure provides evidence that Tweets reflect substantive news and information, and that the use of shared hashtags permits the likelihood of exchange of information, particularly considering that these journalists are embedded in a dense network, as shown above.

However, a significant test of whether we see evidence of information democratization is whether journalists rely on specific content from others, and whether they acknowledge other journalists in their own tweets. Thus we again mined the 898,455 tweets for retweets and

mentions across journalists at both elite and regional and local outlets. Figure 4 provides a weekly breakdown of retweets and mentions from the same period of analysis.

[Insert Figure 4 here.]

This figure offers especially valuable insight on the democratization of the news. Again we find some evidence for elite dominance, as it is more typical for other journalists to retweet or mention elite journalists than vice versa. However, one can see that there remains considerable instances when elite journalists *converse with and acknowledge* the information disseminated by their peers at less prestigious outlets. Looking at the entirety of the data—that is, summarizing across weeks displayed in the figure—we find 945 instances of the elite journalists retweeting non-elites, and 1844 total mentions of others. We find that journalists rely considerably on one another for information, and exchange information with one another readily. The fact that both elites and non-elites mention and retweet one another, and that they are using similar and dissimilar hashtags, offers evidence of information democratization in the digital age.

Conclusion

This research applied data collected from a new information technology and journalistic tool, Twitter, to a long-standing question about information leadership and influence among the mass media. We have shown that, while organizational networks are still weighted toward the elite U.S. newspapers and journalists, there is considerable evidence of a high degree of connectivity and information sharing, particularly in our second network. We have seen that information can move readily across our network of journalists---that the network is dense, and that the average path length connecting one journalist to another in New York is low. Moreover, we found substantial evidence of shared hashtag usage, along with specialization of regional and

local journalists versus their elite peers, which can prove helpful for elites when covering the local and regional news. Lastly, we explored the retweet and mention behavior, showing that journalists do rely on one another and exchange information with one another, both elites and those at regional and local outlets. Taken together, this study provides an important step forward in understanding the connectivity and influence among journalists on social media, and newsmaking in the digital age more generally.

Of course work remains. First, scholars can explore questions of elite influence in a comparative context. It is quite possible that the relationships and networks of journalists look different under different media systems, where journalists face different pressures and constraints in newsmaking. Thanks to the abundance of journalists using Twitter internationally, and the public domain nature of Twitter content, scholars have access to an important platform for exploration. Second, rather than beginning with a list of journalists and locating their Twitter handles, scholars may be able to build a list of media entities more organically, perhaps by using information in users' Twitter profiles—whether a given user describes herself as a journalist, reporter, editor, or the like. Third, it may be possible to probe the content of Tweets more deeply than either the retweets or mentions analysis here provided, perhaps by applying topic models to understand shared discussions among journalists in an ecosystem. There is a body of work in computer science investigating the topics communicated in tweets, and these models may be employed subsequently in Communications and the social sciences. These limitations aside, this analysis has provided new insight on information leadership and intermedia agenda setting vis-à-vis a computational approach, and it serves as a useful foundation for future explorations of leadership and communication in the digital age.

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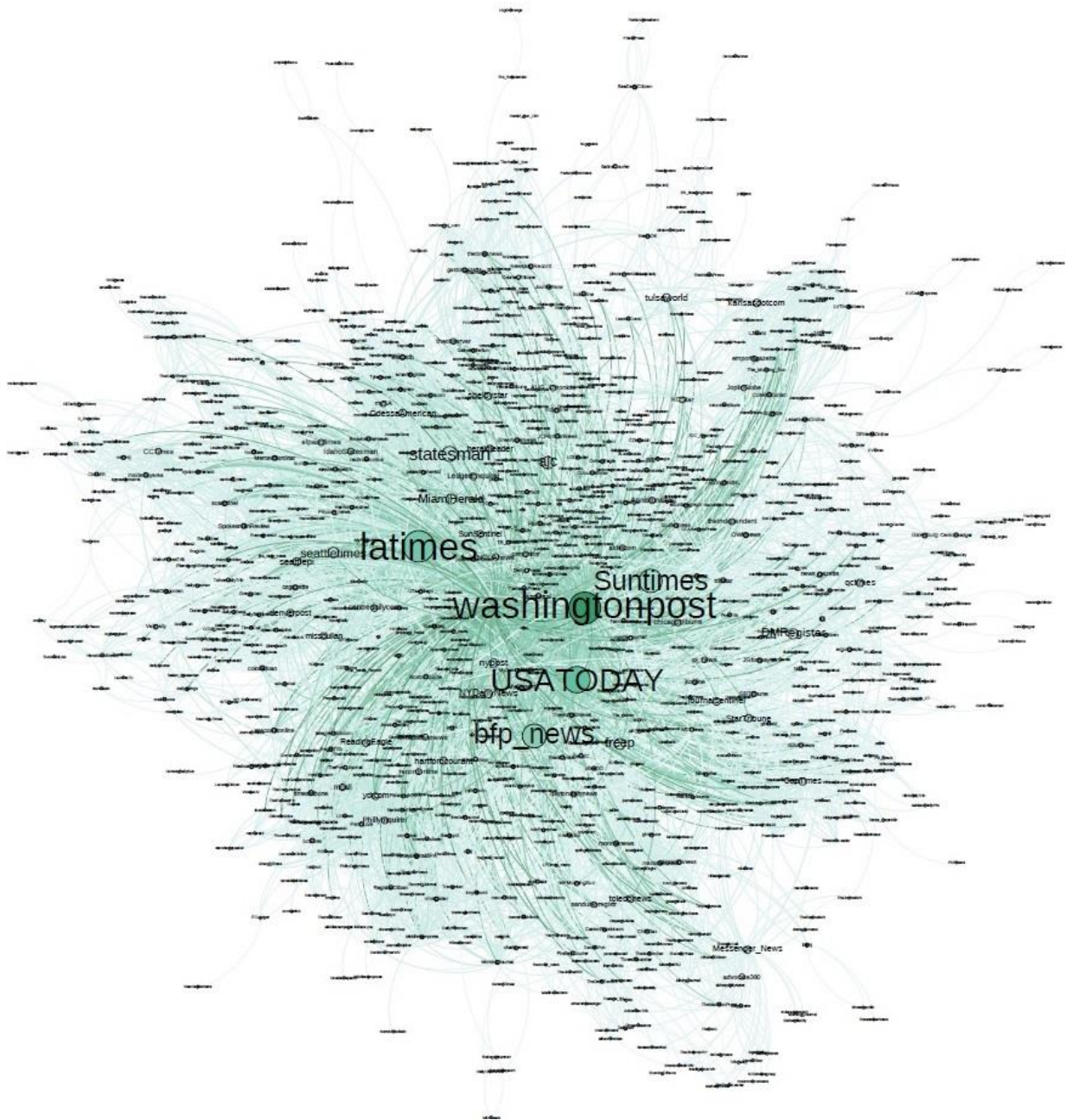


Figure 1. The social network of US newspapers on Twitter. Here we observe the dominance of elite newspaper outlets, who are the most followed, and thus have the highest in-degree centrality.

Number of Followers	Number of Newspapers (Percent)
0	185 (16.1)
1	154 (13.4)
2	123 (10.7)
3	79 (6.9)
4	86 (7.5)
5	92 (8.0)
6	58 (5.1)
7	56 (4.9)
8	55 (4.8)
9	50 (4.4)
10	35 (3.0)
11	28 (2.4)
12	27 (2.4)
13	18 (1.6)
14	15 (1.3)
15-20	35 (3.0)
20-30	35 (3.0)
30-50	10 (0.9)
50-100	2 (0.2)
100-150	1 (0.1)
150-200	1 (0.1)
200+	3 (0.3)

Table 1. The In-Degree Centrality Distribution of US newspapers on Twitter. We see that the vast majority of newspapers have less than 20 follows from other outlets.

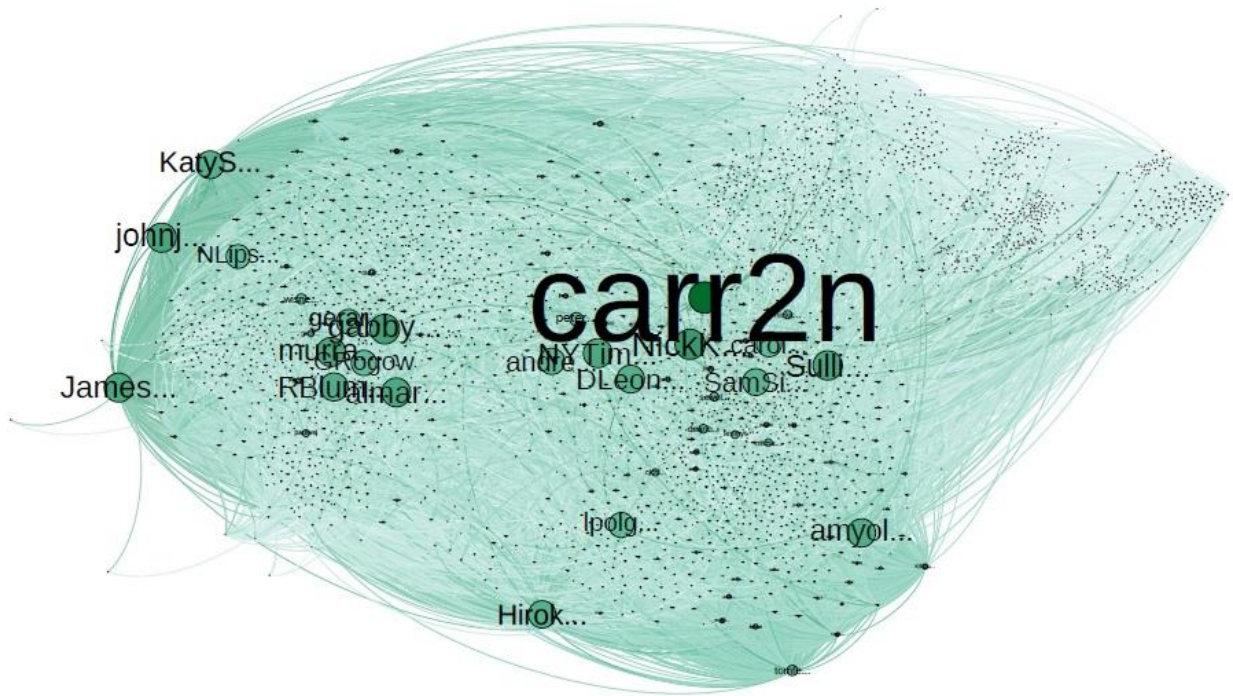


Figure 2. The social network of New York state newspaper journalists. Here we can observe the dominance of elite journalists. These are among the most followed, and thus have the highest in-degree centrality. We also observe a dense network with short path lengths suggesting information can flow readily across channels.

The Top 50 Hashtags and the Number of Elite and Other Journalists Involved, May to August 2015.

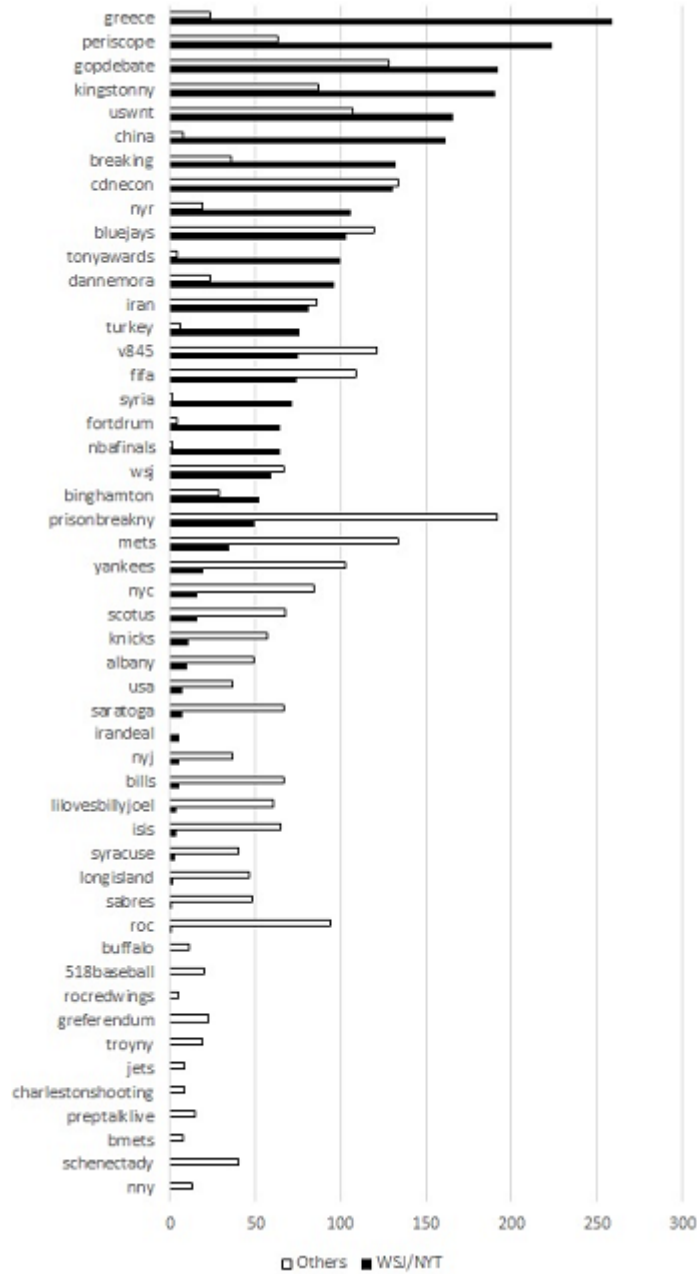


Figure 3. The Top 50 Hashtags used from May 2015 to August 2015 used by the number of elite and regional and local New York journalists. We see evidence of both common topics of discussion and of specialization

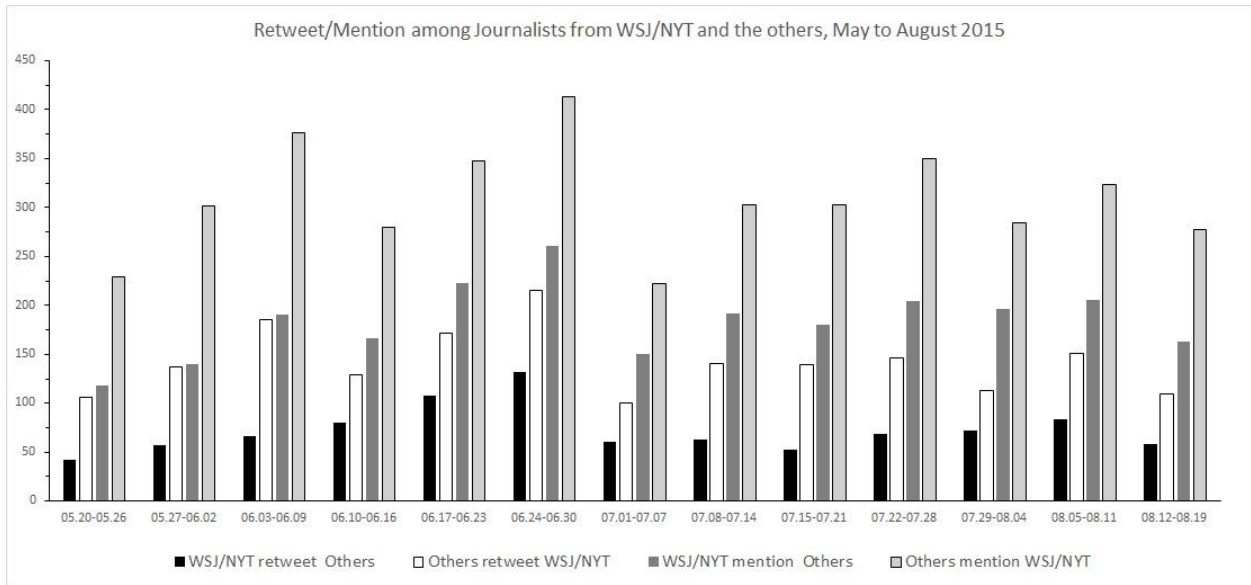


Figure 4. Retweet and mention behavior among elite and non-elite journalists in New York, May 2015 to August 2015. We find that although elites are tweeted and mentioned more often, we do see substantial evidence of tweets and mentions of regional and local journalists by elite journalists.