Party Networks on Twitter: Ideological Extremism
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Abstract
Twitter is now a communication tool used by 89 percent of Congress. Early research found that Twitter adoption by members of Congress was, in part, due to encouragement from party leaders (Lassen, Brown, and Riding, 2010). Similarly, researchers have found that the content of tweets is strongly related to party affiliation (Ammann 2010). Using research on party networks as a guide (Koger, Masket, and Noel 2009, 2010), this paper examines the extent to which members of Congress establish visible partisan networks on Twitter. Do members of Congress follow members of their own party? Analysis reveals distinct networks dependent on ideological extremism, suggesting that members may only be comfortable in revealing their networks if they are strongly committed to the party line.
Introduction

While in office, congressmen spend the majority of their time trying to secure their next term in office. David Mayhew’s (1974) seminal study of Congress established that members of Congress are single-minded seekers of re-election. As part of their strategy of getting re-elected, congressmen partake in several strategies including advertising their achievements, taking public positions on issues, and claiming credit on projects (Mayhew, 1974). In a world with stark technological advances in the last forty years, the ways congressmen partake in these three activities have drastically changed. Congressmen are less reliant on face-to-face contact and media organizations to reach their constituencies, and have begun to turn to new media to communicate with the public. Journalists’ have documented the manner in which Congress uses new technologies to communicate directly with their constituents (Lohr, 2010; Steinhauer, 2011; Stelter, 2008). Without a doubt, the manner in which congressmen communicate with the mass public is quickly changing.

A great deal of this technological innovation has occurred with social networking sites (SNS). The majority of congressmen use social networking sites such as Twitter, Facebook, and YouTube to communicate directly with their constituents. Twitter, a microblogging service launched in 2006, now has over 350 million users. Behind Facebook, Twitter is considered the most popular social networking site in the world. Congressmen have primarily adapted Twitter’s 140-character messages to directly communicate with the people in their districts. While most congressmen use the site, the social impact of Twitter on politics is not very well understood.
Within the literature, scholars are generally optimistic about the ability of social networking sites to increase political participation (Cho et al., 2009, Mossberger, Tolbert, and McNeal, 2008, Shah et al., 2005, Xenos and Moy, 2007). Social networking sites, like Twitter, have the ability to motivate individuals to engage in the political process. However, Twitter also has another component unique from its engagement of the masses. Twitter has a network structure in which users choose to subscribe to other users’ Twitter feeds. These network structures are public and have the ability to inform our thinking about how politicians engage with other individuals online.

This study engages the congressional network structure on Twitter. Congress is undoubtedly a network of co-operating actors; politicians in Congress work together in order to pass legislation. This study investigates the Twitter connections amongst congressmen in the 112th Congress. Using network analysis, this study identifies and describes the structure of relationships on Twitter. Patterns of relationships based on party identification emerge. In addition, active members on the social networking site, tend to be the central structural actors within the network.

Congress and Party Networks

In general, politics can be described as an inherently social activity. The very definition of politics—conflict over the leadership, structure, and policies in government—infers that individuals are continually interacting with others. In making a decision to take action or to participate in politics, the people, places, and time surrounding an individual can be critical to the decision’s outcome. Network research has highlighted the importance of personal contacts in political decision-making.
Social networks are understood to be a set of social ties, sometimes called dyads, between individual actors (Wasserman and Faust, 1994). Actors can refer to individuals, corporations, or collective groups. Social ties can be defined in any number of ways, but the social tie establishes some sort of connection between two or more actors. A dyad refers to the relationship between two actors that establishes that social tie. Network analysis examines the interactions between more than two people and models these interactions through ties and dyads.

Network analysis has recently been applied to research on political parties and legislative politics. Early research suggested that parties contained formal network structures (Domínguez and Bernstein 2003, Monroe, 2001). For example, in the Illinois state legislature, Republican elites organize in a structure made up of formal leadership (Schwartz, 1990). The most recent research suggests that networks may not be completely based on leadership structures. Instead, politicians, interest groups, and media organizations form informal networks in order to share and exchange information (Koger, Maskel, and Noel, 2009). These informational networks are also based on partisan identification. However, these two arguments disagree on the idea that networks in Congress are based on the formal leadership positions held within the party. These new arguments have the ability to change our conceptualization of how political parties work in Congress.

 Formal leadership structures in Congress are based on leadership and committee membership. This type of formal organization is consistent with the political party’s attempt to gain and maintain power in Congress (Aldrich and Rohde, 1997; Downs, 1957; Schelsinger, 1966; Schattsneider, 1942). Technological innovation has begun to
change how scholars think of political party organization. Congressmen are no longer tightly bound by the restrictions of formal leadership within the party (Aldrich, 1995; Koger, Maskel, and Noel, 2009). These changes have caused congressmen to think differently in how they approach their constituencies. Party leaders have even encouraged members to adopt new forms of communication to directly communicate with constituents (Lassen, Brown, and Riding, 2010). Power is becoming decentralized in light of new ways to communicate with constituents, interest groups, and the media.

This new approach of how politicians communicate revitalizes the existing theory of political parties in the United States. Political parties can be defined as networks of politicians, who share the same political affiliation, but also are tied together through social relationships. In this party network approach, the defining characteristic of a connection is communication (Koger, Maskel, and Noel, 2009). The communication and interaction in these networks has the ability to illuminate the extent to which political parties have changed in light of the recent technological innovation of the last forty years.

**Social Networking & Twitter**

As of 2011, Twitter has over 300 million users who generate over 300 million messages or “tweets”. Additionally, the service handles over 1.6 billion search queries per day (Your World, More Connected). Twitter began in 2006 after a podcasting company decided to set up an online-based short message service (SMS). The service allows users to set up individual accounts, where they can send and read text-based posts of 140 characters or less. These text-based posts have become known as “tweets”.


The social networking aspect of Twitter comes into effect when users are allowed to “follow” other users. When logging onto the Twitter home page, users are shown a “feed” of other user’s tweets. The feed is selective; only those users that one chooses to follow will appear in this feed. Thus, Twitter sets up information streams between users. Information is exchanged based on the users who follow other users tweets, setting up an interactive online network.

Twitter has quickly risen in popularity since it began in 2006. In 2007, the site registered 400,000 tweets every three months. In March 2011, there were about 140 million tweets posted daily (Numbers). Twitter has been noted for its ability to impact and influence political events. Activists have used Twitter to support the Occupy Movements, the Iranian election protests, the Egyptian revolution, and the Tunisian protests (Zuckerman, 2011). Without a doubt, a simple short message service has the ability to influence political events around the world.

In general, social networking sites have changed the way in which individuals and politicians communicate with each other. Discussion on the Internet has the ability to affect engagement with the political sphere (McLeod, Scheufele, and Moy, 1999; Hardy and Scheufele, 2005, Shah et al., 2005). This type of technological innovation has brought about what one scholar refers to as “networked individualism.” In this view of the world, individuals are more likely to share information through collaborative networked groups (Wellman 2001). The propensity of the Internet to affect individuals’ political engagement is well documented (Bimber, Flanagin, and Stoll 2005; Gil de Zuniga and Valenzuela 2011; Shah et al. 2005); however, the Internet has also changed the manner in which politicians engage in politics as well.
Although at a rate slower than the general public, Congress slowly integrates and utilizes technological innovations in their campaigns and day-to-day operations. Since the 1980s, Congress has hired professional staff to manage their communication operations (Cook, 1990). And with the advent of Internet technologies, congressmen have the ability to directly generate personal messages and disseminate them directly to a wide audience (Flowers, Haynes, and Crespin, 2003, Steger, Kelly, and Wrighton, 2006). Members of Congress have used new media as a strategy to generate their own media coverage and messages (Lipinski and Neddenriep, 2004). Twitter is a social media tool that congressmen have adopted in hopes of directly communicating their agendas and achievements.

In political science, the topic of Twitter has yet to gain traction in scholarly publications. Scholars have struggled to find meaningful relevance of the social media tool to institutions, public opinion, and even behavior. Although the effect of Twitter on political events like the Egyptian Revolution or the Occupy Movements is apparent, Twitter is a new medium. There is no consensus about how to approach and measure this medium to estimate its effects on politics. Nonetheless, these previous studies are instructive and dictate how researchers should approach investigating Twitter in the context of the US Congress.

Only a handful of studies have looked at the use and effects of congressional Twitter usage in the past few years. Socioeconomic and demographic characteristics are unable to predict congressional Twitter adoption and usage (Chi and Yang, 2010). However, senators are more likely to hold a Twitter account than House members (Lassen, Brown, and Riding, 2010). The first systematic examination of congressional
tweets found that members of Congress are using Twitter to post about daily activities (Golbeck, Grimes, and Rogers, 2010). These postings vary by the amount of resources a candidate possesses, the size of the state in which the congressmen resides, and the competitiveness of a congressmen’s district (Ammann, 2010). Nonetheless, even while adoption is widespread, Twitter does not directly affect public opinion polls (Hong and Nadler 2011). However, Twitter usage does increase once a candidate performs exceptionally well in a previous election (Williams and Gulati, 2010). In sum, while the majority of Congress has Twitter accounts and utilizes them to post messages, its adoption is not an absolute requirement to achieve success.

Beyond the use of Twitter as a social networking site and its effect on voters, these studies obscure the fact that Twitter is a network. Congressmen are connected to constituents, politicians, advocacy groups, and media organizations via the site’s “follow” feature. In addition to the plethora of tweets that are made on congressional accounts, Twitter can be analyzed for the relationships amongst members who follow each other. These relationships form information-exchange networks, which can be further understood using social network analysis.

**Social Network Analysis**

Social network analysis has been used to investigate other types of networks in Congress. For example, social networks based on the co-sponsorship of bills have the ability to illuminate why bills get passed in the first place. From 1973 to 2004, one study constructed network dyads based on co-sponsorship of bills, finding that Congress is a microcosm of real world relationships (Cho and Fowler, 2010). Much of the success is
Congress in inherent not only to the characteristics of Congress itself, but also to the social relationships that form within the legislative body (Cho and Fowler, 2010, p.130). This paper uses social network analysis to investigate another type of networked relationship, the connections and information flows between congressmen on Twitter.

Social network analysis can summarize the information flow between all congressmen that are found on Twitter. Social network analysis models the relationships between individuals in dyads. A dyad represents a relationship between two individuals in the network. For a Twitter network, a dyad exists when one member of Congress follows another on Twitter. Information readily flows in a dyad, where one member informs another through the relevant form of communication. In this instance, information flows across dyads through the content found in tweets.

For a membership of 535 congressmen, these dyads are represented in a network graph. A network graph is a series of dots and lines. Each dot represents an individual congressman and a line represents each relationship. These dots are also referred to as “nodes” and lines are referred to as “ties”. Information flows between two congressmen when a tie exists between two nodes. A tie is merely a visual representation of a dyad.

Previous research suggests that congressmen adopt Twitter accounts at the suggestion of party leadership (Amman, 2010; Lassen, Brown, and Riding, 2010). This sets into motion an expectation that political party membership will influence congressional followings. This study investigates network structures and conducts a centrality analysis to assess whether or not political parties are a structural feature of congressional Twitter networks. Ultimately, this study finds that congressmen mostly “follow” members of their own political party. Network maps show that dense networks
of members form, but they are mostly dictated by political party affiliation and membership in the respective legislative body. In addition, centrality analysis reveals that the central actors in the network are leaders of the political party. This research has the ability to illuminate the manner in which congressmen

*Methodology*

This study collects data from congressional Twitter pages in the months of January to February 2012. Every single member from the 112th Congress is included in the study. However, not every member of Congress has an active Twitter account. In total, there are 535 members in both houses, but as of February 2012, there are only 484 active public Twitter accounts (91% of Congress). A small number of members use multiple Twitter accounts, all of which are included in this study’s sample.

In so far as summarizing Twitter adoption, we see stark patterns between each body and political party. Confirming earlier studies, the Senate has a higher adoption rate (92%) than the House (86%). Republicans also have a much higher adoption rate (92%) than Democrats (81%). These results are not surprising, as they only confirm earlier findings.

To compose this dataset, a mathematical matrix is used. Each one of the 484 members who have a Twitter account represents an individual case within the matrix. Members are matched within this matrix if they follow another member’s account. Thus, the matrix accounts for which members of Congress are following other members of Congress. The matrix for this network has 234,256 observations, each indicating whether

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1 There is no active listing of Twitter accounts on the Internet. Membership of Congress changes every two years and no source actively updates these lists. Therefore, this list readily changes.
or not a member follows another member. In addition to the matrix, information on the party identification, state, and legislative membership of each member is recorded in an accompanying dataset.

The data used in this study is available on each congressman’s individual Twitter page. In addition to the messages that people send out on the service, Twitter lists the people that the user follows, and the people following the user. Thus, the information for the matrix was easily cultivated from the public lists on these congressmen’s Twitter pages. Part of the problem in undertaking a study like this is the fact that the amount of data required to complete the dataset is near impossible to record by hand. Programming languages do much of the heavy lifting when it comes to cultivating data from Twitter.

Results

Network Maps

The first part of the results deals with network maps drawn from Twitter data. These maps are descriptive and allow us to view these networks from a vantage point that otherwise could not be possible. Each network map contains nearly a quarter of million different observations. Thus, the visualization of these observations is impressive and has the ability to communicate a wealth of information in just one figure. These figures are listed beginning on Page 13.

The analysis begins with Figure 1. Figure 1 shows the Twitter data from the existence matrix. Figure 1 looks at existing information flows based on who follows whom on Twitter. A blue node represents each congressional Twitter account. In addition, a unique ID number is assigned to each individual node. This ID number is
based on an alphabetically ordered list, thus the numbering is arbitrary. If at any time, one member followed another, the network graph represents this with a tie.

Figure 1 shows how information flows amongst the 535 members of Congress on Twitter. The layout of Figure 1 is based on the spring-embedding algorithm. The spring-embedding algorithm considers the strength of the ties surrounding every single node and runs iterations to find layouts where those nodes with the smallest paths will be grouped together. Immediately, it is evident that two groups of nodes form, one on the lower left of the figure, the other on the upper right. Unfortunately, because of its complexity, the network graph in Figure 1 does not illustrate much beyond the fact that there may be two groups of congressmen separated by some unknown attribute.

The two groups crystallize in Figure 2 when the political parties of Congress are taken into account. Figure 2 is identical to Figure 1, with the exception that the nodes are now colored based on political party identification. Blue nodes represent membership in the Democratic Party, red nodes represent membership in the Republican Party, and green nodes represent membership in the Independent Party. In Figure 2, we see clear differentiation between these two groups, with party lines clearly being drawn.

The interpretation of Figure 2 is relatively straightforward. Figure 2 demonstrates that Democrats are following other Democrats, while Republicans are following other Republicans. The two Independents with Twitter accounts look and act like Democrats. Both Joe Lieberman and Bernie Sanders caucus with the Democrats and are treated like Democrats for purposes of committee assignments. Thus, it is not surprising that the two green nodes are embedded within the Democratic Party.
Figure 1. Random spring-embedded layout of congressional Twitter network.
Figure 2. Congressional Twitter network based on political party identification.
Figure 3. Congressional Twitter network based on membership in legislative bodies.
Figure 2 confirms that politicians on Twitter form networks based on political ideology. Some congressmen undoubtedly follow members of the opposing party, and this is why there are a multitude of ties crossing the two groups. However, for the most part, the network structure is based on a clear identification based on ideological lines. The networks that congressmen form on Twitter seem to be a case of ideological extremes.

Figure 3 is almost an exact replication of Figure 2. However, Figure 3 shows how membership in each legislative body also distinguishes two separate groups of congressmen. The placement of the nodes is identical to Figure 2. However, yellow nodes indicate membership in the House, while green nodes indicate membership in the Senate.

Figure 3 reveals an instance where we find no cases of a congressman being embedded within the other legislative body. Senators are likely to follow other senators. House members are likely to follow other House members. Ideological differences still apply; we still see two distinct networks based on political party membership. However, the differentiation between the House and Senate groups is not as strong. There are many more ties between the House and Senate groups, whereas there are fewer when compared to the Democratic and Republican groups.

In sum, these three figures demonstrate that congressional Twitter accounts definitely follow a pattern. This pattern is based on two types of characteristics: political party and House/Senate membership. The network maps confirm that amongst the near quarter of a million connections between members of Congress, that the majority of these connections are dictated by political party identification and membership in the House or Senate.
**Centrality Analysis**

Centrality analysis delves deeper into the network. Centrality analysis performs calculations of network positions, to communicate which actors are the most central to the interpersonal dynamics of the group. There are multiple measures of centrality. Those that are used within this study are: degree centrality, closeness centrality, and betweenness centrality. These measures, commonly used in social network analysis, are complimentary to each other and should not be seen as competing measures.

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<th>Ranking</th>
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Congressmen that appear in the Top 25:

Of all three measures: 22, 25, 60, 166, 173, 287, 354, 387

Of two measures: 110, 229, 233, 234, 286, 298, 384, 451
Table 1 lists the results from the three centrality tests conducted on the Twitter network. The table lists the Top 25 scorers, rank ordered, for these centrality tests. The entries corresponding to each of the rankings are the unique ID numbers assigned to each congressman. For example, for the first ranked position on degree centrality, ID number 451 corresponds to Senator John Boehner. Coincidentally, John Boehner is the Speaker of the House. The first ranked position on closeness centrality, ID number 21 corresponds to Representative Bruce Bailey. And the first ranked position on betweenness centrality, ID number 354 corresponds to Representative John Shimkus. In the analysis that follows, each measure of centrality is explained and interpreted for what it means to the network.

_Degree centrality:_ Degree centrality is the simplest measure. By definition, degree centrality is a count of the number of ties that are incident to a particular node. In this context, this is a count of the number of congressmen that each individual node actually follows on Twitter. Those who score in the “top 5” follow the most congressmen in the network. Thus, 451-John Boehner’s Speaker account (R-OH), 77-Eric Cantor’s Majority Leader account (R-VA), 107-John Boehner’s office account, 326-Paul Ryan (R-WI), and 68-Eric Cantor’s office account follow more congressmen than anyone else in the network.

These findings are expected. John Boehner and Eric Cantor, the Speaker and the House majority leader, have a responsibility to take command of their party. They attempt to follow many of the feeds of the other congressmen in their party. This also falls in line with Lassen, Brown, and Riding’s (2010) finding that the Republican Party leadership encouraged Twitter adoption. Paul Ryan is the chairman of the House Budget committee, and has been recognized as one of the most influential members of the
Republican Party (Klein, 2010). Thus, degree centrality confirms that Republicans have the most connections in the network and are actively utilizing the medium.

*Closeness centrality:* Closeness centrality refers to the distance between an individual to all individuals in the network. When the value of closeness centrality is low, this means that there are a small number of ties in which information flows from one individual to all other individuals in the group. If that distance increases, then the information has to cross many more ties, and the value of closeness centrality rises. Closeness centrality has the ability to determine the speed in which information can spread within the network.

In this context, closeness centrality measures how well-connected one congressman is to another in terms of who each congressman follows. Those congressmen who score in the “top 5” are connected with many more congressmen through short paths of ties. Thus, 21-Bruce Braley (D-IA), 298-Lou Barletta (R-PA), 166-Randy Forbes (R-VA), 354-John Shimkus (R-IL), and 60-Donald Manzullo (R-IL) are connected with many more congressmen through short paths of ties.

These congressmen are unique in that their position makes it likely that they will be receptive to information more readily than other congressmen. In a close examination in each of the Top 5, it becomes apparent that each of these congressmen follows a large percentage of other congressmen in their party. Thus, it makes sense that they are the most connected congressmen based through the short paths of ties.

*Betweenness centrality:* Betweenness centrality refers to the proportion of the geodesics of which an actor is involved as an intervening point. This measure is arrived at by
finding the number of shortest paths from one node to all other nodes that pass through that original node. As the value of the betweenness centrality for an individual increases, an individual is more likely to be a mediator of information in the network. These individuals with a higher value of betweenness centrality have a positional advantage in the network, meaning that other actors are more likely to depend on these individuals to conduct exchanges in the network.

In this context, betweenness centrality measures how one congressman can affect information flow across the entire network. These congressmen are at the center of information flow amongst the group based on whom they follow. Those actors who score in the “Top 5” of betweenness centrality are the most involved in the information flows between all other congressmen.

The top 5 include 354-John Shimkus (R-IL), 486-Steny Hoyer (D-MD), 166-Randy Forbes (R-VA), 451-John Boehner’s Speaker account (R-OH), and 234-John Garamendi (D-CA) are more likely to find themselves in between other pairs of congressmen or are more likely to mediate exchanges between congressmen. These congressmen can be seen as “hubs” in the network, where information is more likely to pass through these congressmen’s accounts.

Both the Speaker and Democratic whip are included in this analysis. This is expected; party leaders should be considered the hubs of the congressional network. Not surprisingly, Shimkus and Forbes, who scored high on closeness centrality, also scored high on this measure. John Garamendi is also similar to Shimkus and Forbes, as Garamendi also follows a large percentage of people within his party.
Finally, centrality analysis is also able to identify the congressmen who consistently score high on all three measures of centrality. These congressmen are ranked in the “Top 25” of all three measures. This means that these individuals follow the most amount of congressmen than anyone else in the network, have the highest average influence, and affects the most amount of other congressmen in the network.

The consistently highly ranked congressmen are 22-Buck McKeon (CA-R), 25-Cathy McMorris (WA-R), 60-Don Manzullo (IL-R), 166-Randy Forbes (VA-R), 173-Janice Hahn (CA-D), 287-Kenny Marchant (IL-R), 354-John Shimkus (IL-R), and 387-Robert Wittman (OH-R). In terms of their structural position in the network, these congressmen are influential. These congressmen have the ability to yield and learn information given the Twitter feeds that they subscribe to.

**Conclusion**

The preceding analysis demonstrates that congressional Twitter accounts have important structural features that have real-world constraints. Members of Congress have the ability to follow anybody on the service. However, congressmen choose to follow others in their own political party, and other congressmen in their respective legislative bodies. Network maps confirm that dense networks of party affiliation form in the Twitterverse, while a still dense, yet looser network of senators and House members also form.

This finding is somewhat counterintuitive to the research on political parties. Research has suggested parties are no longer overarching, controlling organizations; political parties mostly exist to serve individual politicians in their campaigns for office
(Aldrich 1995). Thus, political party networks should be seen as loose configurations of leadership and structured around other considerations (Koger, Masket, and Noel, 2011). Nonetheless, party leadership seems to be somewhat influential in how members of Congress decide whom to follow on Twitter. Yet, this finding is not absolute. The analysis demonstrates that Republican party leadership influences adoption of Twitter accounts and that Republicans are better and faster adopters of Twitter. But a few members regularly follow other congressmen from the opposing political party.

Nonetheless, even in its relation to the party literature, this analysis is extremely important. It demonstrates that social network analysis is a significant step ahead in furthering our understanding of how politicians use the Internet. Social networking sites are imperative in this new explosion of technological innovation. Twitter is definitely an unexplored medium, whose effects are still unknown. This research is only a small step in discovering the role of Twitter in the political world.

A significant amount of work remains to be done in this area. Politicians not only use Twitter, but they have adopted other social networking sites such as Facebook and YouTube to communicate with constituents. In addition, the Internet is being used to solve real world efficiency problems. Congress, politicians, and government are communicating in very different ways amongst each other because of the Internet. Rather than approach these technological developments with skepticism, it only benefits us to further investigate these mediums to find out their effects on the politics and behavior.
References


