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13 Online Social Networks and Bottom-up Politics

Sandra González-Bailón

It is a common assumption that digital technologies have helped turn political engagement into a more decentralized process. Examples often cited include the 2011 political protests (from the Egyptian revolution to the Occupy Campaign); the actions of the hacktivist group Anonymous (which coordinates distributed attacks targeted at web servers to suspend online services of companies and governments); or the free culture movement (born to promote the creation and distribution of free online content). Examples more remote in the history of digital technologies include the anti-globalization movement (emerged in the late eighties) and the emancipatory struggles of minorities like the indigenous Zapatistas in Mexico—in both cases, the protests attained global visibility through the use of email distribution lists and alternative media sites like Indymedia. All these examples have in common is that the actors involved used digital technologies to coordinate their actions, and targeted online networks with their messages to reach larger audiences and involve more participants. Internet technologies allowed protesters to organize in a decentralized way, that is, without a central authority processing local information or overseeing strategies from above. This form of organization creates more flexible forms of collective action and it has radically changed the way in which grassroots politics operate. The aim of this chapter is to explain why, by examining the network mechanisms that are involved in this new form of organization.

This shift towards more decentralized forms of participation does not mean that online networks are horizontal structures where all connections matter in the same way. In fact, online networks are so instrumental for bottom-up politics (that is, for modes of participation that do not rely on hierarchical organizations, or institutionalized channels like political parties) because they are far from being horizontal: they form heterogeneous structures where some nodes are much better connected than others. It is this unequal connectivity that allows online social networks to be more efficient in the spread of information; it is also the reason why everybody in the network is at a short distance—or a few links away—from each other.

The assumption often made when accounting for the examples of collective action above is that the Internet has allowed larger groups of people to self-organize without formal structures (Shirky 2008). When formed online, social networks that are not necessarily political in nature can be quickly activated for political purposes (Earl and Kimport 2011). Although this chapter focuses on grassroots politics, the organizational power of online networks is also relevant for institutional forms of participation. In electoral races, for instance, online social networks can shape voting outcomes by allowing people to encourage others to vote for a candidate. The Howard Dean campaign in the United States back in 2004—part of his ultimately unsuccessful Democratic presidential nomination—was one of the first campaigns orchestrated using online technologies. Most significantly, the Obama campaign that followed in 2008 borrowed and built on many of the strategies implemented during the Dean campaign (Kreiss 2012). What made these campaigns so special was their ability to tap into social networks to elicit many small donations—which, on the aggregate, helped raise a significant amount of funds. In other words, these campaigns offer good examples of the power that interpersonal networks have to mobilize people and, in particular, of how digital technologies can be used to harness that power.

Online social networks have also transformed the operation and membership of advocacy and interest groups. The swift rise to prominence of platforms like MoveOn (a non-profit public policy advocacy group) and DailyKos (a progressive political blog) offer additional examples of how online social networks, and the audiences they bring, can empower organizations (Karpf 2012). This chapter, however, focuses on political engagement that takes place outside democratic institutions like parties and advocacy groups; the focus is on grassroots and non-institutional forms of participation. Social movements and political protests fall in this category. Although social networks have always been instrumental for the organization of collective action (Diani and McAdam 2003), online communication has allowed those networks to grow larger and faster, and to bring together people without the need for allegiance to a particular organization or authority. The question this chapter aims to answer is: How do online social networks (formed by people communicating with people) help those forms of political engagement emerge from the bottom-up and be sustained?

This chapter argues that online networks help people self-organize because they activate a number of mechanisms that rely on the connectivity of the network. What makes networks so important is that they make individual actions and decisions interdependent, diffusing information about previous behavior that will affect subsequent decisions and actions. This interdependence extends over the paths that networks create. Although the examples listed so far would seem to suggest that there is something inherently novel in digital technologies and in how online networks reconfigure communication flows

(Castells 2009), the fact is that online social networks operate through similar mechanisms to their offline counter-parts—if only with faster and wider effects. Social networks are capable of scaling up the consequences of interdependence, but this does not mean that the mechanisms governing their functioning are substantively different. In fact, the conceptual tools to understand why social networks (online or offline) give structure and muscle to bottom-up politics can already be found in early mass media and political communication research (Katz and Lazarsfeld 1955).

The chapter starts with a review of previous research on networks and political participation, and a summary of the features that make networks an important part of the political process. The review focuses on three dimensions: social influence and the effects of self-selection; information diffusion and the spread of behavior; and the feedback and cumulative effects that link individual actions to collective patterns. The structure of networks—whether they are forged online or offline—shapes the way in which dynamics like social influence or diffusion unfold. The following section explains why, presenting a series of old research questions that are now being revisited through the lens of online data. Section two follows up on this theoretical discussion using data drawn from online social networks. The aim is to debunk three claims: that online networks are horizontal structures; that online networks encourage polarization; and that online networks are always more efficient at facilitating large-scale diffusion of information. Section three brings the argument to a more concrete level by discussing how online networks, and the information they help flow, can be analyzed empirically in the communication environment created by social media. Special attention will be paid to how different choices when assembling and analyzing the data constrain the theoretical questions that can be considered. Overall, this chapter offers an outline of key theories and findings that should serve as a useful starting point for anyone wanting to do research on bottom-up politics in the digital era.

Networks and Political Participation

Individuals are not isolated decision makers. They are part of primary groups and networks that create a frame of reference where opinions and behavior originate. Networks offer a map of those connections, and the communication patterns that arise from social interactions. They can be measured at the individual or the collective level, and although they have been the focus of analysis in social research for decades, online interactions (and the data trails they leave behind) are allowing us to understand their operation and dynamics in a more nuanced way—after all, social networks rely on human communication, and what Internet technologies allow us to do best is to communicate.

Communication creates the opportunity to influence others and be influenced by them: the information that flows amongst peers can change decisions and have a more relevant impact on actions than exposure to common sources of information like media. The study often cited as pioneering research on interpersonal influence aimed to understand how mass media affects voting behavior; but what the study concluded is that, in fact, personal contacts are more effective when it comes to helping voters make up their minds (Lazarsfeld et al. 1948). In discussing their unanticipated findings, the authors introduced the idea of the “two-step flow of information,” which suggests that the media shapes opinions indirectly through the mediating role of opinion leaders: these are the people that are more exposed to news sources and pass on a digested version of the information through their personal networks (Katz and Lazarsfeld 1955). A significant amount of research has since tried to uncover what has been called the “social logic of politics” (Zuckerman 2005). Underlying these efforts is the realization that actors are not atoms that decide in isolation, but more like molecules (Katz 1957: 78), that is, part of larger structures that need to be analyzed to understand individual actions.

There are several features in these structures that are important for decoding bottom-up politics. On a local level, the focus of analysis is often placed on the size of personal networks, and the frequency of interactions. These dimensions have usually been analyzed using surveys that ask respondents to nominate discussion partners and use follow-up questions on the intensity of those interactions or the characteristics of discussants (Klofstad et al. 2009). Longitudinal analyses of these data have suggested declining trends in the size of discussion networks, which has been interpreted as a sign of weakening democracies (McPherson et al. 2006); this pattern, however has been contested for not taking into account the rising prominence of online social networks (Wang and Wellman 2010). Online interactions and the way in which they mediate communication have forced a shift in this theoretical discussion: they make the analysis of networks less dependent on surveys and questionnaires and more reliant on observational data.

In addition to size, another important dimension of social networks is their composition. The existence of diversity of opinions and disagreement in personal discussion networks has long been a focus for research (Huckfeldt et al. 2004), although the effects of disagreement on engagement and participation are still contentious issues. Online technologies are offering the means to test many of the assumptions made around self-selection and disagreement in networks. Experiments in Facebook, for instance, suggest that people are not that good at assessing the extent of disagreement that exists in their personal networks (Goel et al. 2010). This limits the extent to which people can self-select in groups of similar others because the assessment of how similar they are to friends or acquaintances is, often, inaccurate. Networks, in other words, always contain an amount of disagreement. The question—revisited in the

next section—is whether online technologies are encouraging that disagreement or restricting it because of more polarized interactions.

The way in which personal networks connect to each other on the collective level is crucial to understanding the diffusion of behavior. Empirical research on this level of aggregation is not as rich as on personal discussion networks, given the difficulties of reconstructing networks for entire populations (a difficulty that some digital data alleviate, as the following sections will show). However, simulation studies that are used to overcome the lack of empirical data show that the structure of networks has a significant impact on chain reactions in, for instance, the decision to vote (Fowler 2005). The average degree (i.e. the number of contacts or discussants actors have in their local networks); the amount of local transitivity or clustering (i.e. the tendency of one's contacts to be connected to each other); and the existence of bridges (i.e. shortcuts connecting local networks that would be far apart otherwise) are all relevant structural properties when it comes to facilitating diffusion in a population.

That these features are important is not surprising: they are the properties that make networks small, a phenomenon that has been shown to have an impact on a wide range of collective dynamics (Watts 2004). These ideas are relevant because they link research on political networks back to the original study on the two-step flow of information. In particular, analyzing the structure of networks allows revisiting the question of where opinion leaders fall in the crossroads of connections. As explained above, the two-step flow model presumes that opinion leaders influence other people; networks allow tracing back the chains of influence and analyzing the relative position of some leaders compared to other leaders and to their followers.

Network dynamics are relevant not only because they affect individual decisions and practices but also because they shape collective outcomes: these can take the form of more votes on the aggregate or more people joining a political demonstration. Networks are instrumental not only in recruiting voters but also participants to political protests (Diani and McAdam 2003). Interpersonal connections activate chain reactions that might end up reaching a critical mass, on which collective action depends (Marwell and Oliver 1993). Every successful diffusion process has a point of no return, and networks—by making decisions interdependent—facilitate reaching that point beyond which diffusion becomes self-sustaining (Granovetter 1978). In the context of decentralized networks, initiating a chain reaction (to, say, recruit protesters) relies on the decision of specific individuals; but making that chain reach a large number of people is not in the hands of any of them: chains are shaped by the network position of those who decide to follow, and the position of those who follow the followers, and so on.

According to the network approach, there are three elements involved in a diffusion process. The first is sequential decision making: actors can see what other actors did before them, as when potential protesters check how many others are already demonstrating on the streets. The second element

refers to the activation of thresholds, which happens when actors register that a sufficiently large number of people have already joined the collective effort: the leaders of a movement are driven by an intrinsic motivation to join first (so their thresholds are low), whereas the followers will only join once they see many others already active (so their thresholds are high). The third element are chain reactions: they are driven by sequential decisions and by how networks channel influence, which is similar to a domino effect; cumulative effects in the form of positive feedback loops make the rest of the process unfold (Schelling 1978: chapter 3). It is because of these three elements that networks provide the structure and the muscle of bottom-up politics: they are channels for the diffusion of information and behavior, but they also trigger mechanisms (i.e. threshold activation, chain reactions, cumulative effects) that amplify the impact of every individual action.

Research on Online Social Networks

The previous section identified the mechanisms that make networks important mediators of grassroots politics. There are still, however many open questions about how they operate in the real world: networks are constantly changing and, with them, the position of opinion leaders and the position of their followers. Digital data are helping us understand the empirical intricacies of those mechanisms because they offer a higher resolution lens to observe social interactions (Lazer et al. 2009; Watts 2007). Recent studies illustrate the benefits of working with better data to analyze the three dimensions considered in the previous section: *social influence*, *information diffusion*, and *tipping points* as activated by interactions in networks.

Discussions on how online networks mediate social influence have often centered on the dangers of polarization—especially given the ability to self-select and personalize exposure to information that digital technologies afford by design (Sunstein 2007). This argument suggests that online networks can only amplify preconceptions and radicalize positions, undermining as a result a fundamental component of democracies: to have opinions and values challenged by those who think differently. The now classic example of ideological polarization in the blogosphere (Adamic and Glance 2005) has often been cited as evidence supporting this type of argument (which, up to that point, mostly relied on technological determinism). Other empirical studies soon followed to show that online social networks are biased towards the same old professional elites (Hindman 2009), and to confirm polarization using different subsets of the blogosphere (Baum and Groeling 2008; Hargittai et al. 2008). This line of research arrived to water down early optimistic claims of how digital technologies would transform political freedoms

and empower individuals; it suggested that the concentration and polarization dynamics that shape offline politics are also leaving an imprint on online interactions.

More recent research on political talk in social networking sites, however, casts doubts on the polarization hypothesis: it shows that the extent of polarization depends on how communication networks are reconstructed, and that some users successfully provoke interactions across ideological divides (Conover et al. 2011). This is illuminating because it highlights the importance of operationalization: research on polarization in the blogosphere, for instance, does not often sample moderate or independent blogs, and these might have offered the middle ground where discussions from both sides of the divide converged. Research comparing segregation levels in online and offline news consumption, on the other hand, also finds no evidence that the Internet is becoming more polarized over time (Gentzkow and Shapiro 2011); instead, the evidence suggests that Internet news consumers with homogeneous news diets are the exception: ideological segregation on the Web is low in absolute terms and significantly lower than offline segregation. In brief, it is by no means clear that online discussions and information exposure is more polarized today than it was before the Internet created venues for most public interactions.

The same technological determinism that prevailed in incipient discussions of polarization in online social networks applies also to claims about diffusion. Much in the same way as a technology that allows filtering does not necessarily increase the levels of polarization, networks that allow a fast diffusion of information do not necessarily lead to more cascades. Most case studies analyzing the virality of content or the rapid effervescence of collective action (Castells 2009: chapter 5) are based on success stories that, when put in context, emerge as the lucky outliers. Research with large-scale data, which reduce the effects of sample bias by including both failed and successful instances of diffusion, has shown that global information cascades occur only as a small proportion of all initiated cascades (Goel et al. 2012). These findings, replicated using different datasets and platforms, beg the following question: if online social networks are, by virtue of their structural properties, very efficient in transmitting information, but only occasionally give rise to information diffusion on a global scale, what explains those successful chain reactions? What happens in the rare circumstances when cascades grow large?

Network structure alone does not offer a set of sufficient conditions to answer those questions: content also matters. Research suggests that the domain of the information being diffused (i.e. politics versus entertainment, Romero et al. 2011) or the emotions triggered by that information (Berger and Milkman 2012) are also relevant factors in explaining the extent to which information spreads. Cascades are context-dependent and they are not driven by technology, although technology makes them grow faster—when they happen to grow.

Returning to the two-step flow of information hypothesis, research in online social networks has revealed that it is difficult to identify a subset of individuals who can be labeled as opinion leaders in terms of their demographics; however, they tend to have larger networks (Bakshy et al. 2011; Sun et al. 2009). The identification of opinion leaders is not independent of how “influence” is made operational, an empirical constraint that the next section will revisit. In the case of Twitter, for instance, possibilities include using the number of followers, the number of retweets (RTs) or the number of mentions as proxies to influence (Cha et al. 2010). Each of these alternative ways of measuring the influence of a given user offers different approximations to the same set of people and to the different roles they play in specific information contexts.

These and other recent studies confirm the idea formulated in early research on social influence: that individuals might be leaders in one domain but not in others. This implies that, depending on interests and the diversity of those interests, people will often act as followers and occasionally as leaders (Katz 1957). Because of this, the set of Twitter users following an opinion leader are even more important in the process of information diffusion than the leaders: in the end, leaders can only exert their influence if they have a contingent of followers who, with their actions, will help cascades grow large. The way in which these dynamics unfold in online social networks is important for the political process because they determine (a) who gets exposed to what information; and (b) how diffusion might spillover and shape offline behavior. The following section explores in more detail the way in which social networks can be measured and reconstructed using online communication, and why these methods affect the way in which we can address theoretical questions related to bottom-up politics.

Measuring Online Social Networks

Many of the theoretical questions discussed in the previous sections are very dependent on how network data are collected and analyzed. Digital technologies offer broader and richer observations of how people communicate and interact, but they also add peculiarities to the data. This section summarizes a few of the measurement issues intrinsic to online networks with the help of one concrete example: political communication around the Occupy campaign on Twitter. Online communication has facilitated the emergence of global activism (Bennett 2003), but the formation of transnational networks, or the extent to which they can really be called “global,” are questions that can now be assessed analysing the communication patterns of activists. These patterns can shed light into the structural properties of their decentralized organization

(to identify, for instance, prominent actors), and into the dynamics of protest communication (which changes over time as events take place). Digital data are more granular than traditional sources of information like questionnaires or yearbooks tracking information at the level of organizations; but they require a careful collection and manipulation strategy in line with the theoretical aims—in this case, answer the question of how a social movement organizes on an international scale.

The process of collecting data from digital sources is a topic of its own that lies beyond the scope of this chapter (a good starting point is Hansen et al. 2011). Assuming that a sample of Twitter messages has already been collected—in this case containing variations of the hashtag #Occupy*—the question is how to use the sample to reconstruct the network of communication amongst protesters. Hashtags are labels self-assigned by users to identify streams of information that are relevant to particular issues. In this case, the selected hashtags track information relevant to the political movement that started in New York in September of 2011 and grew shortly afterwards to attain global awareness.

There are different ways of reconstructing communication networks using a sample of Twitter messages. Extracting the unique identifier of the authors sending messages, and crawling their local networks, allows mapping the global structure of who follows whom. This network creates the basic layer of interaction in the Twitter platform. On top of this structure, users can create more direct (and fluid) communication channels by mentioning other users in their messages. This network can be reconstructed using the @handle convention, which targets people by means of their username: every time a user mentions another user in a message, a directed link is formed between the two. Users can also help broadcast some of the messages they are exposed to via RTs, which allow reposting a message previously published by some other user; again, when a user RTs a message, a directed connection is created with the user who posted it first.

The networks formed by these two conversational conventions (RTs and mentions) are embedded in the same underlying structure of users following or being followed, but these networks have a different structure and allow different types of information flow. The analysis of political discussions introduced above, for instance, finds evidence of polarization in the network formed by RTs, but not in the network formed by @mentions (Conover et al. 2011). This suggests that Twitter users employ these conventions for different purposes: they are more likely to broadcast information of like-minded users, but they engage in discussions (as approximated via mentions) with users on the other side of the divide. These differences in communication flow would have gone unnoticed had the researchers focused on just one of the three possible networks.

Likewise, depending on the research question at hand, one level of analysis might be more meaningful than the others. The network formed by @mentions, for instance, is more relevant than the network formed by followers if the quest is to identify the users who are key in the diffusion of specific information, like messages related to a political protest (González-Bailón et al. 2013; González-Bailón et al. 2011). The network of followers creates the opportunity for information exchange (i.e. it opens the basic infrastructure for information diffusion), but interactions through message exchange create the streams of information that are relevant for a given political mobilization.

In the context of the Occupy campaign, there is yet a fourth way of reconstructing networks, namely by using the meta-information contained in the hashtags. Many hashtags used in the campaign are associated to cities as in #OccupyWallStreet for New York or #OccupyLSX for London. When any two of these hashtags are used in the same Twitter message, an implicit connection is created across cities: at the very least, the joint use of hashtags indicates that the message is relevant for the groups mobilized in the referenced cities. Using this meta-information, a spatial network of protest activity can be reconstructed, as illustrated by the map in Figure 13.1.

The network in Figure 13.1 can be disaggregated by looking at the actual individuals who sent those messages and their connections in the following/follower structure (or in the @mentions or the RTs networks). This would



Figure 13.1 Spatial communication network of the Occupy Campaign

Note: links between cities are based on “Occupy*” hashtags with an explicit location reference in the tag (i.e., #OccupyWallStreet for New York or #OccupyLSX for London); a link between locations was created when the hashtags were co-used in the same tweet. Darker lines indicate more messages. The data are aggregated for the time period April 30 to May 30, 2012, and are based on a sample of ~ 255,000 messages containing the hashtag “#occupy*” (only a subset of these messages used jointly two or more location-based tags). The pairs of cities most often co-mentioned are New York—Washington, Ottawa—Toronto, and Los Angeles—San Francisco. Thanks to Ning Wang for his work in collecting the data and drawing the map as part of the Oxford Internet Institute’s project *Leaders and Followers in Online Activism*.

allow identifying the users who act as brokers, that is, those who link local groups and information flows to the international campaign and communication network. Which of all these possibilities offers the most appropriate reconstruction of the communication patterns driving the Occupy campaign is an empirical question, and it depends on the actual theoretical questions motivating the study: Is spatial diffusion the dimension of interest? Is it the dynamics of recruitment into the campaign? Is it engagement in protest activity over time? This section does not aim to answer these questions; instead, it aims to show that there are several ways in which we can measure online social networks, and that each illuminates a different aspect of grassroots or bottom-up politics.

This flexibility is not specific to Twitter data. Platforms like Facebook also allow different network layers to be reconstructed for the same set of users: in addition to the basic friendship ties, relationships can be assessed using posting behavior on walls or the tags applied to the same pictures (Lewis et al. 2008). Access to these data is often restricted and there are many privacy issues to take into consideration, but the point is that online interactions offer many ways of approximating communication networks, or how they change in different information domains and social contexts. This empirical versatility can only enrich our theories of why networks matter for the emergence of the collective dynamics that are relevant for grassroots politics.

Conclusions

This chapter has used the theoretical insights drawn from early mass media and political communication research to assess a few claims about online social networks and how they mediate bottom-up politics. As argued in the introduction, this form of political participation takes place outside institutional channels, and does not rely on the coordinating power of any hierarchical organization; it relies, instead, on the collective dynamics that emerge from self-organized networks of communication. These networks are particularly important for grassroots initiatives mediated by Internet technologies. To explain why networks matter, this chapter has examined explanatory mechanisms on three dimensions: social influence, information diffusion, and critical mass dynamics (when global cascades are generated). These three dimensions are relevant for bottom-up politics because self-organization without a central authority relies on the activation of mechanisms in each of these levels—the network mechanisms discussed above are not specific to online networks, but they are potentially more efficient and scalable online.

In order to demystify common assumptions about how online social networks operate, this chapter has revised recent empirical evidence suggesting that polarization and self-selection are not necessarily higher online; that discussion networks are likely to contain disagreement (even when there is self-selection); and that even though online networks have the structural properties to facilitate a fast diffusion of information, cascades mobilizing a large number of people are still exceptional: they have been shown to be the exception rather than the rule across a number of online platforms. In addition, this chapter has also claimed that the identification of leaders and followers in online networks very much depends on how those networks are constructed. Leaders and followers swap roles in different information domains, and those who act as followers (and their position in the network) might turn out to be more relevant to explain diffusion: once a chain is started, it is followers who make chain reactions continue and grow.

The answer to the original question with which this chapter started (how do online social networks help political participation emerge from the bottom up?) requires a good understanding of how networks mediate—either to facilitate or hamper—influence, diffusion, and feedback effects. By presenting key evidence from recent research, this chapter has outlined the effects of these network mechanisms, and why they are important to understanding decentralized forms of political participation. Online social networks help people self-organize by activating mechanisms that rely on the connectivity of the network, and on the interdependence of their decisions and actions. The structure of social networks—whether they are forged online or offline—shapes the way in which dynamics like social influence or diffusion unfold. What online technologies have changed is the rate and breadth of information exposure: the boundaries of personal networks are less restrictive both in space and time, and the chains of influence they trigger can scale up faster.

More empirical research is needed connecting online networks (and their mechanisms) with grassroots and bottom-up politics. The link between online activity and offline behavior has just started to be investigated (Bond et al. 2012). It is also possible to measure the diversity of opinions expressed in networks using text-mining techniques, which can help identify the characteristics of the information that is more likely to be diffused. There is still much room for improvement, as we have only started to grasp how the study of online communication can help break new theoretical ground in the field of political participation. Our understanding of collective action and grassroots politics, however, will improve with the new data and approaches that Internet-mediated communication makes possible.

■ REFERENCES

- Adamic, L. and Glance, N. S. (2005). "The Political Blogosphere and the 2004 U.S. Election: Divided They Blog." Paper presented at the 2nd Annual Workshop on *The Weblogging Ecosystem: Aggregation, Analysis and Dynamics*, WWW 2005, Japan.

- Bakshy, E., Hofman, J. M., Mason, W. A., and Watts, D. J. (2011). "Everyone's an Influencer: Quantifying Influence on Twitter." Paper presented at the Proceeding of the Fourth International Conference on Web Search and Data Mining (WSDM 2011).
- Baum, M. A. and Groeling, T. (2008). "New Media and the Polarization of American Political Discourse," *Political Communication*, 25: 345–365.
- Berger, J. and Milkman, K. L. (2012). "What Makes Online Content Viral?" *Journal of Marketing Research*, 49(2): 192–205.
- Bennett, W. L. (2003). "Communicating Global Activism: Strengths and Vulnerabilities of Networked Politics," *Information, Communication & Society*, 6: 143–168.
- Bond, R. M., Fariss, C. J., Jones, J. J., Kramer, A. D. I., Marlow, C. A., Settle, J. E., and Fowler, J. H. (2012). "A 61-Million-Person Experiment in Social Influence and Political Mobilization," *Nature* 489: 295–298.
- Castells, M. (2009). *Communication Power*. Oxford: Oxford University Press.
- Cha, M., Haddadi, H., Benevenuto, F., and Gummadi, K. P. (2010). "Measuring User Influence in Twitter: The Million Follower Fallacy." Paper presented at the Proceedings of the International AAAI Conference on Weblogs and Social Media (ICWSM 2010).
- Conover, M. D., Ratkiewicz, J., Francisco, M., Goncalves, B., Flammini, A., and Menczer, F. (2011). "Political Polarization on Twitter." Paper presented at the International Conference on Weblogs and Social Media (ICWSM'11).
- Diani, M. and McAdam, D. (2003). *Social Movements and Networks: Relational Approaches to Collective Action*. Oxford: Oxford University Press.
- Earl, J. and Kimport, K. (2011). *Digitally Enabled Social Change: Activism in the Internet Age*. Cambridge, MA: MIT Press.
- Fowler, J. H. (2005). "Turnout in a Small World," in A. S. Zuckerman (ed.), *The Social Logic of Politics: Personal Networks as Contexts for Political Behavior*. Philadelphia, PA: Temple University Press.
- Gentzkow, M. and Shapiro, J. M. (2011). "Ideological Segregation Online and Offline," *Quarterly Journal of Economics*, 126: 1799–1839.
- Goel, S., Mason, W. A., and Watts, D. J. (2010). "Real and Perceived Attitude Agreement in Social Networks," *Journal of Personality and Social Psychology*, 99(4): 611–621.
- Goel, S., Watts, D. J., and Goldstein, D. G. (2012). "The Structure of Online Diffusion Networks." *Proceedings of the 13th ACM Conference on Electronic Commerce (EC'12)*, New York: ACM Press, 623–638.
- González-Bailón, S., Borge-Holthoefer, J., and Moreno, Y. (2013). "Broadcasters and Hidden Influentials in Online Protest Diffusion," *American Behavioral Scientist*, 57: 943–965.
- González-Bailón, S., Borge-Holthoefer, J., Rivero, A., and Moreno, Y. (2011). "The Dynamics of Protest Recruitment through an Online Network," *Scientific Reports*, 1(197). doi: 10.1038/srep00197.
- Granovetter, M. (1978). "Threshold Models of Collective Behavior," *American Journal of Sociology*, 83(6): 1420–1443.
- Hansen, D., Shneiderman, B., and Smith, M. (2011). *Analyzing Social Media Networks with NodeXL*. Burlington, MA: Morgan Kaufmann.
- Hargittai, E., Gallo, J., and Kane, M. (2008). "Cross-Ideological Discussions among Conservative and Liberal Bloggers," *Public Choice*, 134: 67–86.
- Hindman, M. S. (2009). *The Myth of Digital Democracy*. Princeton, NJ: Princeton University Press.

- Huckfeldt, R., Johnson, P. E., and Sprague, J. (2004). *Political Disagreement: The Survival of Diverse Opinions within Communication Networks*. New York: Cambridge University Press.
- Karpf, D. (2012). *The MoveOn Effect: The Unexpected Transformation of American Political Advocacy*. New York: O.
- Katz, E. (1957). "The Two-Step Flow of Communication: An Up-to-Date Report on an Hypothesis," *Public Opinion Quarterly*, 21(1): 61–78.
- Katz, E. and Lazarsfeld, P. (1955). *Personal Influence: The Part Played by People in the Flow of Mass Communications*. New York: Free Press.
- Klofstad, C. A., McClurg, S. D., and Rolfe, M. (2009). "Measurement of Political Discussion Networks: A Comparison of Two 'Name Generator' Procedures," *Public Opinion Quarterly*, 73(3): 462–483.
- Kreiss, D. (2012). *Taking Our Country Back: The Crafting of Networked Politics from Howard Dean to Barack Obama*. New York: Oxford University Press.
- Lazarsfeld, P., Berelson, B., and Gaudet, H. (1948). *The People's Choice: How the Voter Makes Up His Mind in a Presidential Campaign*. New York: Columbia University Press.
- Lazer, D., Pentland, A., Adamic, L., Aral, S., Barabási, A.-L., Brewer, D., et al. (2009). "Computational Social Science," *Science*, 323: 721–723.
- Lewis, K., Kaufman, J., Gonzalez, M., Wimmer, A., and Christakis, N. A. (2008). "Tastes, Ties, and Time: A New Social Network Dataset Using Facebook.com," *Social Networks*, 30: 330–342.
- Marwell, G. and Oliver, P. (1993). *The Critical Mass in Collective Action*. Cambridge: Cambridge University Press.
- McPherson, M., Smith-Lovin, L., and Brashears, M. E. (2006). "Social Isolation in America: Changes in Core Discussion Networks over Two Decades," *American Sociological Review*, 71: 353–375.
- Romero, D. M., Meeder, B., and Kleinberg, J. (2011). "Differences in the Mechanics of Information Diffusion Across Topics: Idioms, Political Hashtags, and Complex Contagion on Twitter." Paper presented at the International World Wide Web Conference, Hyderabad, India.
- Schelling, T. C. (1978). *Micromotives and Macrobehavior*. London: Norton.
- Shirky, C. (2008). *Here Comes Everybody: The Power of Organizing Without Organizations*. New York: Allen Lane.
- Sun, E., Rosenn, I., Marlow, C. A., and Lento, T. M. (2009). "Gesundheit! Modeling Contagion through Facebook News Feed." *Proceedings of the Third International Conference on Weblogs and Social Media, ICWSM'09*.
- Sunstein, C. (2007). *Republic.com 2.0*. Princeton, NJ: Princeton University Press.
- Wang, H. and Wellman, B. (2010). "Social Connectivity in America: Changes in Adult Friendship Network Size From 2002 to 2007," *American Behavioral Scientist*, 53(8): 1148–1169.
- Watts, D. J. (2004). "The 'New' Science of Networks," *Annual Review of Sociology*, 30: 243–270.
- Watts, D. J. (2007). "A Twenty-First Century Science." *Nature*, 445: 489.
- Zuckerman, A. S. (ed.) (2005). *The Social Logic of Politics: Personal Networks as Contexts for Political Behavior*. Philadelphia, PA: Temple University Press.