

Twitter as Virtual Town Square: Citizen Engagement During a Nationally Televised Republican Primary Debate

Christopher Mascaro
Drexel University

Sean Goggins
Drexel University

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Abstract:

The Internet and social media create a geographically independent virtual town square (Kavanaugh, Perez-Quinones, Tedesco, & Sanders, 2010) that transforms citizen participation in political discourse. In our study, we examine over 185,420 publically available Twitter messages (hashtag #CNNDebate) during a Republican Primary Debate in November 2011, hosted by CNN and viewed by over 3.5 million individuals in the United States. Through analysis of how individuals use the syntactical features of Twitter such as @-mentions, @Reply's, hashtags, links and retweets we identify how civic discourse occurs at different phases of a televised debate. Understanding how individuals engage with each other in an open forum has broad implications for understanding social media's effect on civic engagement and information diffusion among elected officials, candidates and citizens. Our findings suggest that a significant number of the syntactical features specific to Twitter such as retweeting, @reply's and hashtags are utilized to relay information, engage in discourse and create new threads of discourse related to issues that are brought up during the debate.

Introduction

As more individuals use technology to acquire political information and participate in the political process, understanding the technological features that enable effective discourse and the networks of discourse that result becomes increasingly important (Lazer, 2011). Political discourse in the physical world is historically constrained by the geographic proximity of participants — people talk about politics, politicians and social issues with others whom they already know and who are geographically close (Bearman & Parigi, 2004; Huckfeldt & Sprague, 1987). New technology, such as social networking sites (SNS), facilitate discourse independent of geography and pre-existing relationships. In this new medium, citizens form ties with individuals they already know but are also able to engage with a diffuse, growing and geographically diverse group of people.

Political discourse is one of the most common forms of activity on social networking sites. In the 2010 United States Election, 73% of individuals used a social networking site, specifically Facebook or Twitter, to obtain political information, including news about candidates, information about political events and candidate policy stances (Rainie, 2011). Social networking sites are influencing relationships surrounding political matters. In a recent Pew study, 10% of users say they have blocked, un-friended or hidden another individual's comment as a result of the political content (Rainie & Smith, 2012). Similarly, 47% of users of SNS have hit the "like" button while 38% have responded with a positive comment to another individual's political comments on a SNS (Rainie & Smith, 2012).

One of the most recent developments in technologically mediated political discourse is the use of Twitter and other technology as a public commons (Baden & Noonan, 1998) where discourse about real time political events occurs. Electoral Debates provide a contextually focused laboratory for the examination of such discourse in the current political environment as they are widely covered and of significant interest to many. Political debates in the United States are helpful for citizens as they allow them to learn more about lesser-known candidates (Holbrook, 1999). Previous research on technologically mediated interactions around political debates illustrates how individuals have been able to submit questions for participants of a debate as opposed to being able to engage with each other in the context of the debate (Ricke, 2010). Examining real-time civil discourse related to debates on a larger scale emerges as a possibility due to the adoption of Twitter.

Previous methodological approaches to political debate research in the United States do not correlate the affects of specific statements or content during the debate with shifts in attitudes (Fridkin, Kenney, Gershon, & Woodall, 2008; Lanoue & Schrott, 1989b). Most previous studies of political debate rely on non-representative, geographically bounded samples; and the lack of consistent analysis methods across studies limits broader insight (Zhu, Milavsky, & Biswas, 1994). Examining debate focused civil discourse on Twitter overcomes these limitations. Twitter contains time metadata, enabling researchers to identify specific time periods where users may make specific comments related to what is on screen. The focus on a particular event

in political discourse on Twitter – a debate – reshapes prior geographic sampling limitations by enabling geographically independent debate focused discourse analysis.

The existing body of research examining Twitter as a tool for civil discourse around political debates and other press conferences in the United States focuses on event identification and topical analysis (Diakopoulos & Shamma, 2010; Shamma, Kennedy, & Churchill, 2009; Shamma, Kennedy, & Churchill, 2010b; Shamma, Kennedy, & Churchill, 2010b). This early research also uses very small datasets; both as a result of the lack of utilization of Twitter for political discourse until recently and the type of collection methods provided by the service at the time of collection. The findings from previous studies on technologically mediated debate discourse are more broadly situated in the discourse surrounding event identification and back channel communication related to live TV (Doughty, Rowland, & Lawson, 2011; Lanagan & Smeaton, 2011), instead of being situated in discourse that examines how citizens and politicians engage with each other and how this engagement affects citizen attitudes.

Of the select studies that have been published related to political discourse and debates on Twitter, there are only two that examine primary election debates. Prior work on primaries is limited mostly due to the timing of Presidential elections and Twitter's popularity. Hu et al. (2012) examined Twitter in the context of a primary debate by attempting to identify the types of topics and events that were ongoing and whether the discourse at that time was related to what was happening on TV (Hu, John, Seligmann, & Wang, 2012). The other study conducted in part by the two authors of the paper, as part of a larger effort to validate Twitter collection methodologies examine two, examined the communities of discourse related to the 2012 South Carolina GOP Primary Debate and how different hashtags were used differently by different groups of individuals (Black, Mascaro, Gallagher, & Goggins, 2012). This study found that hashtags were adopted differently depending on the device used and the intent of the discourse. Another study conducted by the two authors of the paper explored the participation of groups of people in two debates related to the June 2012 Wisconsin Gubernatorial Recall Election (Mascaro, Black, & Goggins, 2012). This study found that only a small sample of individuals participated in discourse related to both two debates held for the Gubernatorial Recall election and those that did had unique characteristics relative to other participants.

We build on earlier work in this study by presenting the most comprehensive analysis of Twitter activity related to a political debate in the United States to date. Through analysis of the data tweeted using #cnndebate and #gopdebate related to a November 2011 Republican primary debate, it is possible to see how Twitter's syntactical features are used to engage citizens in civil discourse and information exchange. Our analysis demonstrates how citizens utilize Twitter to engage with others while viewing the debate and how citizens use the medium to highlight information related to debate participants and moderators through technologically appropriated means such as hashtags, @-mentions and @Reply's. Our findings have implications for future debate research and understanding how individuals utilize twitter as a backchannel for communication in the context of political discourse.

Related Work

Political Debates

Civic debate has been one of the foundations of government throughout history. Electoral debates in the United States have evolved significantly over time and allow citizens to learn about candidates leading to more informed decisions, although they do not change the minds of individuals that have strong partisan allegiance (Jamieson & Birdsell, 1988). Modern presidential debates are often compared to sports and entertainment (Blankenship & Kang, 1991) and with the advent of 24-hour news coverage this continues to evolve. One of the most significant benefits of debate is that it grounds political discourse and creates an environment where candidates must speak a common language (Hart & Jarvis, 1997).

The grounding of discourse and speaking a common language benefits the consumers of the debates. Debates provide citizens with the ability to judge candidates based on answers to a similar set of questions simultaneously and as a result may strongly influence independent voters. Debates also help to interest individuals in a particular election and educate citizens about issues, even if they do not watch the debate with that purpose (Wald & Lupfer, 1978). Those who are not interested in politics do not watch debates as much as those who are interested, but when the uninterested watch the debate they tend to learn as much as those who are interested (McLeod, Bybee, & Durall, 1979). This illustrates the ability for the debate to influence and educate viewers even when they did not initially intend on it.

Primary debates may be the most influential debates during an election cycle since they expose individuals to each candidate's policy and issue positions all at once (Benoit, McKinney, & Stephenson, 2002). These intraparty debates often occur early in the campaign and therefore provide a different context than many of the more popular and widely viewed debates (Pfau, 1987). Benoit and Hansen (2004) found that debates helped increase issue knowledge among voters for unfamiliar candidates and also increased issue salience for voters as they were exposed to candidates positions on a larger number of issues or policies as a result of the debate (Benoit & Hansen, 2004).

The context of the debate is a significant factor in analysis of how voters perceive candidate messages and are influenced by a particular debate. In an analysis of a 1996 primary debate in Arizona, Yawn et al. (1998) found that individuals who attended the debate changed their attitudes towards the candidates as a direct result of watching the debate (Yawn, Ellsworth, Beatty, & Fridkin Kahn, 1998). Further, they found that the debate had an effect on citizen's perceptions of a candidate's viability, electability and ultimately their support for a particular candidate. These findings differ from other research on general election debates and illustrate the importance of examining primary debates.

Although Presidential primary debates can provide an interesting laboratory for analysis because the public is unfamiliar with many of the candidates, similar analysis of state contests may be a better context for examining the influence of preexisting attitudes on voter perception (Norton & Goethals, 2004). An & Pfau (2004) examined a 2002 US Senate debate to examine whether individuals could be inoculated against counter attitudinal messages from opposing

candidates (An & Pfau, 2004). The results of the study supported the hypothesis that those that received an inoculation of the likely attacks on a candidate were less likely to be affected by them during the debate.

The increasing presence of 24-hour TV news networks means that coverage of debates is increasing, leading to a greater influence of the debates on voter perceptions. Fridkin et al. (2008) found that during one of the 2004 General Election debates media spin related to the debate significantly affected the attitudes of the public (Fridkin et al., 2008); leading to a call for researchers to examine public opinion as close to real-time as possible, limiting the influence of subsequent “media spin”. This echoes outcomes of earlier research that identifies content analysis of specific statements by the candidates as being important for examining public reactions to their activity (Lanoue & Schrott, 1989a).

Although modern presidential debates are widely studied, the methodological approaches used are widely questioned. Zhu et al. (1994) provide a comprehensive review of the literature through 1994 and identify several issues in the design and methodological approach to the research (Zhu et al., 1994). First, most of the debate research until 1994 focused on two election cycles — 1960 and 1976. As a result of this limited scope of analysis, the effects of television and newer technologies were not well studied. Second, most of the studies were drawn from geographically specific adult or student populations, limiting the generalizability of the findings. Third, most of the research is focused on the general election and not the primary election debates that have been illustrated to have a different effect and purpose.

Methodologically, Zhu et al., find numerous issues with previous debate research. Most of the studies that Zhu et al. review use surveys to collect data and do not control for exposure to other information. Also, previous debate research has used a variety of pre-test/post-test and just post-test methods that have given results that may be influenced by information that came from places other than the debate stimulus. One of the most significant weaknesses that Zhu et al. identified was that the methods did not afford the ability for the researchers to correlate the debate content with audience responses. Using this review of the literature as a basis, Zhu et al. examined the first 1992 Presidential debate and identified that the debate had a sizable effect on issue knowledge, but no effect on image perception. We use previous debate research to ground our examination of technologically-mediated discourse in Twitter.

Twitter and Politics

One of the greatest areas of research on Twitter has been the analysis of political activity and participation in Twitter. Political activity on Twitter has two components, the politicians, either elected or running, and the citizens involved in the discourse or consumption of the information. Analysis of both sides of the activity is integral in understanding how the two categories of people interact. The syntactical features of Twitter also allow for unique interactions as citizens can mention politicians or directly address them. Mentioning and directly addressing elected officials represent different modes of engagement. Mentioning someone is intended to highlight a message to someone or to have the message show up in searches for that username. Utilizing the @reply function indicates that the individual is directly addressing the

politician that is illustrative of an engagement between elected official and the citizenry. Similarly, elected officials or candidates for office can do the same, which creates an interesting and unprecedented dynamic in political communication.

Through analysis of retweet behavior, researchers at the Truthy project at Indiana have been able to identify partisan clusters illustrative of echo chambers of ideas in information diffusion in Twitter (Conover et al., 2011). In addition to trying to understand general political activity, these researchers have been able to identify the proliferation of false memes in the context of Twitter (Ratkiewicz et al., 2011). The researchers were able to identify false memes that they deemed “truthy” memes by analyzing the network graph of parties attempting to spread information at abnormal rates and through analysis of the content of the tweets. For example, graphs with a limited number of connected components, star-like properties with high average degree and significant weighted edges between dyads would indicate possible “astro-turf” campaigns. Additionally, many “truthy” memes would attempt to game the inclusion of URL’s in the tweets by adding random strings at the end of the URL so the shortening service would think that URL was unique compared to others. This would lead to users to believing that these URL’s were unique.

These researchers also found the presence of “content injection” that identifies users adopting partisan hashtags or keywords to broadcast material that may be counter to the ideology of the party to proliferate a message. Content injection techniques have also been identified by Livne et al. (2011) who in an analysis of the run up to the 2010 midterm election identified high usage of the conservative hashtag #tcot (Top Conservatives on Twitter) by Democratic candidates (Livne, Simmons, Adar, & Adamic, 2011). The researchers conclude that this is an effort to expose #tcot followers to the Democratic ideas and may have implications for large-scale automated analysis of data as found in other research (Yardi & Boyd, 2010).

Using a dataset of individuals running for the US House of Representatives, Senate and governorships in the 2010 midterm elections, along with a random sample of their followers, researchers used multi-dimensional scaling to classify users based on hashtag and mention usage (Hanna, Sayre, Bode, Yang, & Shah, 2011). They found that the frequency of mentions and hashtags that were classified as being associated with one partisan affiliation can be useful in identifying partisan leanings of the individuals utilizing the technology specific syntactical features. Although the researchers were able to identify a significant majority of the individuals, there were some ambiguous clusters that they claim may be the “poaching” hashtags. This “poaching” is similar to the “content injection” identified by other researchers (Conover et al., 2011).

Research has been conducted in the context of elections to identify different characteristics of users that participate in discourse based on the number of contributions they made (Mustafaraj, Finn, Whitlock, & Metaxas, 2011). Users were broken into five categories based on number of contributions to discourse during the special election in Massachusetts to replace the late Ted Kennedy. It was found that the more “vocal” twitterers, (those posting more than 50 times (n=574) in a dataset of about 235,000 tweets) tended to use significantly more

hashtags, links and retweets than the other groups identified with the greatest difference occurring between the vocal twitterers and those that only contributed once. In addition to those characteristics, it was discovered that users who were more vocal, were newer to Twitter.

German researchers used politically oriented hashtags to identify 2009 election discourse (Jurgens, Jungherr, & Schoen, 2011). During this election, German Twitter users were encouraged to use a priori determined party related hashtags followed by + or – to illustrate agreement or disagreement with the message and the party. This added metadata allowed the researchers to extend their analysis on step further by determining whether the hashtag was used in conjunction with a positive or negative reaction to the party. Such an analysis helps to address the possibility of “content injection” though individuals who would use content injection techniques would likely also misrepresent the valence. From a network perspective, Jurgens et al. (2011) were able to identify “small worlds” of connected individuals that had similar political viewpoints.

Political Events and Twitter

Analysis of political discourse on Twitter has focused on issues, candidate debates and elections. Each context differs in both the type of data and the implications of the findings. A study on the 2010 Australian Federal Election following the hashtag #Ausvotes examined 415,009 tweets from 36,287 users over a 6 week time period. Bruns and Burgess (Bruns & Burgess, 2011) found that the discourse was candidate centric. A majority of the mentions collected with the hashtag were of politicians running in the race and also prominent journalists, as they were the ones integral in covering the campaign. The researchers also identified through collection of candidates running in the race that certain politicians did not use the #ausvotes hashtag at all even though they were involved in the campaign.

The researchers also constructed networks of @reply’s and @-mentions to identify the most central actors based on degree centrality. Bruns and Burgess extended this analysis by also applying the measure betweenness centrality to identify individuals who may not have been the most prolific (high in degree centrality), but who based on the network of replies and retweets played an integral role in information dissemination and bridging in the network based on their position. The researchers do not use follower and followee networks in constructing their networks since these networks are a result of “longer-term affinities and affiliations between users.” The point of using a hashtag in the political sphere can largely be seen is a way to encounter and participate in a distributed conversation with individuals who are already part of a conversation as well as those who are not.

Analysis of technologically mediated discourse surrounding political debates has been an area of burgeoning study and methodological approaches are still being developed and in some areas are titled “live research” (Elmer, Langlois, & McKelvey, in press) methods. Research on one of GOP Primary Debates from the 2012 United States General Election has identified that the promotion of hashtags to allow individuals at home to announce whether they thought the candidate answered the question or dodged it created different communities of discourse. Only 13% of the individuals that participated in the #answer versus #dodge exercise promoted by the

host of the debate, FOX News, participated in the general discourse related to the debate hashtag #scdebate. Additionally, the device usage between the communities was significantly different illustrating how different user communities may use devices or hashtags differently (Black et al., 2012). Research on a September 2011 GOP Primary debate found that twitter discourse before and after the debate was general on topic whereas during the event the twitter participants responded to more specific activity even though this activity was not correlated exactly to the timeline of events (Hu et al., 2012).

Using hashtags and user accounts of those participating in a 2008 Canadian federal election among the federal leaders, Canadian researchers were able to identify spikes in temporal activity as a result of statements of wide appeal or controversy. Additionally, by capturing the activity before and after the debate, the researchers were able to identify the emergence of different hashtags based on partisan affiliation (Elmer et al., in press). The dataset for this analysis was small, but illustrates a methodological approach that had previously not been attempted.

Shamma et al. (Shamma et al., 2010b) analyzed 53,712 tweets from the Twitter public timeline during President Obama's inauguration to identify a set of 13,370 inauguration related tweets. They found that certain activity such as @mentions dropped when important parts of the inauguration such as President Obama taking an oath and Vice President Biden taking the oath occurred, but increased over time as important events were not occurring. A decrease in the average word count of tweets during this time was also identified. Using this analysis, the researchers were able to segment the broadcast events and further understand the community conversation that was occurring (Shamma et al., 2010b). The researchers conclude that as individuals pay more attention to the onscreen activity they are less likely to be tweeting extensively and using syntactical features such as @-mentions to highlight or engage with others.

Twitter Access Mechanisms

One of the important aspects of examining discourse on Twitter is in the analysis of the application used by the participants. Analysis of device usage in the context of Twitter activity has been fairly limited. As a small portion of a larger study, Wohn and Na (2011) found that tweets about specific television shows tended to come from mobile devices (Wohn & Na, 2011). This finding was attributed to possible demographic differences in the television programs studied such as the fact that television shows that appealed to younger demographics tended to have twitter discourse coming from mobile devices. Additionally, these researchers identified a lack of interaction (~4% of the total tweets) between users tweeting while watching television. This may be more indicative of the information broadcast activity than the device used or the absence of discourse among this segment. These researchers also identified that people tweet more during commercial breaks that may be indicative of cliffhangers before commercial breaks or an interest in focusing on the program on the television while it is on.

One of the most comprehensive analyses of Twitter device usage was done to attempt to characterize if humans or bots were tweeting (Chu, Gianvecchio, Wang, & Jajodia, 2010). Chu et al. (2010) split devices into four categories: web, mobile, registered third-party applications and

API's. They found that overall the web was used 46% of the time followed by third party devices at 40% and mobile and unregistered devices at 6%. More than half of the tweets that were posted by humans came from the web and mobile devices where most of the tweets from bots were done using unregistered third party applications and API's.

We choose to examine the general nature of application usage as it represents a unique variable in discourse that is conducted using Twitter. Applications that are used to access social media tend to have similar presentation and features, but this varies significantly in the Twitter application environment. Also, the examination of the devices used by one Twitter handle may indicate different forms of discourse or the presence of multiple individuals in control of one account. The findings that we present in the later sections indicate that a small percentage of individuals choose to participate using multiple devices and this varies depending on the time period.

Dataset and Operationalization

The #cnndebate and #gopdebate data were collected using the 'twitteR' package for the statistical application 'R', which uses the Twitter REST API. The twitteR package collects the 1500 most recent tweets with a specified search string when not using Oauth authentication. With authentication it is possible to collect up to 3200 tweets per query, but with authentication a user may collect tweets that are not intended to be viewed by the public and in the interest of privacy and institutional research guidelines the authors chose to only focus on public tweets.

The first author used the twitteR package to query for the hashtag #cnndebate, every 45 seconds from 30 minutes before the debate through 3 hours after the conclusion of the debate. The hashtag was promoted by CNN, the debate sponsor and moderator, as a way to concentrate the Twitter discourse on one hashtag. In addition to querying during the debate, twitteR was used once a day for the three days prior to the debate to collect discourse that occurred in the run up to the debate.

In addition to the hashtag #cnndebate, the authors also collected on the hashtag #gopdebate for the 2 days before the debate and throughout the night of the debate at the same interval as #cnndebate. The collected tweets were combined with the #cnndebate dataset and these results were combined into the collection. Only 6,786 (3.5%) tweets had the hashtag #gopdebate illustrating a limited discourse community around that hashtag and the need to include #cnndebate to participate in the broader debate discourse. We note that 873 of the tweets in our dataset contain both the #cnndebate and #gopdebate hashtag giving validity to the fact that those using #gopdebate during the time period of collection were doing so to engage around the CNN debate.

The tool that we used for collection does not discern between new tweets and tweets that were already collected and as a result many tweets collected were duplicates. In total, over 300,000 tweets were collected of which 185,420 were unique. In this dataset there were 44,572 unique users with 23,963 individuals only posting one tweet.

We are not aware of the total number of tweets that used the #cnndebate hashtag and as a result we are unaware if our dataset is truly representative of all of the discourse related to the debate that occurred on that night. We believe that the large number of duplicates indicates that the dataset is likely representative of a large portion of the overall public discourse using #cnndebate on Twitter. To address previously noted collection inconsistencies by the researchers based on frequency of queries (Black et al., 2012), numerous checks for face validity of the API results were conducted using the Twitter website using the query #cnndebate, during the debate. The results using the website search and the API collection were the same and we believe this is the most prudent measure of collection completeness.

In our analysis we narrowly operationalize three Twitter syntactical features (Table 1). We identify a retweet as a tweet that has the structure “RT @[username] text” at the beginning of the tweet. We understand that there are other ways to denote a retweet (Kooti, Yang, Cha, Gummadi, & Mason, 2012), but the most common Twitter usage of retweet is with that syntax, including when using the Twitter automated retweet button, so we believe that any retweets not included in that operationalization are minimal and do not affect the findings. We operationalize mentions as any existence of “@[username],” and further operationalize a @reply as any mention occurring in the first position of the tweet. The @reply operationalization follows Twitter specific syntax. There is significant debate about what retweets, mentions and @reply’s also signify, but we believe that is outside the scope of this paper (boyd, Golder, & Lotan, 2010; Honeycutt & Herring, 2009; Mustafaraj & Metaxas, 2011; Suh, Hong, Pirolli, & Chi, 2010).

Syntactical Feature	Common Syntax	Purpose
@Reply	@[username] at first position of tweet text	To directly address another individual in a public manner.
Mention	@[username] at any point in tweet text	To highlight a tweet to another individual or to talk about someone. Mentioning them will inform them of the tweet.
Retweet	RT @[username] “tweet text”	To further disseminate another individual’s tweet.
Links	http://[until whitespace]	To include external information in a tweet. Note: Twitter uses a URL shortener, but also accepts other URL shorteners as links too.
Hashtags	#[alphanumeric text]	To tag a message with a conversational marker or to add a tweet to an existing stream of discourse independent of a follower/followee network.

Table 1: Twitter Syntactical Features Operationalized

Methods and Limitations

All of the analysis was conducted through a combination of the statistical program R and network analysis application GEPHI. Using the TwitterZombie infrastructure (Black et al., 2012) and a series of analytical scripts authored by the first author, collected data is parsed into a series of files that identify important parts of the data in a readable format. These files include descriptive statistics and measures of the usage of hashtags, mentions, URL's and also network edge lists that can be plotted using network analysis tools such as GEPHI. The data presented in the tables throughout were aggregated using R as detailed in each of the specific findings sections. Network analysis visualizations were done using the "Force Atlas 2" algorithm in the network analysis program GEPHI.

After the initial parsing of the data, the list of URL's that are identified in the text must be run through another script authored by the first author to decode them. Since Twitter employees a tweet shortening service to maximize the number of characters for other information, there are many times when the same link may be shortened and then assigned a new link that would appear as though it were unique. For example, "www.washingtonpost.com/cnndebatestory" may be tweeted by two people, but as a result of Twitter's shortening service it may be shortened to two different links that have the base <http://t.co/>. Depending on the device used, it is also possible that a full link may be used or that the link input may be from another URL shortening service, such as bit.ly. Therefore, it is necessary to decode the shortened URL's through an iterative process that identifies the actual URL and not the shortened URL. Through analysis of both the shortened links and the decoded links, the authors determined that analysis of the non-decoded links would significantly alter the findings of popular links that were tweeted.

We recognize that there are some limitations to some aspects of the study. First, we were using only public tweets identified with the #cnndebate hashtag. It is possible that other discourse occurred outside the scope of this hashtag, but we believe that this discourse may not have been intended for the public or to be discovered. Since CNN promoted the hashtag as part of the election promotion, we feel confident that the hashtag based discourse is concentrated in #cnndebate and also #gopdebate. Second, we base our analysis on the east coast timeframe and do not take into account the possibility of users time-shifting their viewing. Therefore, it is possible that some of the discourse may be miscategorized as occurring after the debate when it really occurred during the debate. We also feel that because this was a live event on a nationally televised cable news network that the possible affect of time-shifting was mitigated. Third, it is possible that our limit of 1500 tweets per search may have limited some of the tweets we collected. Although this is a possibility our collection method stayed consistent and therefore we believe that our results are no less valid than if traditional sampling techniques were used.

Context and Research Questions

The debate began at 8:00pm eastern on 11/22 and lasted for two hours. The topic of debate was foreign policy and national security. The seven participants were Governor Mitt Romney, Speaker Newt Gingrich, Senator Rick Santorum, Congressman Ron Paul, Congresswoman Michele Bachmann, Ambassador Jon Huntsman, Governor Rick Perry and Herman Cain. This was the 14th debate of the GOP Primary cycle and was the last one with these seven candidates as Herman Cain dropped out of the race shortly thereafter. The debate was moderated by Wolf Blitzer of CNN with questions from members of the audience and occurred at DAR Constitution Hall in Washington D.C. sponsored by The Heritage Foundation and The American Enterprise Institute.

We utilize the following research questions to develop a foundation of technologically-mediated political discourse in the context of a primary debate.

1. How does the usage of Twitter specific affordances vary by time period in the context of a nationally televised political debate?
2. To what extent does the application usage by Twitter users vary by time period?
3. To what extent do the @reply and retweet networks of the Twitter data illustrate conversational activity and information exchange?

Findings

Table 2 illustrates the breakdown of the utilization of different affordances throughout distinct time periods. Collection began two days before the debate and this allowed for the discourse related to the run up to the debate. The pre-debate time period incorporates the night of 11/13 (when our first tweet was collected) through 8:00 pm eastern on 11/22 when the debate began. The debate time period of the debate includes the 2 hour time frame when the debate occurred and was televised and the post-debate time period incorporates the time period of 10 pm eastern through five minutes after midnight on 11/23. The post-debate time period incorporates the televised live post-debate coverage and allows for an analysis of the reaction of the debate.

Time Period	Tweets	URL	Mentions	@Reply	Retweets	Singleton
Complete	185,420	7.22%	52.60%	4.11%	42.88%	53.76%
Pre-Debate	10,750 (6%)	28.99%	71.54%	9.00%	48.83%	71.77%
Debate	152,059 (82%)	5.08%	48.32%	3.82%	39.55%	51.35%
Post-Debate	22,611 (12%)	11.26%	72.38%	3.74%	62.43%	69.11%

Table 2: Syntactical Feature Breakdown

In total, 82% of the tweets that were collected occurred during the 2-hour window in which the debate occurred. Since we collected using a hashtag as a selection criteria, 100% of the tweets contained a hashtag. Additionally, from the perspective of user involvement, we see that just over half of the individuals posted only one tweet (Singleton). This percentage varied over time and was at its highest before and after the debate. This may illustrate that during the debate individuals were engaged in exchanging information and debating with others within the context of the debate as if they were all physically co-present. The usage of other syntactical features also varies significantly based on the time period. We now examine hashtags, links and mentions and how they differ over time.

Hashtags

The collection criteria for the data corpus were the hashtags #cnndebate and #gopdebate and therefore every tweet that was collected had a hashtag. Although each tweet had one of those two hashtags, examining the hashtags that co-occurred with these hashtags illustrates the topical distribution of discourse (Table 3). The most common hashtag throughout all three time periods and the overall debate is “tcot,” which is a hashtag that stands for “top conservatives on twitter” and is one of the most popular hashtags as it is appended to or used within many tweets related to the conservative community. The progressive counterpart to #tcot is #p2 and we see that it appears quite frequently throughout the discourse as the 6th most popular hashtag besides #cnndebate and #gopdebate.

Pre-Debate	Debate	Post-Debate	Complete Debate
tcot	tcot	tcot	tcot
2012gop	Gop	ronpaul	gop
gop	ronpaul	gop	ronpaul
teaparty	tweetthepress	p2	teaparty
p2	Hannity	ilied	tweetthepress
tlot	teaparty	dwts	p2
gop2012	gop2012	teaparty	hannity
cnn	p2	tlot	gop2012
fitn	Tlot	gop2012	tlot
iacaucus	Perry	ronpaul2012	2012gop

Table 3: Hashtag by time period

The hashtags that occurred in the pre-debate time period differ the most from the hashtags that occur in the other time periods. For example, “fitn” (“First in the Nation”, referring to the New Hampshire primary) and “iacaucus” (Iowa Caucus) appear in the pre-debate data, but do not appear with high frequency throughout the rest of the data. This illustrates the situating of the discourse before the debate in the context of the first two races of the primary season, the New Hampshire Primary and Iowa Caucus.

During the debate, although #tcot is still the most popular hashtag we see that two of the candidates (#RonPaul and #Perry) that are debating are among the most frequently used hashtags. Both the #RonPaul and #Perry hashtags were used to tweet quotes or other position statements that they had made during the debate such as the tweet *“Lobbyists get paid more than Congressmen because they write more laws than we do”* #CNNDebate #RonPaul. In the case of #RonPaul and #Perry, the hashtag was used both as a marker of discourse and also as a part of the sentence, such as: *“#Perry blames #Supercommittee failure on #Obama's “failure to lead”* #CNNDebate #GOPDebate.”

We see that most of the top 10 hashtags throughout all of the time periods are overtly related to the discourse or politics. In the post-debate discourse two hashtags #dwts and #ilied appear in the top 10, although their relation to the topics in the debate is not apparent. #ilied is common hashtag on Twitter that is used for sarcastic purposes and appended onto tweets and #dwts stands for Dancing with the Stars, a popular television show that was on at the same time as the debate. In the context of a debate, at first glance it would seem possible that such a hashtag would be used negatively in the context of discussing debate participants.

Further analysis of the context and content of the tweets in which #ilied and #dwts appear illustrates that the hashtags were used to spam the discourse related to the CNN Debate by including an advertisement for a home security system in addition to numerous hashtags such as #CNNDebate, #ilied, #dwts. This spamming illustrates one of the drawbacks of following popular discourse on Twitter during a live event in that it may be possible to be spammed by content that is completely unrelated to the discourse of interest. In this instance, a coordinated effort injected information into a stream of discourse similar to other research that has examined partisan hashtags (Conover et al., 2011; Conover, Gonçalves, Ratkiewicz, Flammini, & Menczer, 2011; Ratkiewicz et al., 2011).

URL's

The number of URL's that occurred throughout each time period demonstrates the difference in topics of discourse throughout each time period. The number of unique URL's over the four time periods is identified in Table 4. We note that as a result of parsing errors or the fact that some of the links were no longer valid that not all of the links that were tweeted were examined. The total number of links that were unable to be parsed was less than 2% of the total and therefore we believe this to be immaterial in our analysis.

We examine URL's in two different phases. First we look at the most popular links throughout the whole corpus and then examine the base of the URL's by time period to further examine the nature of URL's being tweeted during each time period. We do not present an analysis of each fully decoded URL during each time period, as it is possible that links may traverse multiple time periods more easily.

The top three unique URL's in the complete corpus are links to liveblogs of the debate from Washington Post, CNN and Huffington Post. This illustrates that the most popular source of external information in the stream of Twitter discourse are URL's to external sources that are documenting the debate. The fourth most popular URL is actforsudan.org, which advocates for

the ending of the genocide in Sudan. Since this was a national security and foreign policy this URL speaks to many of the issues that were addressed during the debate and this site was also host to an open letter to the GOP candidates from members of the organization.

Time Period	Unique URL's
Complete Debate	4,808
Pre-Debate	1,464
Debate Only	2,558
Post Debate	1,036

Table 4: Unique URL's by Time Period

Other popular URL's included news stories about the GOP candidate's foreign policies stances or actions. Of most interest from a socio-technical perspective is that 12th most tweeted link in the overall discourse was a Foursquare check-in from Mitt Romney that he was at the debate. This illustrates the integration of multiple technological presence features that are integrated into discourse. This was the only foursquare check-in from all of the candidates.

Table 5 illustrates the distribution of base URL's by time period. We see that youtube.com is the most popular base URL throughout. Throughout the debate users shared videos highlighting the candidates previous statements. The most popular youtube video identified throughout the whole debate was a video from the American Enterprise Institute (one of the debate sponsors) entitled "GOP National Security Debate: Foreign Policy is Personal" that was a short video from a family member of a service member. The video served as an advertisement for individuals to watch the debate.

Pre-Debate	Debate	Post-Debate	Complete Debate
youtube.com	youtube.com	youtube.com	youtube.com
blog.heritage.org	washingtonpost.com	washingtonpost.com	blog.heritage.org
twitter.com	huffingtonpost.com	huffingtonpost.com	twitter.com
yfrog.com	twitter.com	elections.nytimes.com	washingtonpost.com
aei.org	heritage.org	rickperry.org	huffingtonpost.com
cnn.com	elections.nytimes.com	twitter.com	elections.nytimes.com
washingtonpost.com	politicalticker.blogs.cnn.com	politifact.com	cnn.com
facebook.com	blog.heritage.org	dailycaller.com	heritage.org
huffingtonpost.com	opensecrets.org	blog.heritage.org	aei.org
foursquare.com	rickperry.org	ronpaul2012.com	yfrog.com

Table 5: Top Base URL's by time period

Most of the other base URL's relate back to a news organization or political blog. Two of the most popular base URL's in the pre-debate time period are twitter.com and yfrog.com. Links to twitter.com are the result of individuals in the discourse sharing other individuals statuses without retweeting them and also sharing photos. Twitter.com appeared frequently in the pre-debate time period because of a photo that Jon Huntsman's Daughters tweeted out of him at the debate. Yfrog is also a photo sharing site that has close integration with Twitter. Similar to the high frequency of twitter.com, yfrog appears has one of the most frequent bases because it was used to share a photo of Wolf Blitzer rehearsing for the debate. In both of these instances we see the integration and information sharing of data from other services that provide more than just text.

Mentions

Similar to hashtag analysis, identifying the entities that are mentioned at different time periods during an event may help for identifying the overall discourse or type of conversation that was occurring. We operationalize mentions as the presence of any @-mention in a tweet. These tweets can also be categorized as retweets or @reply's depending on the location and syntax of the @-mention. We use include all of those to identify overall influence and then isolate the networks of retweets and @reply discourse in later sections.

Pre-Debate	Debate	Post-Debate	Complete Debate
wolfblitzerCNN	BorowitzReport	BorowitzReport	BorowitzReport
Heritage	piersmorgan	piersmorgan	piersmorgan
JonHuntsman	TheFix	RonPaul	TheFix
CNN	RonPaul	washingtonpost	RonPaul
BorowitzReport	rolandsmartin	rationalists	Heritage
AEI	dickmorristweet	JonHuntsman	rolandsmartin
THEHermanCain	JonHuntsman	THEHermanCain	JonHuntsman
MittRomney	rationalists	Heritage	THEHermanCain
WolfBlitzerCNN	Heritage	rolandsmartin	dickmorristweet
donnabrazile	aishatyler	TheFix	wolfblitzerCNN

Table 6: Top Mentions by time period

Similar to the analysis of the hashtags we see that the pre-debate discourse differs from the other two time periods (Table 6). The mentions in the pre-debate discourse are easily classified into two groups, those hosting the debate, including the co-sponsors @AEI and @Heritage and candidates (Jon Huntsman, Herman Cain and Mitt Romney. In addition to those that are hosting the debate BorowitzReport (a New Yorker blog) was one of the most mentioned and was the most mentioned in the overall debate. The high number of mentions for @BorowitzReport was the result of a number of comedic comments made throughout the debate that were retweeted by those participating.

During the debate, we see that the moderator of the debate Wolf Blitzer is no longer among the most mentioned even though he was one of the prominent participants in the debate. Instead, we see that @piersmorgan and @rolandsmartin, both CNN commenters, become more mentioned as they are participating in the discourse using the #cnndebate and are also being retweeted. Additionally, we see that @aishatyler, an entertainment reporter, is also highly mentioned as she was participating in the discourse.

During the debate, we also see a shift in the candidates that are high in mentions with Ron Paul becoming the most mentioned candidate, which is likely a result of his unique comments on national security and see that Mitt Romney and Herman Cain are no longer in the top 10. Of the 9,328 unique mentions of Twitter handles that occurred during the debate, all of the candidates on stage occurred in the top 27, with Michelle Bachmann receiving the least.

In the post-debate discourse we see that the top 10 @-mentions are very similar with @washingtonpost becoming the fourth most mentioned. This position is likely the result of @washingtonpost posting after analysis and also facilitating discourse with such tweets as: *“Use #factcheckthis to send us questions about GOP candidates' claims: <http://t.co/0N2ZiVYm> #CNNDebate.”* We also note that @TheFix is heavily mentioned during the debate and after the debate and this account is associated with Chris Cillizza a reporter for the Washington Post that runs a section of the website entitled “The Fix.”

The distribution of mentions illustrates an interesting pattern. There is a mix of individuals participating in the actual discourse and those that are the subjects of the discourse. The candidates that are mentioned do not originate any tweets as they are on the stage, but people using the Twitter syntactical feature of the mention to technologically identify and concentrate the discourse on an easy to search term. Additionally, we also see that the commenters that are participating the discourse are heavily mentioned both through retweeting and also use of the mention as a way to highlight discourse to their attention.

Looking at the most frequent mentions is not the only interesting aspect of examining mention behavior. Our data indicates that President Barack Obama was only mentioned 294 times out of over 118,000 total mentions in the data set. This lack of mentioning in the discourse illustrates the focus on the issues that were happening on the television during the debate and not larger issues.

Application Usage

Twitter allows for individuals to access the technology through a number of devices and third party applications along with the official Twitter applications and website. The device access is identified in the publically available data through the Twitter API and analysis of the different types of devices and applications used could illustrate different intent or patterns that may be interesting. For example, certain applications such as Hootsuite allow for a group of individuals to Tweet from one account, which may be indicative of group activity instead of personal activity. This type of analysis needs to be factored into analysis of overall Twitter data as conclusions of individual behavior represented by one account may actually be illustrative of more than one person. As illustrated in an earlier pilot study (Black et al., 2012), the inclusion of

tweet buttons on websites may draw in individuals that would otherwise not participate in a certain discussion and they may use affordances in a different manner.

Table 7 illustrates the number of devices used in each time period and also identifies the percentage of individuals who used multiple devices or applications in that time period. We see that the number of devices and percentage of individuals who use multiple devices varies over time. In total, 280 unique devices or applications were used to tweet in the collected data and they represent a diverse set of platforms and access mechanisms.

Time Period	Devices	Multiple Device User
Complete	280	10.58%
Pre-Debate	118	4.24%
Debate	236	10.34%
Post-Debate	145	5.34%

Table 7: Device Usage

One of the most understudied aspects of backchannel discourse is device usage. Device usage is important as previously noted as it may afford an individual different opportunities to use certain features. Additionally, device usage is a proxy for other socio-technical factors such as co-location or mobile activity and also may help to identify the presence of more than one individual in control of the account. For example, it is unlikely that individuals tweeting from a debate-watching party would be on their laptops. They would instead most likely be using a mobile device. That is why it is interesting that almost 11% of the individuals that tweeted during the debate used more than 1 device.

The account that used the most applications was “Women4Huntsman” that used 21 applications total including. These applications included foursquare, camera on iOS and a number of other applications for a variety of different platforms. Such a high variety of applications indicates that it is likely that the account was controlled by many different individuals using specific applications that do not allow for distributed access.

Figure 1 illustrates the distribution of device usage throughout the whole debate. Devices that were not used in at least 1% of the tweets were aggregated for visualization clarity. The web was the most common access method for tweeting throughout the whole debate garnering 43% of the total tweets. This was followed by Tweetdeck, Twitter for iPhone and Hootsuite. The significant use of the web for tweeting during the debate illustrates that individuals were using a traditional computer or laptop or were using the website on a mobile device.

The usage distribution of the top devices was mostly constant through the pre-debate, debate and post-debate time periods when compared to the complete debate. The most noticeable change between the three time periods is that the mobile web went from being used in 1% of the tweets in the pre-debate time period, to less than 1% during the debate up to 6% in the post-debate time period. The authors do not have an explanation for such activity, but we present

these findings as a contribution to the currently limited study of application usage for technologically-mediated discourse on Twitter.

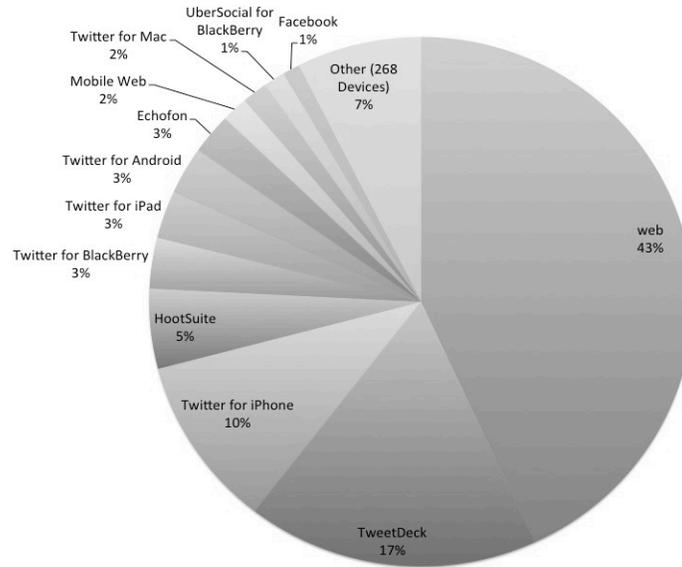


Figure 1: Complete Debate Device Distribution

Retweet Networks

Analysis of the networks of retweets allows for the identification of information dissemination occurring throughout the debate. We operationalize a retweet to allow for weighted, directed network analysis by identifying retweeted user as the inward tie (in-degree) of an individual that is doing the retweeting (out-degree). Therefore, an individual that has high weighted in-degree centrality is someone that is retweeted often and someone that has high out-degree centrality is someone who retweets others often.

Instead of examining retweet behavior by time period we examine the complete time period of retweets to identify who is the most influential in the context of retweeting. Figure 2 illustrates the complete retweet network. There is a very strong core with a significant amount of peripheral nodes. The core represents a concentrated set of individuals retweets a small subset of others. The periphery represents those that are only retweeted by a limited number of individuals.

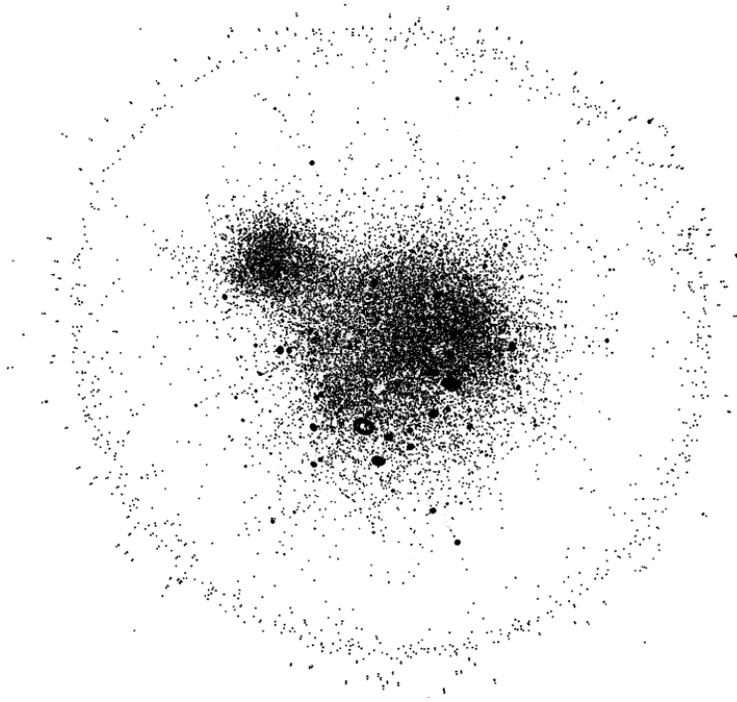


Figure 2: Retweet network

By using the network statistics Weighted Degree, Weighted In-Degree and Weighted Out-Degree we are able to identify those who are most influential with relaying information (Weighted Out-Degree) and who is responsible for being retweeted (Weighted In-Degree). As a result of the significant amount of individuals that are retweeted compared to the number of individuals that are doing the retweeting, the total weighted degree and in-degree are the same. Those individuals that are highest in weighted in-degree are members of media organizations or responsible for hosting the debate except for @rationalists who is an author who a self-described atheist and provided numerous comments throughout the debate that were retweeted.

Total Weighted Degree	Weighted In-Degree	Weighted Out-Degree
BorowitzReport	BorowitzReport	Women4Huntsman
piersmorgan	piersmorgan	adamsavader
TheFix	TheFix	RalphHornsby
rolandsmartin	rolandsmartin	ak2webd3
dickmorrisset	dickmorrisset	rockylee54
rationalists	rationalists	impotex
washingtonpost	washingtonpost	KSTAR102TALK
Heritage	Heritage	libertyspot
aishatyler	aishatyler	TheOldOakInfo
RonPaul	RonPaul	blackrepublican

Table 8: Network Statistics for the Retweet network

The fact that those that are high in weighted out-degree are not members of the media or other prominent individuals illustrates that citizens helped to control the relay of information in this debate. Women4Huntsman, as previously identified, was a group advocating for the election of Jon Huntsman and had participated quite heavily in the discourse. The other in the top 10 are individuals who participated by retweeting other information of interest to them.

Conversation Networks

We operationalize the placement of an @-mention at the first location of the tweet text as a directed public message that is illustrative of conversational activity (@reply). Through analysis of the weighted directed network of @reply messages we can identify and examine the presence of conversation in a large unthreaded network.

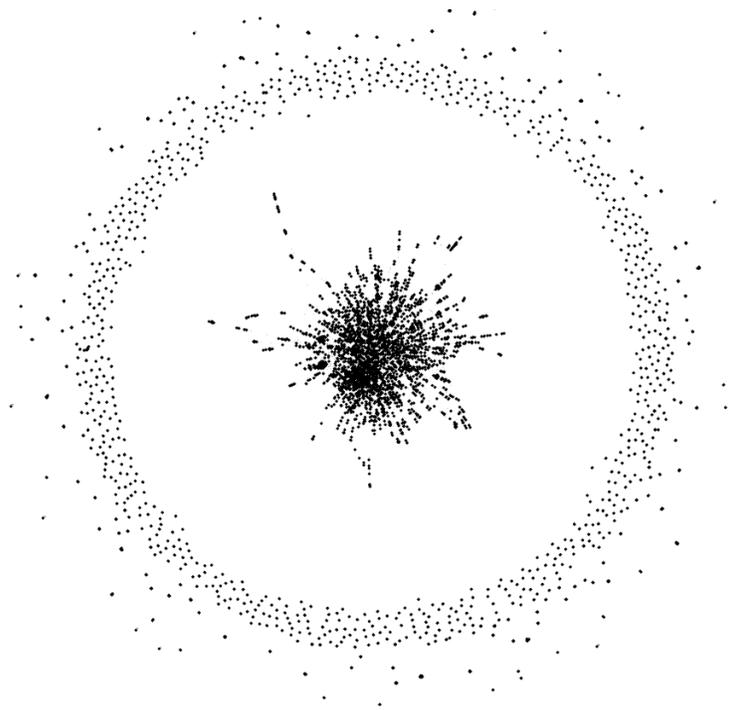


Figure 3: Complete Conversation network

Figure 3 illustrates the conversational network of the complete corpus. Similar to the retweet network there is a strongly defined core and a large periphery that consists of mostly dyads of users who are engaging with each other. Table 8 identifies the weighted degree, weighted in-degree and weighted out-degree for the network. The network is directed just as the retweet network. Someone with high out-degree would have originated more messages where as someone with high in-degree would be someone who receives more message.

We see that the total weighted degree and weighted in-degree are the same lists as the number of people that are receiving messages is much more concentrated than the individuals that are sending messages out. Similar to the retweet network those that are receiving messages are more prominent figures in the event. Each of the top 10 individuals in weighted in-degree is

either related to the press or is one of the candidates. Wolf Blitzer is the one who receives the most messages directed to him and he is the moderator. In total, 6 of the 7 candidates are in the top 10 and the only one who is not is Michele Bachmann, who was number 12. This demonstrates that individuals were using the @reply syntactical feature to engage with individuals that were on the TV or members of the press and signal to the larger audience the subject of their message similar to the utilization of a hashtag.

Weighted Degree	Weighted In-Degree	Weighted Out-Degree
wolfblitzercnn	wolfblitzercnn	fishinsam
CNN	CNN	TermLimtCongres
RonPaul	RonPaul	DavidMDrucker
newtgingrich	newtgingrich	RepublicanRocks
MittRomney	MittRomney	PoliticsIn01245
THEHermanCain	THEHermanCain	ryan_printy
GovernorPerry	GovernorPerry	donna816
JonHuntsman	JonHuntsman	24AheadDotCom
piersmorgan	piersmorgan	GOPBlackChick
cspanwj	cspanwj	MOforPerry

Table 9: Network Statistics for the Conversation network

Similar to the retweet network those individuals that have the highest out-degree are not members of the press or any organized group except for “MOforPerry,” a group of Governor Perry’s supporters in Missouri. The statistics and shape of the network illustrate that Twitter is used by citizens to engage with members of the event that they are watching, even though the individuals cannot be responsive as they are currently involved in a debate. Examining these types of networks for individuals who are mentioned a lot may help to identify the topical content of certain parts of an event.

Discussion

Our findings illustrate three distinct contributions to the literature on political debates and technologically mediated discourse. The first contribution is that “big data” can be used to further understand real-time political discourse. Examining how individuals engage with each other and exchange information surrounding specific events is possible, and has potential implications for political science research. Previous research that has examined citizen response to electoral debates has used a variety of methods that have limited generalizability and understanding of the outcomes. Analysis of Twitter data does not require researcher intervention or interaction with participants.

What is being said on Twitter or other social media platforms at a specific time enables new insight into citizen participation. These methodological advantages do come with some

drawbacks such as the possibility that the large sample of Twitter users may also not be representative of the overall population. For example, Twitter users tend to be more affluent and there is a potential for the discourse to be gamed or influenced by the media and spammers. The potential for understanding the civil discourse and political process in new ways, combined with the risk of manipulation move traditional discussion around media influence into a new territory. In this new world, influence comes from new sources that include citizens, and citizen provocateurs.

The second contribution of this paper is in the further understanding of how individuals engage with each other and with politicians using technologically-mediated means. The hashtag represents a community of discourse specific to an event and through this community, individuals engage not only with each other, but also attempt to engage with elected officials and members of the media using specific syntactical features. This unprecedented ability to connect with candidates and elected officials holds significant promise for democratic interactions moving forward. In addition to the presence of elected officials, the presence of the media also may help to facilitate discourse better. Our findings illustrate that the public was interested in not only engaging with the candidates, but also engaging with the media and specifically those members of the media that were on the television. The discourse that is now possible between politicians, media and citizens is unprecedented and can be used to further accountability of the press and politicians.

The third contribution is an understanding of how specific types of information such as URL's or photos are adopted and proliferated through a network by individuals. Our findings illustrate that specific photos and foursquare check-ins from candidates are retweeted or shared on the network; a new form of power is potentially derived from the number of Twitter followers a candidate has, and how interesting or compelling a candidates Tweets are. Further, retweeting by a user often comes with augmented commentary, so there is potential for derivative messages not intended by a candidate to enter the discourse. Through analysis of how the public responds to specific information that is tweeted out or how individuals are sharing specific information such as campaign information through URL's, it may be possible to further craft a message that resonates with certain groups of users. The discourse that is carried out in these technologically-mediated means may be the greatest campaign targeting tool to date.

Conclusion

This paper represents an exploratory analysis of a GOP Presidential Primary debate by examining the syntactical features and how they vary over time. Only one other paper not authored by this paper's authors (Kooti et al., 2012) has examined Twitter data in the context of a primary debate even though previous studies identify primary debates to be important in understanding political discourse. We will continue to build on this analysis by examining how political discourse evolves over the course of the campaign in the context of debates and other events. We are also currently examining how technologically-mediated discourse differs between

national and statewide elections in an analysis of two debates in the Wisconsin Governor Recall election (Mascaro, Black & Goggins, 2012).

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