Partisan Alignments and Political Polarization Online: A Computational Approach to Understanding the French and US Presidential Elections

Alexander Hanna
Department of Sociology
University of
Wisconsin-Madison
ahanna@ssc.wisc.edu

Chris Wells
School of Journalism and
Mass Communication
University of
Wisconsin-Madison
cfwells@wisc.edu

Peter Maurer
Department of Communication
University of Vienna
peter.maurer@univie.ac.at

Lew Friedland
School of Journalism and
Mass Communication
University of
Wisconsin-Madison
lfriedla@wisc.edu

Dhavan Shah
School of Journalism and
Mass Communication
University of
Wisconsin-Madison
dvshah@wisc.edu

Jörg Matthes
Department of Communication
University of Vienna
joerg.matthes@univie.ac.at

ABSTRACT

With the advent of Twitter and the ability to collect large datasets from this technology, researchers have the opportunity to analyze political participation in cross-national electoral contexts. This paper capitalizes on this capability to examine political polarization and citizen engagement during the US and French presidential campaigns. We use the Twitter Gardenhose collection to filter tweets based on keywords around a 50-day window, from March 19, 2012 to May 8, 2012 for the French election and September 19, 2012 to November 8, 2012 for the US Election, particularly focusing on on engagement during the US and French presidential debates on October 3, 2012 and May 2, 2012, respectively. From these data, we constructed partisan alignments based on hashtag usage and retweet networks. We found evidence of more stark political polarization in the French case, while the US case demonstrated less partisan division. This study elaborates commonalities and contrasts in the use of a major social medium by citizens in contexts that differ in political culture and language but feature similar ideological divides, electoral politics, and campaign contexts. We conclude by discussing the implications of computational social science and "big data" in communications, comparative politics, and political sociology.

Categories and Subject Descriptors

H.5.3 [**Information interfaces and presentation**]: Group and Organization Interfaces—*Collaborative computing*

Keywords

Twitter; politics; presidential debates; cross-national comparison; political polarization; networks

1. INTRODUCTION

1.1 Networked politics

A topic of great interest within political communication research has been the question of "networked politics" âĂŞ how social networks enable forms of political exchange and engagement, and what is happening as our society's communication system is increasingly defined by, and constituted in, digital and social media. The consequences of this shift has implications for the subfields of political communication, information science, and computer science, each of which bring particular perspectives and concerns to these questions.

Political communication asks whether networked politics in a digital age are likely to display increased fragmentation and polarization alongside gains in interaction and participation. Evidence of political polarization has been observed in a number of the developed nations – particularly the United States [1, 17]. This political polarization parallels the fragmentation of the broadcast media, the availability of explicitly partisan media in the US and beyond, and the corresponding move toward customization of media experiences [15, 18].

Although early conceptualizations of networked politics imagined a displacement/replacement of the broadcast media system as computers and mobile devices dispersed, more recent notions have revised this idea. People are not giving up one screen in favor of another, but instead are consuming television while interacting on Facebook and Twitter. Laptops, iPads, etc., are becoming a "second screen" *alongside* broadcast media, and are allowing for another type of engagement with its content [19]. The Pew Research Center estimates that nearly 11% of Americans watched the first US presidential debate with a second screen [14]. Some

communication scholars have called these views the "viewertariat": "viewers who use online publishing platforms and social tools to interpret, publicly comment on, and debate a television broadcast while they are watching it" [2, p. 441]. The second screen allows a media consumer to interact with broadcast content and their social network in deeper ways. These interactions also provide an opportunity to examine how citizens react to political events, projecting political alignments through language and labels.

Social media embody the characteristics and possibilities of digitally networked communication. And it is becoming evident that social media platforms such as Facebook, Twitter, and YouTube are playing increasingly potent roles in political events, both as providers of information, coordination mechanisms, and sites of political expression. This has been demonstrated in both formal electoral contexts [21, 7] and contexts of non-electoral movements and mobilizations [e.g. 8, 20], leading some scholars to anticipate profound changes in the nature of political learning and activism [3, 4].

The analyses that have come out of information and computer sciences have focused on Twitter as a meaningful tool for political actors to connect with and influence citizens, as well as for citizens to connect with one another and form political alignments, especially in electoral contexts [21, 7]. Recent analyses have shown that Twitter can be used to gauge political polarization [6], public mood and opinion [5, 13], the mapping of relations among candidates and followers [9], and, most relevant for the current study, track the semantic structure and content of political media events [16]. These technologies allow elites to connect with and influence citizens, and give citizens a place to form and express partisan alignments. They may also allow a space in which those who hold differing issue positions to engage with each other [23].

These technologies provide a framework for researcher to assess how elites connect with and influence citizens, and how citizens form and express partisan alignments. It is possible to do so by assessing expression and mapping network ties, thereby inferring these elements from the content of messages and network structure of connections.

Using these methods, we are able look closely within two seemingly parallel "second screen" political events: The US and French presidential debates on October 3, 2012 and May 2, 2012, respectively. Our analysis allows us to explore two questions: In In digital media, to what extent can a *national conversation* still exist? Or, to what extent are partisans secluded within their own *echo chambers*?

1.2 Comparing France and the US

The French and US elections, specifically their debates, present a good opportunity to explore some of these questions in a transnational context, in terms of similarity between political systems and technological penetration. Both presidential systems lead inevitably to a strong personalization of political attitudes. There is a great persistence and significance of the "left-right cleavage" in both polities, sustained by the mode of elections. Campaigns are both very polarized, partially conditioned by the behavior of incumbents while in office.

From a technological perspective, both of the polities have a high penetration of social media; in Twitter usage per capita, the US ranks 1st worldwide, while France is 7th. They are also similar television and debate cultures. De-
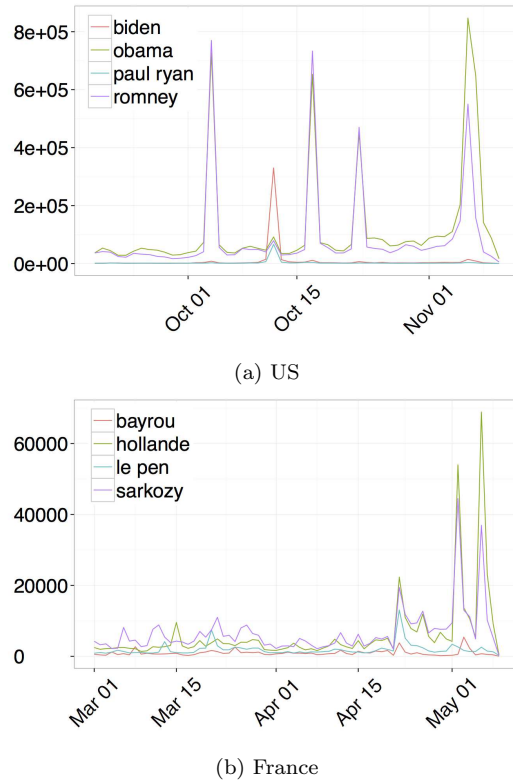

(a) US

(b) France

Figure 1: 50-day plots for each country

bates are the central moments of the campaign broadcast nation wide with a broad audience. It is estimated that 67 million people (about 21% of the population) watched the first 2012 presidential debate on cable television in the US, while 20 million (about 31% of the population) watched the single 2012 debate in France.

2. DATA COLLECTION

We maintain a continuing collection of data on the Twitter Gardenhose, beginning in February 2012. The Gardenhose represents a 10% sample of all of Twitter across the globe, according to the Twitter API[1]. The resulting dataset accounts for anywhere from 20-40 million tweets a day.

From this dataset, we drew posts based on keywords around a 50-day window before each election, from March 19, 2012 to May 8, 2012 for the French election and September 19, 2012 to November 8, 2012 for the US Election. In the US case, we focused on tweets that contained the names of prominent presidential candidates from the two major parties but also the smaller parties. We performed queries based on candidate's full name or last name, depending on whether we believed whether the name would include more noise than signal (e.g. querying for "paul ryan" instead of just "ryan"). In the French case, we included all candidates who ran in the first round, querying only by last name. Based on these queries, Figure 1 displays only the volume of the most highly visibly keywords. In the US case, those words are "obama", "biden", "paul ryan", and "romney", reflecting the Democratic and Republican presidential and vice pres-

---

[1]`https://dev.twitter.com/docs/streaming-apis`

idential candidates. In the French case, the top terms are "hollande", "sarkozy", "le pen", and "bayrou". Hollande and Sarkozy were the most popular candidates, both of whom advanced to the second round of the election. François Hollande represents the center-left Socialist Party (*Parti socialiste*), while Nicolas Sarkozy represents the center-right Union for a Popular Movement (*Union pour un mouvement populaire*). We included Marie Le Pen of the nationalist National Front (*Front national*) and François Bayrou of the centrist Democratic Movement (*Mouvement démocrate*).

What we see from our bird's eye view during the campaigns is that Twitter activity is closely mapped to elections and debates. We see massive numbers of messages during debates, orders of magnitude more than during a typical day during the campaign. The four peaks prior to November 7 in the US plot (1a) all correspond to days of presidential debates, with the fourth being the vice presidential debate. Similarly, in the French case (1b), the peak on May 2 corresponds to the presidential debate before the election several days later. This suggests strong support for the notion of the "second screen" – the devices being used to monitor and product Twitter messages are not displacing the broadcasts of the debates, but instead giving viewers the opportunity to add their own views to what is in fact a national conversation. Social media users get a chance to express, dissect, correct, spin and joke about what is going on in the broadcast event. Notably, this is a synchronous conversation – a rare moment in which nations *do*, in fact, come together to consider candidates in the election. It is difficult to say to what extent the conversation is truly deliberative, and there is no way to measure the extent to which it is representative. But this certainly suggests that these moments of intense activity warrant further analysis.

3. ANALYSIS

In this analysis, we drill down into these periods of intense discussion and national conversation. We focus on the first US presidential debate, which took place on October 3, 2012, from 9-10:30 PM EST, and the only French presidential debate, which occurred on May 2, from 9 PM-12 AM Central European Summer Time (CEST). We analyzed the period of the debate, plus a 2-hour period before and after it in order to compare the conversation beforehand, during, and after the debates. Given prior work on social media behavior during debates [2], we expect to see the before and after periods to exhibit very different dynamics: before the debate very few people will be paying attention to national politics, while after people will keep on speaking about the debate, to give their reactions.

We use two strategies to characterize the national conversations around elections. In the first, we suggest that counts of candidate mentions can be considered a "share of voice" measure for each candidate during the debate."Share of voice" denotes simple mentions of each candidate, without coding for any valence or contextual elements of the candidate mention. While this may be a crude measure, previous studies of Twitter and elections suggest that sheer numbers of mentions of a particular candidate correlate with electoral victory [21, 7] (although see [11]). Second, we use network maps and statistics to explore the retweet networks during these periods, and analyze polarization within those networks by classifying users according to which candidate they support through their hashtag usage.
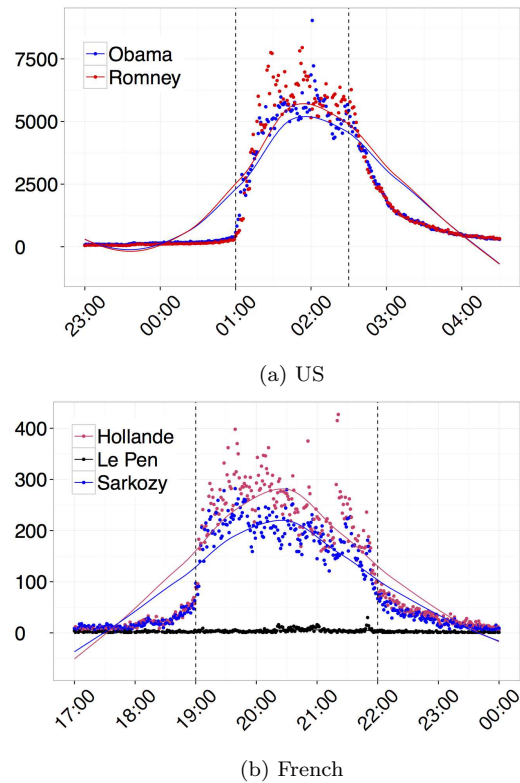

(a) US

(b) French

Figure 2: Debate-centered "share of voice".

3.1 "Share of voice"

The plots in figure 2 are minute-by-minute scatter plots with LOESS-smoothed trend lines superimposed representing mentions of each candidate during the debate. The dotted vertical lines are the times when the debate started and ended. In the US graph (2a) mentions of candidates are low before the debate but rise once the debate begins. The counts for Obama and Romney are close, but Romney ends up receiving more mentions overall. Share of voice stays somewhat high after the debate, which may denote a continual conversation and citizen-centric spin and expression. In the French graph (2b), the rise of mentions is consistent to what we see in the US case. Throughout, mentions of Hollande are higher than Sarkozy. However, compared to the US case, mentions fall off much more quickly. While this may indicate less post-debate conversation, it also may be a consequence of the fact that the debate in Paris ended close to midnight.

What's significant in both cases is that there was a greater share of voice to the "winning" candidate. By "winning" candidate, we mean the candidate which press and polls had indicated who won the debate. We see three phases of the debate: (1) intermittent discussion before the start – we see this more in the French case; (2) heightened discussion during the debate. The points are jagged because people are responding to particular events within the debate; (3) Lastly we see a return to equity post-debate, but that this is a bit slower in the US, meaning there may be a more enduring conversation in the US although the length and time of the French debate may have played a factor in this.

	Period	V_{tot}	E_{tot}	V_{LC}	E_{LC}
US	Before	134029	4365	383	389
	During	456297	373960	243447	292357
	After	572031	165266	102332	111986
France	Before	18552	1647	661	677
	During	31088	29261	17595	25608
	After	32426	3119	1805	1948

Table 1: Network statistics

3.2 Networks

In these graphs we can see the structure of the network and the expression of political preference for the Twitter users engaged in the conversation during the debate. The networks were generated from retweeting behavior of users which we picked up by filtering on candidates' names. Users who were retweeted more often are represented by larger circles. These graphs denote only the largest connected component of these networks. We focus here on the largest component because we assume that this is the core of where major conversations are occurring.

To obtain a metric for polarization and fragmentation, we attempted to classify candidates according to political alignment. In the US case, no single hashtag stood out as definitely pro-Obama or Romney. Therefore, we used a summation of three hashtags for each candidate: `#teamobama`, `#obama2012`, and `#voteobama`; `#teamromney`, `#romney2012`, and `#cantafford4more`. If the user used more hashtags for one candidate than the other, we classified that user as a supporter of that candidate. In the French network, the most popular hashtags in the dataset were explicitly partisan. We assigned users candidate support based on whether the user tweeted more of either of two hashtags - `#avecsarkozy` and `#votehollande`.

Before both debates, networks for both debates were sparse. During the debate, however, volume exploded and the networks became incredibly dense. In the US case, the network (3b) appears to be throughout dense but it isn't clear that there are any clear patterns of clustering by political alignment or candidate support. There may be smaller conversations occurring that are not focused on expressing partisan support. However, in the French case, the network (4b) is clearly polarized in support of either Hollande or Sarkozy. After the US debate, the networks remain populated and dense, and, to a degree, somewhat more partisan. The French post-debate is much more sparse, however. The network dynamics reflect the "share of voice" figures and the stages of the debate.

Table 1 displays the network statistics for all of these networks. V_{tot} and E_{tot} denote vertices and edges in the total network, respectively, while V_{LC} and E_{LC} denote those in the largest connected component. In the US case, there's a huge growth of vertices in the graph from before to during the debate. Focusing on the largest component, it goes from around 300 to closer to 300,000. After the debate, it crawls down 100,000. However, there are still around 600,000 users in the greater conversation that are not connected to the largest component. E_{tot} declines to nearly half of what it was during the debate.

We see similar dynamic during the French debate. The largest component goes from 66 to nearly 18 thousand dur-
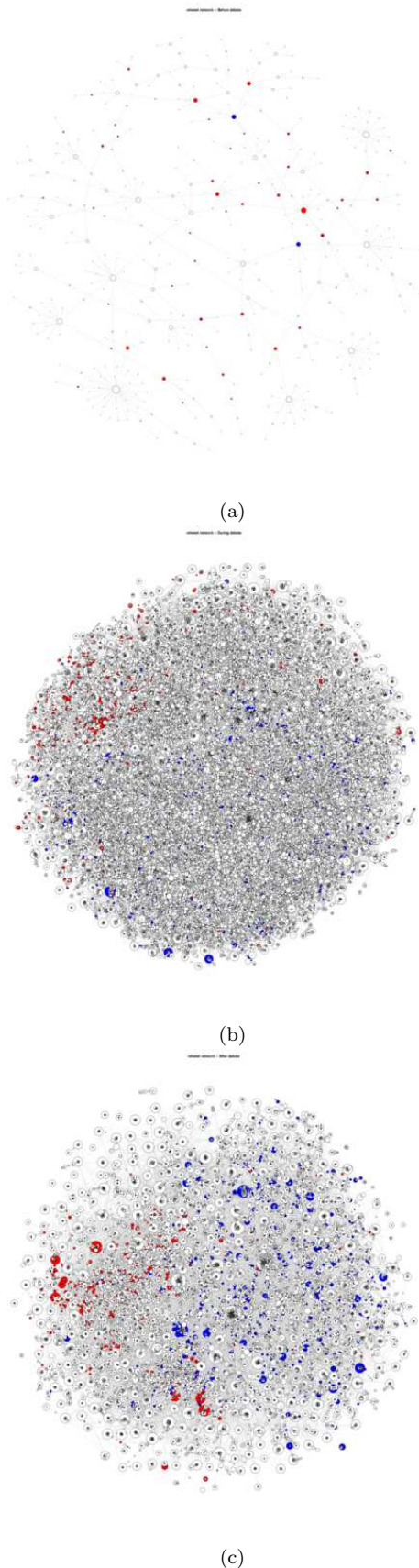

(a)

(b)

(c)

Figure 3: US retweet networks: before, during, and after the debate. Blue represents Obama supporters and red Romney supporters.

(a)

(b)

(c)
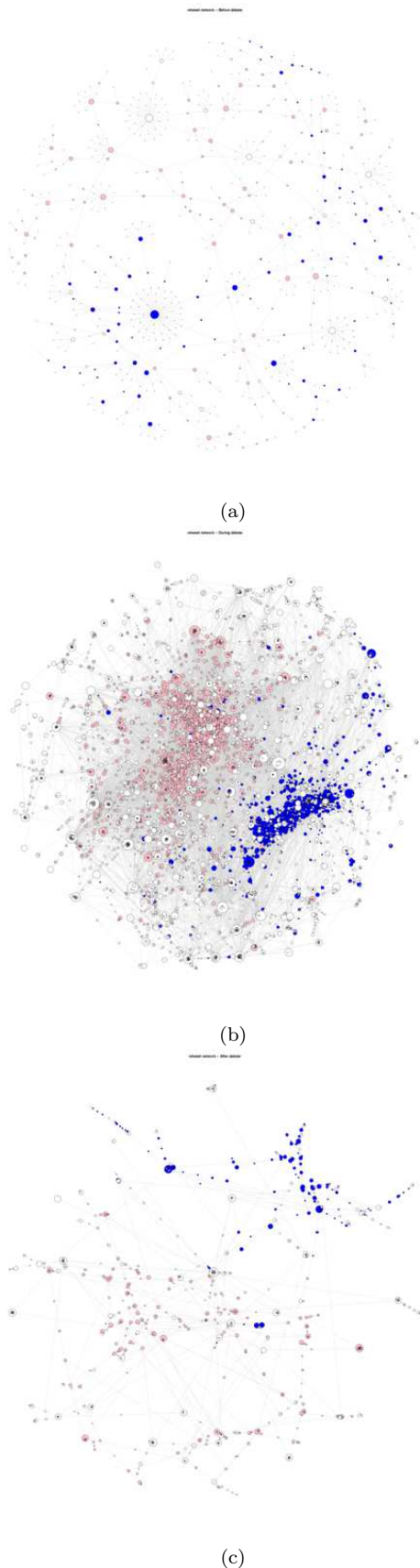
Figure 4: French retweet networks: before, during, and after the debate. Blue represents Sarkozy supporters and pink Hollande supporters.

	Obama	Romney
Before	2.09%	24.54%
During	5.95%	2.33%
After	12.29%	2.68%

	Hollande	Sarkozy
Before	36.46%	37.67%
During	23.71%	16.55%
After	34.74%	16.45%

Table 2: Polarization statistics within largest component in the retweet network

ing the debate. However, this number falls back down to 1,805 after the debate, making the post-debate retweet network much sparser than the US network.

Table 2 reports percentages of people in the largest network component expressing partisan alignment. We see that before the US debate, nearly a quarter of users express support for Romney while only two percent express support for Obama. During the debate, less than 10% of users express support for either candidate. But after the debate, nearly 12% of users express support for Obama. The French case is a stark contrast. Nearly 40% of users express support for either of the candidates, meaning that nearly three-fourths (74.13%) of the network is composed of partisans. During the debate, support for candidates is still comparatively high (40.26% in total). Lastly, after the debate, expressions of support for Hollande rises and in total, expressions of support rise to a majority of users (51.19%).

4. CONCLUSIONS

This article presents a computational approach to partisanship and polarization in the the US and French presidential elections. We make claims about political behavior, partisan alignment, and citizen engagement by looking at both Twitter content and networks. We chose to focus our analysis on presidential debates, given the central place they occupy in both the US and French presidential elections and campaigns. Debates are moments of national conversation, and are major broadcast events with which individuals participate through new media tools. The implication is that networked politics is not enacted solely with new media tools but in interaction with broadcast media events.

In this preliminary analysis, we revealed many commonalities between the Twitter discussion surrounding the US and French debates. We see strong support that users are engaging with the "second screen" during debates. We also see that the "winning" politician is the one who gets greater "share of voice." While this is a blunt measure, it seems to accord at least with the literature on Twitter and elections. We also see that the dynamics of debate follow a relatively stable pattern, with conversation increasing greatly during the debate and then declining afterwards.

However, there are some significant departures between the two cases. We see a relatively more partisan hashtag and retweet network within the French case compared to the US case. We also see a continuing conversation post-debate in the US, while the French conversation drops off significantly. This may indicate that Twitter users in the US are more likely to engage in other types of conversations surrounding the debate that have little to do with expressions of

support, while in France this is the primary organizing principle of discussion. It may also indicate that only when the debate has finished do the US partisans express their support, although this may be an artifact of particular tactics of the candidates themselves (e.g. after the debate, @BarackObama sent a tweet saying "RT if you're on #TeamObama tonight"[2], which has received over 86 thousand retweets).

Methodologically, there are two concerns with the current study. The first is time of day. The French post-debate activity is much lower compared to the US, but this may be because the French debate ended at midnight on a weeknight. It may be a simple matter of user fatigue. The second issue is the construction of the retweet networks. The inferences from these data should be made with caution, given that the original data is already a sample from the full Twitter stream, which has been shown questionable validity for standard network measures [12], and that we are reducing the data further by filtering only on candidate names.

Despite these methodological concerns, we are confident that computational approaches can tell us much more about how debates fit into elections, campaigns, and national conversations. Our future work will expand in focus and in methods. First, we are interested in understand how Twitter dynamics play out across the whole campaign cycle, not only just during debates. How do opinions shift across time? How do they interact with broadcast media events – not only debates but also more common horserace activities like barnstorming and speeches? Additionally, the comparative case allows us to understand how this plays out across different national political systems.

In terms of method, we are only scratching the surface in terms of the kind of analysis that can be brought to bear on these data. Given the sheer amount of textual data, using machine learning methods to classify not only partisan alignment but also other types of behaviors would be an apt strategy. These network data can be also be subjected to community detection to find not only partisanship but also the different types of political behavior in which users are engaged. Both of these methods have been used to detect partisanship within Twitter networks [6]. Using these methods can also provide insight into other types of political behavior which are more issue-centric and conversational.

We place this research in the growing trend in the social sciences which has been called computational social science [10], and, more specifically, a data-driven political science [22]. While these methods have gained much currency within computer and informational sciences, they have not made their way into the canon of political communication research. However, data is growing, not shrinking, and in time, these methods will be critical to the interrogation of modern democratic politics.

References

[1] A. I. Abramowitz. *The Disappearing Center: Engaged Citizens, Polarization, and American Democracy*. Yale University Press, 2010.

[2] N. Anstead and B. O'Loughlin. The emerging viewertariat and bbc question time: Television, debate, and real-time commenting online. *The International Journal of Press/Politics*, 16(4):440–462, 2011.

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

[4] B. Bimber, A. J. Flanagin, and C. Stohl. Reconceptualizing collective action in the contemporary media environment. *Communication Theory*, 15(4):365–388, 2005.

[5] J. Bollen, A. Pepe, and H. Mao. Modeling public mood and emotion: Twitter sentiment and socio-economic phenomena. In *Proceedings of the 5th International Conference on Weblogs and Social Media (ICWSM)*. AAAI, 2011.

[6] M. D. Conover, J. Ratkiewicz, M. Francisco, B. Gonçalves, A. Flammini, and F. Menczer. Political polarization on twitter. In *Proceedings of 5th International Conference on Weblogs and Social Media (ICWSM)*. AAAI, 2011.

[7] J. DiGrazia, K. McKelvey, J. Bollen, and F. Rojas. More tweets, more votes: Social media as a quantitative indicator of political behavior. 2013.

[8] B. Gleason. #occupy wall street: Exploring informal learning about a social movement on twitter. *American Behavioral Scientist*, 2013.

[9] A. Hanna, B. Sayre, L. Bode, J. Yang, and D. Shah. Mapping the political twitterverse: Candidates and their followers in the midterms. In *Proceedings of 5th International Conference on Weblogs and Social Media (ICWSM)*. AAAI, 2011.

[10] D. Lazer, A. Pentland, L. Adamic, S. Aral, A.-L. Barabási, D. Brewer, N. Christakis, N. Contractor, J. Fowler, M. Gutmann, T. Jebara, G. King, M. Macy, D. Roy, and M. Van Alstyne. Computational social science. *Science*, 323(5915):721–723, 2009.

[11] P. T. Metaxas, E. Mustafaraj, and D. Gayo-Avello. How (not) to predict elections. In *Privacy, security, risk and trust (PASSAT), 2011 IEEE third international conference on and 2011 IEEE third international conference on social computing (SocialCom)*, pages 165–171. IEEE, 2011.

[12] F. Morstatter, J. Pfeffer, H. Liu, and K. M. Carley. Is the sample good enough? comparing data from twitter's streaming api with twitter's firehose. In *Proceedings of 7th International Conference on Weblogs and Social Media (ICWSM)*. AAAI, 2013.

[13] B. O'Connor, R. Balasubramanyan, B. R. Routledge, and N. A. Smith. From tweets to polls: Linking text sentiment to public opinion time series. In *Proceedings of 4th International Conference on Weblogs and Social Media (ICWSM)*. AAAI, 2010.

[14] Pew Research Center for the People & the Press. One-in-ten 'dual-screened' the presidential debate, 2012. http://www.people-press.org/2012/10/11/one-in-ten-dual-screened-the-presidential-debate/.

---

[2] https://twitter.com/BarackObama/status/253686037140877312

[15] M. Prior. *Post-broadcast democracy: How media choice increases inequality in political involvement and polarizes elections.* Cambridge University Press, 2007.

[16] D. A. Shamma, L. Kennedy, and E. F. Churchill. Tweet the debates: understanding community annotation of uncollected sources. In *Proceedings of the first SIGMM workshop on Social media*, pages 3–10. ACM, 2009.

[17] N. J. Stroud. *Niche News: The Politics of News Choice: The Politics of News Choice.* Oxford University Press, USA, 2011.

[18] C. R. Sunstein. *Republic.com 2.0.* Princeton University Press, 2009.

[19] The Nielsen Company. In the us, tablets are tv buddies while ereaders make great bedfellows, 2011. `http://www.nielsen.com/us/en/newswire/2011/in-the-u-s-tablets-are-tv-buddies-while-ereaders-make-great-bedfellows.html`.

[20] Z. Tufekci and C. Wilson. Social media and the decision to participate in political protest: Observations from tahrir square. *Journal of Communication*, 62(2):363–379, 2012.

[21] A. Tumasjan, T. O. Sprenger, P. G. Sandner, and I. M. Welpe. Predicting elections with twitter: What 140 characters reveal about political sentiment. In *Proceedings of 4th International Conference on Weblogs and Social Media (ICWSM)*. AAAI, 2010.

[22] I. Weber, A.-M. Popescu, and M. Pennacchiotti. Data-driven political science. In *Proceedings of the sixth ACM international conference on Web search and data mining*, WSDM '13, pages 777–778, New York, NY, USA, 2013. ACM.

[23] S. Yardi and D. Boyd. Dynamic debates: An analysis of group polarization over time on twitter. *Bulletin of Science, Technology & Society*, 30(5):316–327, 2010.