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How Social Media Facilitates Political Protest: Information, Motivation, and Social Networks

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It is often claimed that social media platforms such as Facebook and Twitter are profoundly shaping political participation, especially when it comes to protest behavior. Whether or not this is the case, the analysis of "Big Data" generated by social media usage offers unprecedented opportunities to observe complex, dynamic effects associated with large-scale collective action and social movements. In this article, we summarize evidence from studies of protest movements in the United States, Spain, Turkey, and Ukraine demonstrating that: (1) Social media platforms facilitate the exchange of information that is vital to the coordination of protest activities, such as news about transportation, turnout, police presence, violence, medical services, and legal support; (2) in addition, social media platforms facilitate the exchange of emotional and motivational contents in support of and opposition to protest activity, including messages emphasizing anger, social identification, group efficacy, and concerns about fairness, justice, and deprivation as well as explicitly ideological themes; and (3) structural characteristics of online social networks, which may differ as a function

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of political ideology, have important implications for information exposure and the success or failure of organizational efforts. Next, we issue a brief call for future research on a topic that is understudied but fundamental to appreciating the role of social media in facilitating political participation, namely friendship. In closing, we liken the situation confronted by researchers who are harvesting vast quantities of social media data to that of systems biologists in the early days of genome sequencing.

KEY WORDS: social media, social networks, collective action, protest, group identification, political ideology, friendship

Introduction: Social Media and Political Protest

It has been claimed repeatedly—often in the absence of solid data—that Twitter, Facebook, and other social media resources are profoundly shaping both disruptive and nondisruptive forms of political participation (e.g., Cha, Haddadi, Benevento, & Gummadi, 2010; Jungherr, Jurgens, & Schoen, 2011; Lynch, 2011; Shirky, 2011). Yet as a research community we are still learning just how it is that the use of social media systematically affects political participation in areas such as voting or demonstrating for or against a given cause or regime. Isolating direct and specific causes and consequences of social media use remains tremendously challenging, and acute theoretical and methodological problems have yet to be solved (Aday et al., 2010; Gladwell, 2010). Even the most trenchant empirical contributions have been saddled thus far with limitations, such as the unrealistic assumption that "users joined the movement the moment they started sending Tweets about it" (González-Bailón, Borge-Holthoefer, Rivero, & Moreno, 2011, p. 2).

Nevertheless, the use of social media has been linked to the spread of political protest in many cities around the world, including Moscow, Kiev, Istanbul, Ankara, Cairo, Tripoli, Athens, Madrid, New York, Los Angeles, Hong Kong, and Ferguson, Missouri. Obviously, political protest itself is far from new, but the fact that it is possible to access real-time accounts of protest behavior documented and archived through microblogging (e.g., Twitter) and social media (e.g., Facebook) websites is a novel phenomenon. Indeed, it is becoming increasingly difficult to find a protest that does not have its own distinctive hashtag on Twitter (e.g., #OWS = Occupy Wall Street; #Jan25 = protests in Egypt; #direngeziparkı = protests in Turkey; and #Euromaidan = protests in Ukraine), and it is easy to connect these hashtags to message content, user metadata, and social networks.[1] User metadata associated with these accounts allows researchers to access critical information about location, time, position in and structure of the user's social network, all of which creates unparalleled opportunities for social scientific research.

For movement organizers, social media provides an efficient vehicle for the rapid transmission of information about planned events and political developments, thereby facilitating the organization of protest activity. Because of this, Shirky (2011) concluded that: "As the communications landscape gets denser, more complex, and more participatory, the networked population is gaining greater access to information, more opportunities to engage in public speech, and an enhanced ability to undertake collective action" (p. 1; see also Diamond & Plattner, 2012). On the other hand, the use of social media by would-be dissidents provides extraordinary opportunities for governmental authorities to detect and suppress protest activity. For example, the Chinese government has become a worldwide leader in Internet censorship, using technology to identify and quash attempts to organize public

[1] Twitter is a micro-blogging service that allows users to compose messages of up to 140 characters. Users of Twitter can elect to "follow"–i.e., see the "tweets" of–other users. If others "follow" you, they are considered your "friends." It is possible to see (and search for) other messages that have not been labeled as private (i.e., available only to followers). To faciliate such searches, a hashtag convention has developed, whereby individually defined keywords are preceded by a pound symbol ("#"). So, for instance, the hashtag for Occupy Wall Street was #OWS.

assemblies and demonstrations—while simultaneously *allowing* criticism of the government, apparently so that they can monitor public opinion (King, Pan, & Roberts, 2013). A technological "cat-and-mouse" game between dissidents and defenders of existing regimes is underway (MacKinnon, 2012; Morozov, 2011; Shirky, 2011), and it is hard to imagine that it will ever disappear.

For political psychologists and other behavioral scientists, the rise to ubiquity of social media—and the conglomeration of websites and online services loosely referred to as "Web 2.0" (Kaplan & Haenlein, 2010)—presents remarkable empirical opportunities as well as theoretical and methodological challenges (Alberici & Milesi, 2012; González-Bailón et al., 2011; Hooghe, Vissers, Stolle, & Mahéo, 2010; McGarty, Thomas, Lala, Smith, & Bliuc, 2013; Postmes & Brunsting, 2002). The sudden emergence of social media upends models of collective action that have relied on traditional assumptions about the pace and modes of human communication; at the same time, massive data archives from networking sites present researchers with resources to address important long-standing questions. Social and behavioral scientists throughout the second half of the twentieth century relied on surveys of hundreds or perhaps thousands of respondents; only recently have they been able to capitalize on web-based methods to compile datasets involving tens of thousands of respondents (Berinsky, Huber, & Lenz, 2012; Gosling, Vazire, Srvistava, & John, 2004; Nosek, Banaji, & Greenwald, 2002). Social media, by comparison, promises to equip researchers with data sets involving tens of millions of informants, raising enormous scientific—as well as ethical—challenges (Dhar, 2013; King, 2011). Before behavioral scientists can take advantage of these extraordinary opportunities, however, it is necessary to develop an integrative understanding of the effectiveness of both informational and motivational appeals in the context of new technological vehicles for communication; the role of ideology, group identity, emotion, and other social psychological factors in facilitating or inhibiting participation in collective action; and the spread of influence through friendship and other complex social networks.

Our aim in this article is to critically evaluate claims about the macrolevel effects of social media on political participation and to develop and refine empirically testable theories of the microlevel (i.e., social, psychological) processes by which these effects might occur (Aday et al., 2010; Farrell, 2012; González-Bailón et al., 2011; McGarty et al., 2013; Meier, 2011). Although it is possible that online technology has created qualitatively novel forms of political participation, it may also be the case that—as McGarty et al. (2013) put it—social media usage largely contributes to "an acceleration of processes that normally occur much more slowly" (p. 3). Furthermore, the effects of social media may be especially pronounced in relatively closed or authoritarian societies, insofar as online communication creates opportunities that are otherwise lacking for citizens to air grievances and gauge public opinion (Diamond & Plattner, 2012; McGarty et al., 2013; Shirky, 2011).

An Emerging Research Program on Social Media and Political Protest

In this article, we summarize empirical evidence pertaining to a variety of protest movements that have taken place around the world, including Turkey, Ukraine, the United States, and Spain. Our purpose here is not to review each movement in great detail; interested readers may consult published articles, reports, and supplementary materials elsewhere (e.g., see Barberá, Jost, Nagler, Tucker, & Bonneau, 2015a; Barberá et al., 2015b; Langer et al., 2015; Tucker et al., 2014; Tucker et al., 2016). Instead, we endeavor to summarize and synthesize evidence from these various cases to: (1) establish that social media platforms facilitate the exchange of information that is vital to the coordination of protest activities, (2) demonstrate that, in addition to informational provisions, the contents of social media messages communicate emotional themes and motivational appeals, and (3) illustrate the fact

that structures of online social networks have important, nonobvious implications for political communication, organization, and mobilization.

How Social Media Facilitates the Exchange of Information

For over 50 years, it has been a staple of social scientific models of collective action to assume that individuals choose to participate in politics (or not) on the basis of prospective costs and benefits of participating (Downs, 1957; Finkel, Muller, & Opp, 1989; Heckathorn, 1996; Marwell & Oliver, 1993; Oberschall, 1973; Olson, 1965; Riker & Ordeshook, 1968; Tilly, 1978; Useem, 1998). Implicit in "rationalist" models such as these is the assumption that participation requires being able to calculate the anticipated benefits of various potential outcomes (such as shifts in policy or leadership) and to compare them with the anticipated costs of participation (such as injury or arrest) and making some determination that the former outweighs the latter.

Inferring the Costs and Benefits of Protest

The rationalist formulation, sensible as it is, reveals how vulnerable organizational efforts—whether they are aimed at increasing voter turnout or coordinating protest behavior—are to the "free rider" problem (Aldrich, 1993; Franklin, 2004; Grofman, 1993; Morton, 2006), which can be expressed in interrogative form: "Why would anyone ever choose to protest if the success of the movement is unaffected by the presence or absence of any single protester?" As Muller and Opp (1986) point out, each citizen can enjoy the potential benefits of a successful protest whether or not he or she bears the costs of participation. A paradox ensues: If everyone thinks in this calculated, self-interested manner, then the protest will never take place.

And yet millions do participate in politics, and many people engage in protest and other forms of collective action, so there must be a broader set of considerations at work. Despite the paradox that lurks beneath the "cost-benefit" framework, few would deny that it has proven useful in helping to understand the occurrence (and nonoccurrence) of protest movements as well as individual-level decision-making with regard to political participation (Pacek, Pop-Eleches, & Tucker, 2009). According to one intriguing line of argumentation, any citizen with grievances against his or her regime possesses a hypothetical "participation threshold" (Kuran, 1989, 1991). If the number of other people protesting against the regime falls below that threshold, then the potential costs of protesting (relative to the likelihood of success) will discourage the individual from participating. When the number of other protestors exceeds the individual's participation threshold, then he or she will join the protest.

This model has a number of extremely interesting implications, with the most important being that it is impossible (a priori) to know the strength of antiregime sentiment (or the potential reservoir of protestors) simply by asking people "Do you oppose the regime?" or "Would you be willing to protest against the regime?" This is because the individual's answer will (and ought to) depend upon his or her estimate of the current number of opposition members. Following regime transition, many more citizens are likely to say "Yes, I opposed the regime" than would have said so ex ante, not only because of apprehension about responding honestly but because their attitudes toward the regime only registered (or counted) as opposition when the number of other protestors cleared their individual thresholds for participation.

From the perspective of cost-benefit analysis, one would hypothesize that social media usage is likely to affect political behavior by changing the quality and/or quantity of information to which individual citizens are exposed. More specifically, social media may affect the decision to participate by increasing or otherwise altering knowledge about the ratio of costs to benefits. On the "costs" side of the equation, social media could make it easier to acquire information about whether, when, and where a protest is likely to occur as well as timely information about turnout, police presence, and the occurrence of violence. From this perspective, social media should make it easier to solve collective action problems in general, thereby making protest more likely to occur—especially if *certainty* (as

opposed to ambiguity or indeterminate risk) about costs makes people more likely to act.[2] However, in some circumstances, information spread through social media could reduce participation by increasing perceived costs of participation. For instance, highly salient examples of police violence may depress turnout disproportionately—at least in the short run—if people assume that such violence is occurring more frequently than it actually is.

Does Social Media Provide Useful Information to Protestors?

Numerous observers contend that social media plays a vital role in spreading basic information, such as information about the occurrence of rallies in Moldova that were not covered by official media sources (Faris, 2010; Lotan et al., 2011; Mungiu-Pippidi & Munteanu, 2009). Lysenko and Desouza (2012) suggested that Twitter was especially helpful in internationalizing the Moldovan protests and broadcasting information about mass demonstrations. At the same time, claims such as these were challenged by Morozov (2009a), who concluded that there were too few Twitter users in Moldova at the time to produce such effects.[3] In general, skeptics point to the lack of concrete behavioral evidence demonstrating that citizens' online involvement directly shapes offline events; they conclude that the use of social media is neither a necessary nor sufficient cause of protest (Aday et al., 2010; Gladwell, 2010; Lynch, 2011).

The same debate arose with respect to the antecedents of civil unrest following the 2009 Iranian elections. Howard (2010) argued that "the Iranian insurgency was very much shaped by several digital communication tools, which allowed social movements within the country to organize protests and exchange information and made it possible for those groups to maintain contact with the rest of the world" (p.11).[4] Indeed, the U.S. State Department apparently regarded Twitter as sufficiently important in promoting regime opposition that it asked the company to postpone scheduled maintenance tasks to avoid disruption of service.[5] At the same time, Aday et al. (2010) concluded that "Twitter's impact on the protests was almost certainly extremely modest" (p. 18) and that traditional media sources were equally important in conveying information about the protests in Iran.

Complicating matters further, it appears that the Iranian regime used the same social network platforms to identify opposition activists and mobilize regime supporters (Aday et al., 2010). This raises the possibility that the net effect of social media is to *hinder* political participation by making it easier for governments to disrupt oppositional activities. Such disruption can range from monitoring the same Twitter feeds that opposition members use to communicate with one another,[6] to limiting Internet access through the use of technical tools such as filtering and blocking keywords (e.g., Qiang 2011; Zitrain 2008), to fairly sophisticated ways of exerting control, such as denial-of-service attacks, planting provocateurs among opposition online communities, and making use of new technologies that will allow governments to identify protestors based on voices and facial images from protest recordings that are uploaded to social media sites (Morozov, 2011).

[2] It is also possible that discovering that many other people are participating in a given protest would *reduce* one's likelihood of participating because of the social psychological process of "diffusion of responsibility," which follows this logic: If many others are protesting, then it is not necessary for *me* to do so (e.g., Darley & Latané, 1970).

[3] Writing only a few days later, Morozov (2009b) urged critics not to lose sight of the larger picture: "The fact that so few [Twitter users] actually managed to keep the entire global Twittersphere discussing an obscure country for almost a week only proves that Twitter has more power than we think."

[4] Revolutions in Tunisia, Egypt, and, to a lesser extent, Libya, reportedly featured prominent use of social media by activists (Lotan et al. 2011; Lynch 2011; Starbird & Palen 2012). In Egypt, the administrator of one of the most influential Facebook pages, Wael Ghonim (2012), claimed that social media was "the key vehicle to bringing forth the first spark of change" (p. 51).

[5] See http://blog.twitter.com/2009/06/down-time-rescheduled.html.

[6] See, for example, www.allvoices.com/contributed-news/10014037-dubai-police-monitor-the-means-of-social- communication-in-anticipation-of-protests.

Table 1. Popularity of Major Facebook Pages Pertaining to the Turkish Protests of 2013

Webpage	Purpose	# of Likes (August 2013)	Date Started
www.facebook.com/geziparkidirenisi	Most popular "Occupy Gezi" page	643,951	05/31/2013
www.facebook.com/TaksimDayanismasi	Taksim Solidarity movement; started before protests	82,683	02/13/2012
www.facebook.com/OccupyGezi	Primarily English language "Occupy Gezi" page	65,215	05/31/2013
www.facebook.com/TaksimDiren	Another "Occupy Gezi" page	55,854	05/31/2013
www.facebook.com/Diren-Gezi-Park	Another Turkish language "Occupy Gezi" page	25,136	06/01/2013

Note. This table is adapted from Tucker et al. (2016). It shows the number of "likes" of several important Facebook pages pertaining to the Turkish protests (as of August 2013).

Information Exchange During the Turkish and Ukrainian Protests of 2013–14

An especially promising situation in which to explore the effectiveness of social media with respect to the organization of mass political participation came from the Turkish protest movement that began in June of 2013 (see Tucker et al., 2016, for an extended discussion). Spurred by a perceived lack of media coverage by traditional Turkish media, protestors turned to Twitter and Facebook in droves to spread and receive information about the events unfolding in Istanbul. The result was a remarkable demonstration of information diffusion using online social networks. In Table 1, we have listed five of the most popular Facebook pages covering protests that began in Gezi Park. During the period we investigated, four of these pages received approximately 250–725 "likes" per day. The most popular Facebook page, which was in Turkish, was "liked" 643,951 times over a three-month period; this figure represents an average of over 7,000 "likes" per day.

Furthermore, we found clear evidence that Twitter was used for the sort of logistical purposes that have been claimed by enthusiasts of online activism (Tucker et al., 2016). In the first month of the protest alone, over 30 million tweets citing the most salient hashtags were transmitted; most of these were sent in Turkish from inside the country. These figures were significantly higher than those observed only a few years earlier, as in the case of the Egyptian revolution of 2011, where less than 30% of the tweets originated in Egypt (Starbird & Palen, 2012). Half a million of the Turkish tweets were geo-located, so this corpus of tweets provides a valuable source of objectively verifiable information about how protest behavior spreads online and offline. In Figure 1, we display the geographic distribution of a large sample of tweets citing one or more of the major protest hashtags. Most of the messages were sent directly from Taksim Square, and as many as 30,000 different users sent at least one tweet from the area, confirming that social media usage was indeed widespread during the protest period.

We selected a random sample of 800 tweets from the Turkish protests and had them translated into English. Some of the tweets were clearly intended as messages of encouragement and support, and others passed along international news coverage of the events. Many tweets provided specific informational updates, such as instructing demonstrators to converge on particular locations, warning them when the police were approaching those locations, and providing information on how to obtain medical assistance for injuries. Still other messages solicited advice about how to counteract the effects of tear gas or to recruit donors of specific blood types in order to treat those who were wounded in protest (see Tucker et al., 2016).

With respect to the Ukrainian protests of 2014, our analysis of the role of social media yielded four major conclusions (Tucker et al., 2014). First, social media platforms—especially Facebook—

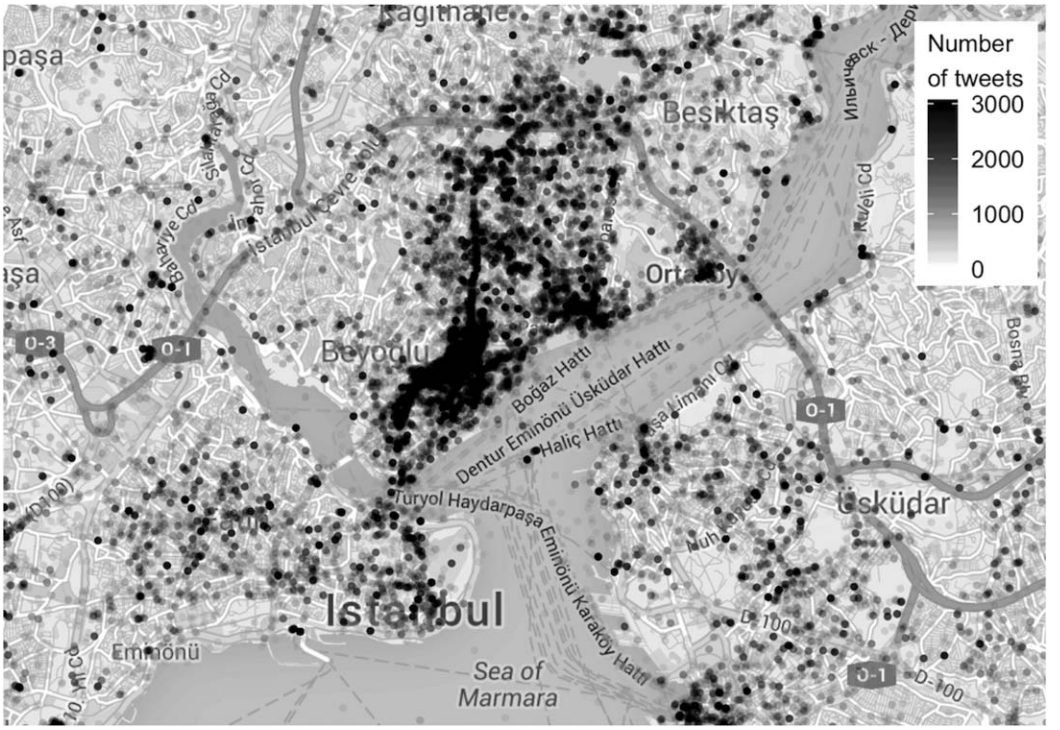

Figure 1. Geolocated tweets about Turkish protests sent from Istanbul (May 31–June 29, 2013).

clearly helped to facilitate the organization of Euromaidan protests. According to a survey of protestors, 5% of respondents learned about the protest from a student group on Facebook, and 40% indicated that they were encouraged to participate by friends or family members on Facebook (Onuch, 2014). Some of the most influential Facebook pages are listed and described in Table 2. They provide several examples of the ways in which social media was used to coordinate activity and recruit new participants once the protests were underway. The Euromaidan Facebook page appeared on November 21, 2013, at the very beginning of the protests. Within two weeks this page had received more

Table 2. Popularity of Major Facebook Pages Pertaining to the Ukrainian Protests of 2014

Webpage	Purpose	# of Likes (end of 2014)	Date Started
www.facebook.com/EuroMaydan	Main page for protest organization	290,000	11/21/2013
www.facebook.com/EvromaidanSOS	Organizing resources (legal, social, media) for protest participants and victims of violence	102,000	11/20/2013
www.facebook.com/EnglishMaidan	News about Euromaidan in English	40,860	11/30/2013
www.facebook.com/helpgettomaidan	Organizing carpools to the protests	12,375	12/10/2013
www.facebook.com/maidanhelp	Coordinating various types of help for people on Maidan	5,804	12/06/2013
www.facebook.com/maidanmed	Coordinating volunteer medical care	5,221	12/02/2013
www.facebook.com/RESOURSES.maidan	Organizing resources (legal, social, media) for protest participants and victims of violence	1,561	01/24/2014

Note. This table is adapted from Tucker et al. (2016). It shows the number of "likes" of several important Facebook pages pertaining to the Ukrainian protests (as of December 2014).

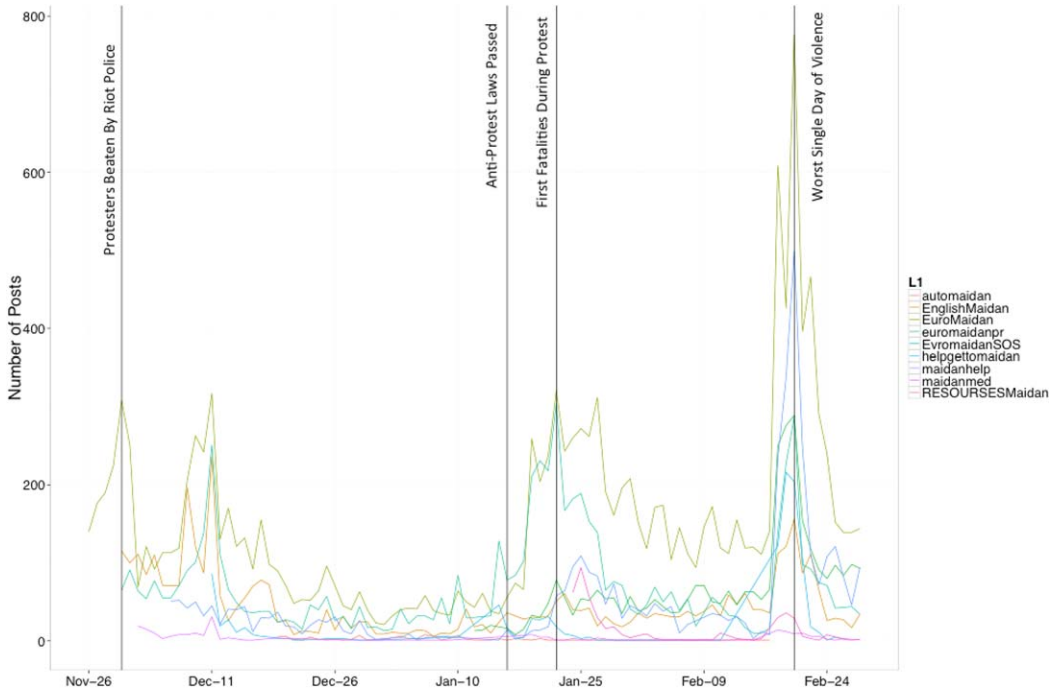

Figure 2. Number of Facebook posts related to the Ukrainian protests as a function of webpage, date, and protest-related events (2014–15). This figure shows the number of Facebook posts on each of several key pages related to the Euromaidan protests over time. Vertical lines mark key protest-related events in order to highlight the ways in which activity spiked on certain pages in response to offline political developments. [Color figure can be viewed at wileyonlinelibrary.com]

than 125,000 "likes." The page was used simply to spread news and information about the ongoing protests. Another page, which was "liked" more than 40,000 times over the next year or so, spread news and information in English. To address more specific needs, new pages were created to coordinate transportation, medical services, and legal support.

It seems clear that protest organizers used social media platforms to provide key logistical support for participants. One Facebook page, which appeared in early December, was called "helpgettomaidan," and it facilitated the organization of carpools to the Maidan from other cities and other parts of Kiev. Users shared the number of passengers they could transport, the time and location of departures, and telephone numbers. This enabled would-be protestors from all over Ukraine to coordinate travel and other details. Another page ("Maidan Medics") was created to coordinate activity among medical practitioners. Similar pages included "EuromaidanSOS" and "Maidanhelp," which offered support to victims of violence. In Figure 2, we have illustrated the number of messages posted on several major Facebook pages during the crisis period in Ukraine. All of these pages remained active throughout the successive waves of protest. The sheer amount of activity on the "EuroMaydan" page — a page that did not exist before November 21, 2013 — is remarkable. This page generated 600,000 comments, 2.2 million "shares," and 7.9 million "likes." The page's popularity increased steadily over time, suggesting that it gained informational relevance once the protests started.[7]

[7] We observed very little anti-Maidan activity on Facebook, suggesting that the platform was favored by citizens with Western sympathies. Those who opposed the Euromaidan protests turned instead to VKontakte, an alternative social media platform that is popular among Russian speakers. One VKontakte page in particular saw a reasonable amount of counterprotest activity in January, with a noticeable increase in February of 2014.

A third conclusion from our analysis was that social media usage closely tracked important political developments throughout the crisis. As can be seen in Figure 2, spikes in online activity correspond very closely to periods of important offline activity, including the initial surge of protests that began in late November; clashes that erupted after antiprotest laws were passed on January 16, 2014; and another surge of protest activity following police violence that killed 20 protestors on February 18, 2014. Twitter usage in Ukraine started at a low level, but the number of new accounts increased significantly with each successive wave of protest activity (see Figure 3). This pattern suggests that many Ukrainians may have joined Twitter in order to follow Euromaidan events. There is an especially dramatic increase in the use of Twitter that coincides precisely with the outbreak of police violence on February 18, 2014. Between July 2013 and July 2014, the number of Twitter users in Ukraine more than doubled, and the most popular hashtag during this period was related to the protests.

A fourth observation was that the social networks of Ukrainian and Russian users of social media overlapped considerably. That is, we observed that many people who listed Ukrainian (UK) as their preferred language when they registered their Twitter accounts also tweeted in Russian, and many people who listed Russian (RU) as their preferred language also tweeted in Ukrainian. Even in Russian language networks, the vast majority of tweets came from people who appeared to be pro-Ukrainian. We also observed that Ukrainian and Russian language users often tweeted in English, either to reach international media outlets or members of the diaspora living outside of Ukraine. The number of tweets in all three languages (Ukrainian, Russian, and English) increased dramatically

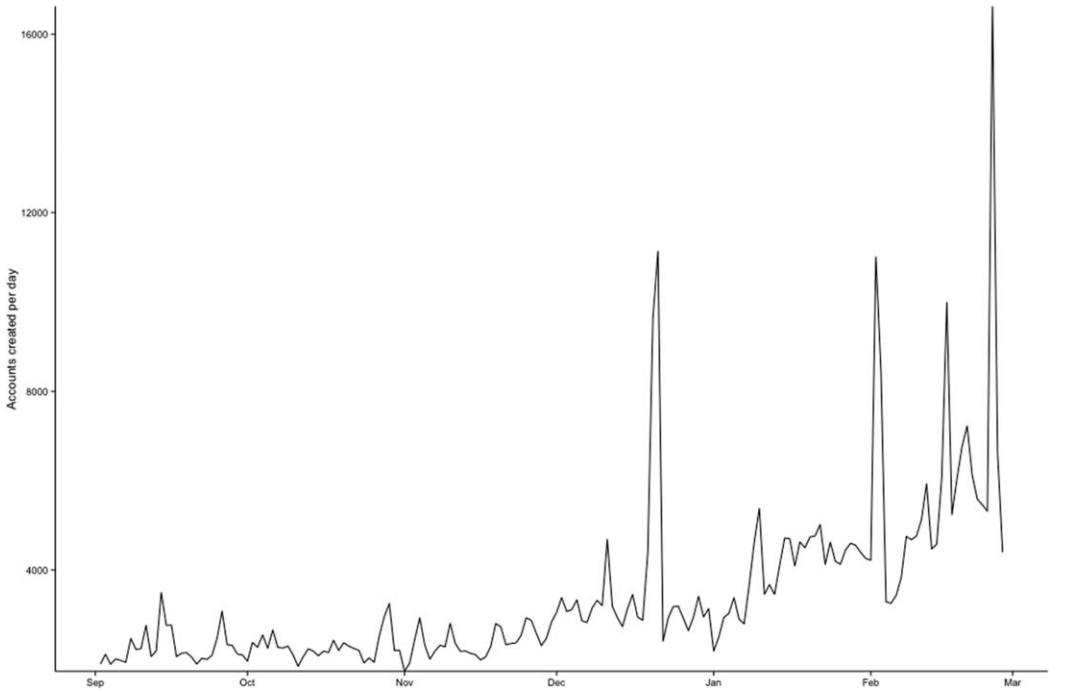

Figure 3. Number of new Twitter accounts created daily in Ukraine before and after the protests (2014–15). This figure shows the distribution of account creation dates for users in our dataset (i.e., for those who tweeted at least once about the Euromaidan protests using the keywords and hashtags we designated for collection). There was a relatively stable number of new accounts created prior to the protests, but—beginning in late November—there was a dramatic increase in new account creation, suggesting that citizens joined Twitter in part to follow the protests. This figure is adapted from Metzger and Tucker (2017).

following the clash with police forces on February 18, 2014, suggesting that interested parties were processing the events together in real time rather than simply spreading foreign news reports (see Tucker et al., 2014).

How Social Media Communicates Emotional Themes and Motivational Appeals

On the basis of theory and research in social and political psychology, we would assume that social media could exert meaningful effects on political participation that are distinct from those that are attributable to the communication of basic information, such as the time or location of a demonstration. Most psychological models of collective action and political protest take their impetus from theories of relative deprivation (Crosby, 1976; Gurr, 1970; Pettigrew, 1967; Runciman, 1966) and/or social identification (Klandermans, 1997; Subasic, Reynolds, & Turner, 2008; Tajfel & Turner, 1979; van Zomeren, Leach, & Spears, 2012). Both of these theories emphasize the importance of shared or collective processes of group identification, but—given that every individual belongs to many different groups, including those based on gender, race, religion, ideology, profession, relationship status, and so on—such processes are often latent. Some kind of triggering event (or change in the external environment) must take place in order to transform a latent form of identification into a highly salient and explicit one (Klandermans, 2014). It is generally observed that (1) with increasing salience and strength of group identification, the likelihood of participating in collective action on behalf of that group grows, and (2) participation in collective action increases the salience and strength of identification with the group whose grievances are addressed through collective action.

Moral Outrage, Social Identification, and Group Efficacy

Existing social psychological models emphasize the following factors: (1) anger or indignation at perceived injustice (Barbalet, 1998; Goodwin & Jasper, 2006; Jost et al., 2012; Kawakami & Dion, 1995; Stürmer & Simon, 2009; Tausch et al., 2011; Wakslak, Jost, Tyler, & Chen, 2007; van Zomeren, Postmes, & Spears, 2008; van Zomeren, Spears, Fischer, & Leach, 2004); (2) social identification, that is, a strong sense of group belonging and shared interests (Drury & Reicher, 2009; Jost et al., 2012; Kelly & Breinlinger, 1996; Klandermans, 1997; McGarty et al., 2013; Smith, Thomas, & McGarty, 2015); and (3) beliefs about group efficacy or empowerment—confidence that the movement is more likely to succeed than fail (Bandura, 1997; Mazzoni, van Zomeren, & Cicognani, 2015; Tausch et al., 2011; van Zomeren et al., 2012). McGarty et al. (2013) summarized the state of the research literature this way: "[A]lthough the relative importance and causal order of the factors is disputed, collective action is more likely when people have shared interests, feel relatively deprived, are angry, believe they can make a difference, and strongly identify with relevant social groups" (p. 2). Some have argued that these variables are capable of influencing one another in reciprocal fashion, so that group identification may fuel a sense of group efficacy, and perceptions of group efficacy may strengthen group identification (van Zomeren et al., 2012, pp. 190–191). It would appear that a number of distinct but similar models are empirically viable, especially given the variety of circumstances in which protest may (or may not) arise.

These social psychological factors—moral outrage, social identification, and group efficacy—affect the individual's *desire* or *motivation* to participate in protest. It is important to keep in mind that they may be subject to nonrational (as well as rational) influences, such as the denial of injustice or wishful thinking about group efficacy. Furthermore, the two major pathways by which social media can affect participation—informational and motivational—are by no means mutually exclusive. In fact, we would conjecture that they work in tandem to influence political participation. In a similar vein, van Zomeren et al. (2012) described would-be protestors as "passionate economists," insofar as they are driven by emotional factors (such as feelings of injustice and anger) as well as more instrumental considerations such as calculations of costs and benefits and perceptions of group efficacy (see also Stürmer & Simon, 2009; Tausch et al., 2011). In some cases, it may be difficult if not impossible to distinguish between

instrumental (or economic) and symbolic (or psychological) causes of political behavior. When participation in protest is regarded as part and parcel of social identification (i.e., what it means to be a "good" group member), for instance, the reputational costs of acquiescence may be extremely high (cf. North & Weingast, 1989). When an individual attends a demonstration because members of her social network regard it as highly normative (if not mandatory), is she behaving in accordance with group-based (relational) motives or some kind of cost-benefit calculus? Both, we would presume.

Jost, Becker, Osborne, and Badaan (2017) pointed out that most social psychological models of collective action have neglected explicitly ideological factors, despite the fact that protests typically occur in a societal context in which some people are motivated to defend and bolster the existing regime, whereas others are motivated to challenge and oppose it. These authors proposed that a system justification perspective—which suggests that people are motivated (to varying degrees, depending upon situational and dispositional factors) to defend, bolster, and justify the social, economic, and political systems on which they depend—could help to specify when individuals and groups will (and will not) experience moral indignation and whether indignation will be directed against the status quo—or in defense of it. Several studies demonstrate that system justification motivation undermines support for progressive, system-challenging protest movements, such as the feminist and Occupy Wall Street movement (Becker & Wright, 2011; Hennes, Nam, Stern, & Jost, 2012; Jost et al., 2012; Osborne & Sibley, 2013). It can also fuel backlash against community activists and others who are perceived as disrupting the status quo (Diekman & Goodfriend, 2007; O'Brien & Crandall, 2005; Rudman, Moss-Racusin, Phelan, & Nauts, 2012; Yeung, Kay, & Peach, 2014). Consistent with an analysis of political ideology in terms of system justification processes, such as goals to maintain versus rectify the societal status quo, social movements of the political right and left may be fueled by rather different motivational concerns (see Hennes et al., 2012; Jost, 2006).

Content Analysis of Tweets From an Occupy Wall Street Demonstration

To investigate informational and motivational contents of social media messages and to understand their relationship to political participation, Langer et al. (2015) conducted a qualitative analysis of a subset of over 80,000 tweets featuring #OWS, #occupy, #mayday, and related hashtags that were sent on May 1, 2012—a day on which Occupy Wall Street protests occurred in New York City. Members of our research team hand-coded a random subset of more than 7,000 tweets. Every tweet was coded by two different research assistants; the results with respect to informational contents are summarized in Table 3. The annotations "Pro-OWS," "Anti-OWS," and "Irrelevant/Unclassifiable" were mutually exclusive; all other annotations were allowed to co-occur with one another and with "Pro-OWS."

The first thing to note is that our analysis suggests that filtering on hashtags is an effective means of collecting relevant messages; fewer than 25% of tweets were classified as "irrelevant" or "spam." Second, as we saw with respect to the Turkish protests as well, many of the tweets shared basic informational resources. For those cases in which both coders agreed, 44% of the tweets contained informational content, such as details about protest location, safety, police presence, as well as attempts to correct misinformation spread by mass media (see examples in Table 3). Nearly half of these tweets included web links that provided additional information, and approximately 4% of the tweets indicated that the author had participated or planned to participate in the protest.

In Figure 4, we have plotted the number of tweets per hashtag from 3:30 p.m. to 7:30 p.m. on May 1, 2012. While these data are "noisy," we can still note the spike in the only location-oriented hashtag (#unionsq, for Union Square in New York City) from 4:30 to 5:30 p.m. This is important because it suggests that Twitter was used to transmit key information about the timing and location of the demonstration. According to an online OWS schedule, a rally was scheduled to take place at Union Square between 4:00 and 5:30 p.m., just before protestors began a march down to Wall Street. Allowing for some delay, it appears that tweets featuring #unionsq rose dramatically during the rally and then tailed off once the march began.

Table 3. Informational Contents in Occupy Wall Street (OWS) Tweets (coded manually)

Question	Coder Agreement %	Classification (coder-agreed tweets)	Examples
Contains information about OWS (time, location, crowd size, etc.)	70.2%	Yes: 44% No: 56%	1. Peaceful protest, chants, fellow NY's together! NYPD tried to run us over, but these are our streets! #May1 #OWS http://t.co/0UKrmnNn 2. NYCLU RT @nyclu Arresteee was arrested for crossing the street, he was clubbed, he fell down, was arrested #occupywallstreet #ows 3. nypd chatting it up with occupiers all across union square, everyone in good spirits #occupywallstreet #ows
Does the tweet contain a link?	92.6%	Yes: 40% No: 51% Yes, but the link is dead: 9%	1. #toronto police telling #occupy #toronto protesters if a structure goes up people will be charged w/trespassing http://t.co/L9gukOUS 2. http://t.co/DNqgAiRk| Occupy Movement Stirs Across The Country: The Occupy Wall Street movement mar… http://t.co/XtBSMuZ9 #FollowNGain 3. May Day Occupy protests - live coverage http://t.co/TaPY6Rvc via @guardian
If yes, is this link related to Occupy Wall Street or protest?	89.7%	Yes: 99% No: 1%	*See above*
Indicates participation (past, present or future intent)	90.81%	Yes: 4% No: 96%	1. Converging in front of wall st #ows #m1gs 2. Protesters are at Washington Square, I can hear the helicopters here at Cooper Union. Going to run over there. 3. May 1st live in new york….occupy wall street…we are the 99 percent!! #ows http://t.co/SsuVlAWd
Indicates lack of participation (past, present or future intent)	97.4%	Yes: < 1% No: 99% (+)	1. With a newborn, there's no way I could go to #M1 protests. But I want to thank those risking harm to create a better world for him. #oo #ows 2. @Ooh_Anita exactly why I cut out early and booked it back to my beloved jersey! None of that OWS BS for me! 3. Sooooooooooooo ready to move away from union square and its daily protests.

Note. This table is based on data presented by Langer et al. (2015). The third column contains the percentage of tweets in each category for which both coders classified the tweet in the same way. In other words, tweets that coders did not agree on were excluded from the calculation of these percentages.

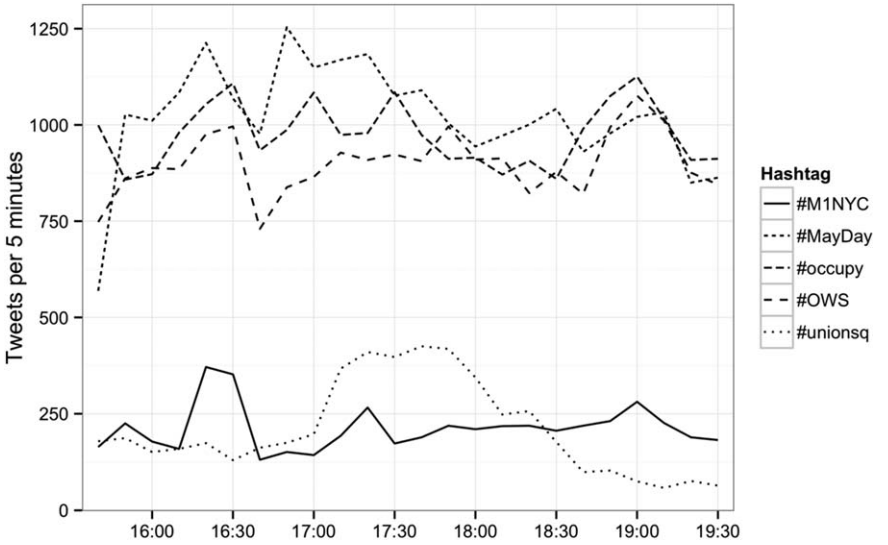

Figure 4. Frequency counts of tweets related to Occupy Wall Street as a function of hashtag and time (on May 1, 2012). This figure is based on data presented by Langer et al. (2015).

Research assistants hand-coded a subset of tweets on key social-psychological dimensions, including moral outrage, social identification, and group efficacy (e.g., Jost et al., 2012; McGarty et al., 2013; van Zomeren et al., 2012). They also coded tweets for themes pertaining to self-interest and political ideology. Intercoder agreement was quite high (better than 80%) for all five of these dimensions. In Table 4, we have listed examples of these types of tweets as well as descriptive results based on our content analysis. For tweets on which the coders were in agreement, 60% contained some form of sentiment for or against the Occupy Wall Street movement. Nearly 7% of the tweets mentioned individual or collective self-interest (e.g., "Failed capitalism is desperately cannibalizing everything we love: education, health care, old people. Make it stop"), and 5% tapped into issues of individual or group efficacy ("Direct action is similar to voting, in fact it actually makes a difference!"). Approximately 12% conveyed a sense of social identification with Occupy Wall Street organizers or participants ("Good luck & a safe night to all my brothers & sisters at #OWS tonight. We are all the 99%"), and 10% cited concerns about fairness, morality, social justice, poverty, or deprivation ("Tell Pres. @BarackObama: Don't give Wall Street crooks a 'get out of jail free' card"). In addition, 12% of the tweets drew explicitly on ideological themes, such as criticism or affirmation of political or economic systems ("The news coming in from #OWS is loud and clear. 'Business as usual' just won't do. The economic order of the day has to change!").

Moreover, the expression of motivational concerns was correlated with actual participation in the May Day demonstration, at least as estimated by our research assistants. Bivariate correlations among study variables are listed in Table 5. Strengthening confidence in the measure of user participation, we observed that the expression of pro-Occupy sentiment was positively correlated with participation ($r = .387$, $p < .001$), whereas the expression of anti-Occupy sentiment was negatively correlated with participation ($r = -.290$, $p < .001$). Consistent with social-psychological models of collective action, social identification with the Occupy movement was strongly associated with participation in the protest ($r = .391$, $p < .001$). The expression of concerns about justice ($r = .044$, $p < .001$), self-interest ($r = .092$, $p < .001$), and group efficacy ($r = .155$, $p < .001$) were also positively associated with protest participation. Anger per se was negatively related to participation ($r = -.024$, $p < .05$), as was the expression of ideological themes ($r = -.046$, $p < .001$). Most of the ideological messages that were

Table 4. Emotional, Motivational, and Ideological Contents of Occupy Wall Street (OWS) Tweets (coded manually)

Question	Coder Agreement %	Classification (coder-agreed tweets)	Examples
Does this tweet express or indicate a sentiment regarding Occupy Wall Street?	67.1%	Yes: 60% No: 37% Don't Know: 3%	**Pro-OWS**: 1. EVERY single Worker performs a Necessary job. Do they Not deserve to be paid enuf to LIVE ON after providing 40 Hours of PRODUCTIVITY? #OWS 2. Tell Pres. @BarackObama: Don't give Wall Street crooks a "get out of jail free" card. http://t.co/UmH5zpDv #p2 #ows #ffraud 3. Why do people trash talk OWS so much? They have a right 2 protest like anyone else. WTF are the trash talkers doing? Corporate slaves & Proud **Neutral**: 1. Occupy London sets up tents in Paternoster Square - BBC News: BBC NewsOccupy London sets up tents in Paternoster... http://t.co/U6VtWD5X 2. Scenes from Occupy Wall Street marches around New York City. http://t.co/DO9RfOPR 3. @OccupyWallStNYC Should #OWS plan to take political action such as organizing voting? **Anti-OWS**: 1. The occupy movement is so #dumb lol 2. So I hear that there is human Lexcrement breaking windows in Seattle. Way to win hearts and minds #occupyseattle #ows! 3. Occupy Wall St is an embarrassment to humanity.
Contains positive/negative emotional expression	67.9%	Yes: 33% No: 64% (+) Don't Know: 3%	1. OCCUPY! Lovin the protest, 'They say come back, we say fight back!' @AngellyneK 2. Hey #Occupy, why be responsible for your own life and decisions when you could just demonize the successful? Oh, that's what u do. #tcot 3. May Day Terror Begins (mine) | FrontPage Magazine: http://t.co/9H3soYCo #tcot #p2 #ows #obama #acorn #ocra #SubversionInc #fpmag
Evokes social identification with OWS or feeling of membership with organizers or participants)	81.0%	Yes: 12% No: 85% Don't Know: 3%	1. The true opposite of #OWS #mayday is studying for property. I'm there in spirit! 2. I wish I was there in lower Manhatten 2day with Occupy Wall St. 3. Love it up here at #OWS but missing my comrades at #occupydc. Solidarity forever. #M1GS
Appeals to individual or collective self-interest	89.2%	Yes: 7% No: 91% Don't Know: 2%	1. Tell Pres. @BarackObama: Don't give Wall Street crooks a "get out of jail free" card. http://t.co/zNR9IVPG #p2 #ows #ffraud 2. #CorporateGreed Hard working Americans risking their money to build a business and give jobs to others! Greedy Bastards!! #ows 3. It is making us sick and we are sick of it. We are the 99% #ows

TABLE 4. *Continued*

Question	Coder Agreement %	Classification (coder-agreed tweets)	Examples
Appeals to a shared or collective sense of efficacy	91.3%	Yes: 5% No: 93% Don't Know: 2%	1. I dream of a better tomorrow, & I believe that we can build that better tomorrow. We are all in this together. We are the 99%.#occupy #ows 2. Let's put social media to work: Rise of Generation Occupy - Occupy Wall Street - http://t.co/CoxQNHXa http://t.co/RsfjAk5g 3. #May1 has come to an end but the workers' struggle for social and economic justice has not. #MayDay 365 days a year! #ows #connectttheleft
Mentions concerns about fairness, morality, social justice, poverty, or deprivation	88.6%	Yes: 9% No: 89% Don't Know: 2%	1. @DLoesch:Occupy:it's greed when one wants to retain fruits of their labor but not greed when someone who didn't work for it wants it free. 2. #autofollowback Occupy Wall Street Has Labeled These Three Restaurant Chains 'Super-Villains' http://t.co/ytyVcCmh 3. NYPD tells us no one arrested, but I saw several OWS protesters detained. Photo here is at LES #m1nyc #owsmayday http://t.co/6eEc4jfP
Draws explicitly on ideological themes, such as criticism or affirmation of economic systems	86.1%	Yes: 12% No: 86% Don't Know: 2%	1. If only US police would renounce violence and uphold the law like we expect the Taliban to do. @barackobama #M1GS #OWS #OO 2. OWS represents the worst of man - greed, sloth, envy, violence, hate, destructive, slave-mentality. 3. "Democracy never lasts long. It soon wastes exhausts and murders itself. Never was a democracy that didn't commit suicide." John Adams #ows

Note. This table is based on data presented by Langer et al. (2015). The third column contains the percentage of tweets in each category for which both coders classified the tweet in the same way. Tweets that coders did not agree on were excluded from the calculation of these percentages.

Table 5. Correlations Between Emotional and Motivational Themes and Participation in the May Day 2012 Demonstration Based on Manual Coding of Occupy Wall Street (OWS) Tweets

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) User Participation										
(2) Liberal Ideology	.216**									
(3) Social Identification	.391**	.262**								
(4) Self-Interest	.092**	.115**	.305**							
(5) Group Efficacy	.155**	.181**	.421**	.508**						
(6) Justice Concerns	.044**	.120**	.350**	.440**	.452**					
(7) Ideological Themes	−.046**	−.100**	.198**	.296**	.308**	.516**				
(8) Positive Emotion	.039*	0.020	.249**	.286**	.306**	.297**	.286**			
(9) Anger	−.024*	−.123**	0.010	.038*	−.032*	.053**	.061**	.156**		
(10) Pro-OWS Sentiment	.387**	.452**	.635**	.271**	.411**	.364**	.142**	.208**	.113**	
(11) Anti-OWS Sentiment	−.290**	−.552**	−.419**	−.139**	−.265**	−.208**	.037*	.027*	.262**	.645**

Note. This table is based on data presented by Langer et al. (2015). *N*'s range from 5,548 to 8,244.
*Correlation is significant at the 0.05 level (two-tailed).
**Correlation is significant at the 0.001 level (two-tailed).

exchanged about Occupy Wall Street on the day of the demonstration were in critical opposition to it (e.g., "OWS represents the worst of man – greed, sloth, envy, violence, hate, destructive, slave-mentality"). That is, content that was judged to be angry and ideological was more prevalent in messages of *backlash* against rather than support of the movement.

Barberá (2015) has developed a method that provides point estimates of a given Twitter user's political ideology based on the set of political accounts and journalistic sources that he or she follows. We have validated this follower-based method in a number of different ways (see Barberá et al., 2015a, Supplementary Materials). First, we compared ideological estimates for those 365 members of the 113th U.S. Congress who had more than 5,000 followers on Twitter with "ideal points" based on their roll-call votes in Congress (Jackman, 2014). As illustrated in Figure 5a, the two ideological estimates were extremely highly correlated ($\rho = .956$ in the House, $\rho = .943$ in the Senate). Even within-party correlations were relatively high ($\rho = .442$ for Republicans, $\rho = .647$ for Democrats). In Figure 5b, we compare the distributions of Twitter-based ideological estimates for elite actors and ordinary citizens in our sample. The pattern that emerges reproduces the well-known finding that Republican and Democratic politicians are far more polarized than ordinary citizens (Bafumi & Herron, 2010)—with the former group displaying a bimodal ideological distribution and the latter group approximating a normal distribution.

As shown in Figure 5c, Twitter-based ideological estimates were highly correlated with percentages of citizens in each state who endorsed liberal (vs. conservative) opinions on a variety of different issues ($\rho = .871$)—as determined by Lax and Phillips (2012) on the basis of public opinion surveys and socioeconomic indicators. At the statewide level, Twitter-based estimates of median ideology were strongly correlated with the percentage of the two-party vote that Obama received in 2012 ($\rho = .813$). Finally, let us consider results obtained with a sample of 42,008 Twitter users who were publicly registered as either Democrats or Republicans in Arkansas, California, Florida, Ohio, and Pennsylvania. As can be seen in Figure 5d, Democratic voters in all five states were indeed classified as more liberal than Republican voters on the basis of Barberá's (2015) method.

When we applied this same method of estimating political ideology to our sample of users who tweeted about Occupy Wall Street on May 1, 2012, we observed that more politically liberal Twitter users were indeed more likely to express pro-OWS sentiment ($r = .452$, $p < .001$), less likely to express anti-OWS sentiment ($r = -.552$, $p < .001$), and more likely to participate in the May Day demonstration ($r = .216$, $p < .001$). More liberal users were also more likely to express themes

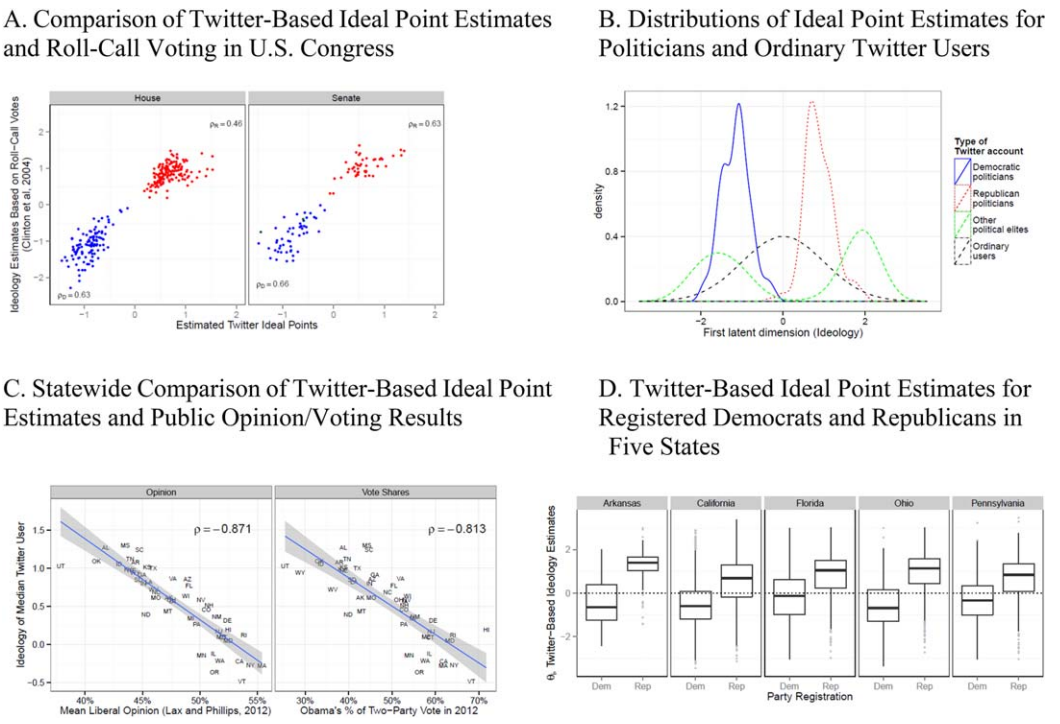

Figure 5. Four ways of validating the follower-based method of estimating Twitter users' ideological placement. These figures are adapted from Barberá, Jost, Nagler, Tucker, and Bonneau (2015a, Supplementary Materials). [Color figure can be viewed at wileyonlinelibrary.com]

pertaining to social identification ($r = .262$, $p < .001$), justice ($r = .120$, $p < .001$), self-interest ($r = .115$, $p < .001$), and group efficacy ($r = .181$, $p < .001$). Liberals were less likely than conservatives to express anger ($r = -.123$, $p < .001$) or explicitly ideological themes ($r = -.100$, $p < .001$). It is important to bear in mind, however, that the tweets we analyzed were sent *during* the demonstration itself. It is possible that supporters and detractors of social movements would share different types of messages well before or well after a specific demonstration was held (see Langer et al., 2015). When we expanded our analysis to include tweets sent during the two weeks preceding the demonstration, however, we obtained similar results (Langer et al., 2018).

How Structures of Social Networks Affect Information Exchange

In a magazine article entitled "Small Change: Why the Revolution Will Not Be Tweeted," the popular journalist Malcolm Gladwell (2010) argued that the types of social networks that are facilitated by Twitter or Facebook involve "weak" (rather than "strong") social ties and are therefore unlikely to motivate the types of commitment and sacrifice that are required to sustain a protest movement. Social media usage, according to Gladwell, may support certain varieties of "slacktivism" (defined by the online "urban dictionary" as "the act of participating in obviously pointless activities as an expedient alternative to actually expending effort to fix a problem"), but they pose very little threat to existing political regimes:

> [Social media] makes it easier for activists to express themselves, and harder for that expression to have any impact. *The instruments of social media are well suited to making the existing social order more efficient. They are not a natural enemy of the status*

> *quo*. If you are of the opinion that all the world needs is a little buffing around the edges, this should not trouble you. But if you think that there are still lunch counters out there that need integrating it ought to give you pause. (emphasis added)

According to Bennet and Segerberg (2012), it is not the case that new approaches to protest organization are necessarily ineffective, as Gladwell implies; rather, it is just that their putative effectiveness is difficult to understand on the basis of familiar, traditional models of collective action. These authors suggest that a new form of organization, which they term "connective action," has emerged in response to the new opportunities afforded by digital technology and the use of social media. In contradistinction to Gladwell, they claim that the relatively decentralized, diffuse nature of organization in these social movements constitutes their basis for success rather than a sign of failure. Using the 15M protests in Spain as an example, they argue that given "its seemingly informal organization, the 15M mobilization surprised many observers by sustaining and even building strength over time, using a mix of online media and offline activities that included face-to-face organizing, encampments in city centers, and marches across the country" (p. 741).

Gonzalez-Bailon, Borge-Holthoefer, and Moreno (2013) propose that the seemingly horizontal nature of online communication tends to become more tightly centralized and hierarchically organized as a given protest movement matures. Their contention is that such movements do possess a good deal of structure and organization, although the structure is not dominated by official collectives (such as NGOs or civil society organizations), and so it is true that they depart from traditional modes of social mobilization and familiar models of collective action. New studies of social media usage such as these are appearing rapidly, but it is still true that the broader community of behavioral scientists lacks consensus about whether, and precisely how, online social networks facilitate protest activity. Is Gladwell (2010) right that social media use just "makes it easier for activists to express themselves, and harder for that expression to have any impact"? Or do certain types of social network structures predict movement success? In the next section, we describe the results of two research programs focusing on the structures of social networks and their potential consequences for political mobilization.

The Critical Periphery in the Growth of Social Protests

Barberá et al. (2015b) explored the possibility that, through the use of social media resources, peripheral members of social movements—those sometimes derided as "slacktivists"—may play important yet underappreciated roles in the spread of informational and motivational messages. Whereas most prior research on the role of social networks in collective action has emphasized the effects of density, network size, strength of social ties, and degree distribution and centralization (e.g., Centola, 2013; Marwell & Oliver, 1993; Watts, 2002), we investigated the "core-periphery" structure in online social networks (see also Csermely, London, Wu, & Uzzi, 2013). More specifically, we focused on the role of peripheral activists—the majority of participants who surround the small minority of highly committed movement organizers—in the context of three major protest events: the Gezi Park demonstrations in Turkey in 2013, Occupy Wall Street protests in the United States in 2012, and the Indignados movement in Spain in 2012.

In all three cases, we analyzed the network of "retweets" (i.e., messages forwarded from one participant to others in the sample), using these as the directed ties linking users in the network of information exchange. (Each edge in the network originates with the user who forwarded the message and ends with the user whose message was retweeted.) We used the total number of messages containing any of the relevant hashtags (regardless of whether they were retweeted) as node-attribute information and counted, for each node, the total number of followers. We estimated *reach* as each participant's number of followers divided by the total number of followers in the network. This estimate is roughly comparable to standard measures of audience share in media market studies, such as Nielsen ratings used in television and radio. Just as rating measurements fail to guarantee that members of a

household are actually attending to a given program, it is impossible to be sure that Twitter users are reading all of the protest messages that appear in their news feeds. Nevertheless, we were able to estimate how many users were potentially exposed to protest-related information from at least one of the sources they followed.

This type of analysis captures the mobilization potential of repeated exposure. Research in psychology indicates that people are more likely to behave in a certain way when it has been encouraged by multiple sources in one's social network (Harkins & Petty, 1987; Latané, 1981) and that familiarity with propositional statements increases the likelihood that those statements will be judged as valid and true (Begg, Anas, & Farinacci, 1992). Thus, we expect that individuals who are exposed more frequently to online information about protest activity are more likely to take part in the movement. We identified core and peripheral participants using the *k*-core decomposition technique, which partitions a network into nested shells of connectivity (Alvarez-Hamelin, Dall'Asta, Barrat, & Vespignani, 2005). More specifically, we assessed the overall impact of peripheral users by simulating how removing those users from the social network would affect audience reach, in comparison to a random benchmark.

For the Turkish protests, we queried Twitter's streaming API for messages containing hashtags related to the protests and collected a sample of 30,019,710 tweets sent by 2,908,926 unique users between May 31 and June 29, 2013. In Figure 6, we illustrate the *k-core* decomposition of the communication network that emerged during the Turkish protests; it is a simplified map of participants' online interactions. The group with the highest percentage of users who reported being at the Taksim Gezi Park (the geographical epicenter of the protests) constitutes the core of the network, where most of the retweets originated. This shows that information flowed largely from the core to the periphery, allowing many participants who were not at the demonstration to learn about it very quickly. Access to timely information through online networks was crucial in the Turkish context, because mainstream media was heavily controlled and used to divert attention away from events transpiring in Gezi Park.

It is true that peripheral users were much less active on a *per capita* basis than core participants, but their power consisted in their numbers. There were so many more peripheral members that their overall contribution to the exchange of information was greater than that of core participants. Removing the lowest five *k-cores* would have resulted in a drop of 50% in terms of audience reach. In other words, the influence of core participants would have been diminished greatly had it not been for the forwarding activity of peripheral members of the network.

For the second and third data sets, we tracked Twitter activity pertaining to an international demonstration that was planned for May 12, 2012 under the banner "United for Global Change." We collected 606,625 tweets sent by 125,219 unique users for the period April 30 to May 30, 2012, capturing messages that contained hashtags related to the Indignados movement in Spain and variations of the word "Occupy*." In comparison to the Turkish case, these two Twitter networks were smaller and more dispersed, resulting in fewer *k-cores* overall. Nevertheless, the core-periphery dynamics were quite similar. Most of the information flowed from the core to the periphery; although peripheral members were significantly less active on an individual basis, in total they contributed as many messages as did core members. Removing the three outer *k-cores* would have resulted in another precipitous drop of approximately 50% in terms of audience reach (see Barberá et al., 2015b). Thus, peripheral users played a critical role in amplifying the voices of movement organizers.

The analysis of two other data sets unrelated to protest activity strengthened our interpretation that core-periphery dynamics are especially important when it comes to mobilization for collective action. The first data set included 7,527,157 tweets sent by 3,910,627 unique users between March 2 and 5, 2014; these were collected on the basis of hashtags pertaining to the "Oscar" ceremony hosted by the Academy of Motion Picture Arts and Sciences (AMPAS). The second data set included 2,957,847 tweets sent by 1,199,414 unique users between February 3, 2014 and February 2, 2015 pertaining to the debate in the United States about whether to raise the minimum wage. In both of these cases, social network structure was very different from what we had observed in the protest networks.

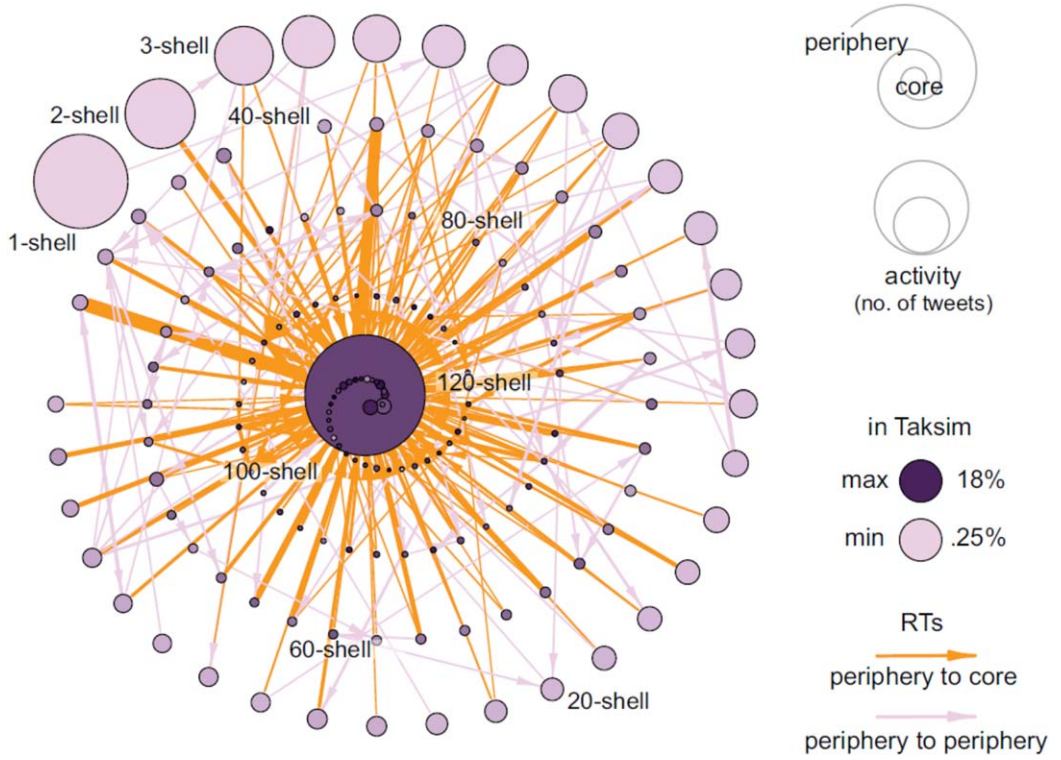

Figure 6. Decomposition of the retweet network that emerged during the 2013 Gezi Park protests in Turkey. This figure is adapted from Barberá et al. (2015b). Individual users are grouped into corresponding *k-shells*, which are represented by nodes. Lower *k-shells* include peripheral members of the network; higher *k-shells* contain core participants. Node size is proportional to aggregated activity, measured as total number of protest messages (not just retweets). Arcs indicate retweeting activity, and their width is proportional to normalized strength; arcs low in strength have been filtered to improve network visualization. The darkness of nodes represents the proportion of participants who were in Gezi Park (the geographical epicenter of the protests), as determined on the basis of geolocation of tweets. Most of these participants are at the core of the network, where most retweets originated. Thus, information tended to flow from the core to the periphery. [Color figure can be viewed at wileyonlinelibrary.com]

Communication activity arising from the core of the network was significantly less intense than that coming from the periphery. As a result, removing peripheral layers of the network did relatively little to alter the communication dynamics of the network as a whole.

Barberá et al. (2015b) concluded on the basis of these results that committed minorities may indeed constitute the "heart" of protest movements. Nevertheless, their success in maximizing the number of citizens exposed to protest messages online depends on their ability to activate the "critical periphery." Although "slacktivist" members of the network were less active on a *per capita* basis, their total contribution to the dissemination of information about the protest movement was comparable in terms of magnitude to that of core members.

Contextual and Ideological Variability in the Structure of Social Networks

It has been a persistent lament that social media, like the Internet itself, fosters an "echo chamber" environment in which users—by virtue of choosing which sources of information they will and will not confront—avoid learning new things in favor of strengthening their confidence in preexisting beliefs and opinions. The worry, in other words, is that democratic ideals are thwarted because, "Many people restrict themselves to their own preferred points of view—liberals watching and

reading mostly or only liberals; moderates, moderates; conservatives, conservatives; neo-Nazis or terrorist sympathizers, Neo-Nazis or terrorist sympathizers" (Sunstein, 2007, p. 2). Fortunately, several recent studies suggest that the situation is not nearly as dire as has been prophesied (Bakshy, Messing, & Adamic, 2015; Barberá et al., 2015a; Flaxman, Goel, & Rao, 2016; Garrett, Carnahan, & Lynch, 2013; Vaccari et al., 2016).

For instance, Barberá et al. (2015a) observed that the degree of ideological homophily in online patterns of communication varied as a function of contextual factors such as topic, timing, and ideological orientation. Specifically, we investigated the extent to which online communication resembled an "echo chamber" characterized by ideological segregation, polarization, and selective exposure—versus a "national conversation" in which individuals of differing ideological persuasions read and forward one another's messages. We also sought to determine the extent to which structural characteristics of online networks differed over time for political versus nonpolitical topics and for liberal versus conservative users of social media.

It is commonly assumed that liberals and conservatives are equally prone to engage in selective information processing, which tends to confirm one's preexisting opinions and to exhibit equivalent levels of ideological homophily (or homogeneity) in terms of social networks. This is because processes such as cognitive dissonance reduction, motivated reasoning, and social identity maintenance are thought to be uniformly prevalent in the population as a whole (Frimer, Skitka, & Motyl, 2017; Hogg, 2007; Kahan, 2016; Munro et al., 2002; Sunstein, 2007). At the same time, there is mounting evidence that important ideological asymmetries exist when it comes to motivated social cognition. For example, conservatives are higher than liberals in terms of cognitive and perceptual rigidity; dogmatism; personal needs for order, closure, and structure; intolerance of ambiguity and uncertainty; self-deception; receptivity to pseudo-profound bullshit; and subjective perceptions of threat. Conversely, liberals are higher than conservatives when it comes to integrative complexity, personal need for cognition, and cognitive reflection (Jost, 2017). For all of these reasons, conservatives might be more likely than liberals to favor an "echo chamber" environment.

Research focusing on traditional forms of media usage was mixed with respect to these issues. Some studies suggested symmetrical patterns of selective exposure, dissonance avoidance, and attitudinal conformity (Frimer et al., 2017; Iyengar & Hahn, 2009, Knobloch-Westerwick & Meng, 2009; Munro et al., 2002; Nisbet, Cooper, & Garrett, 2015). Other studies, however, revealed that conservatives were in fact more likely than liberals to exhibit these types of behaviors (e.g., Garrett, 2009; Iyengar, Hahn, Krosnick, & Walker, 2008; Lau & Redlawsk, 2006; Mutz, 2006; Nam, Jost, & Van Bavel, 2013; Nyhan & Reifler, 2010).

Barberá et al. (2015a) used the follower-based method (described above) to estimate the ideological preferences of 3.8 million Twitter users in the United States and, using a dataset of 150 million tweets pertaining to 12 political and nonpolitical issues, compared the structures of liberal and conservative social networks. We focused again on one of the most common forms of social interaction on Twitter, namely retweeting, which involves forwarding (or reposting) another user's content. Retweeting behavior indicates information exposure and transmission but not necessarily endorsement of the original message. As highlighted in Figure 7, levels of ideological segregation, polarization, and extremity of retweeted messages varied considerably as a function of topic and timing. With respect to political issues—such as the 2012 presidential election, the 2013 government shutdown, and 2014 State of the Union Address, the vast majority of retweets occured within ideological groups. That is, liberals tended to retweet posts from other liberals, and conservatives tended to retweet posts from other conservatives. At the same time, not all conversations resembled the traditional "echo chamber" view of Internet communication. Responses to the 2013 Boston marathon bombing, the 2014 Super Bowl, and the 2014 Winter Olympics fit the pattern of a "national conversation," with individuals of differing ideological persuasions frequently reading and retweeting one another's messages.

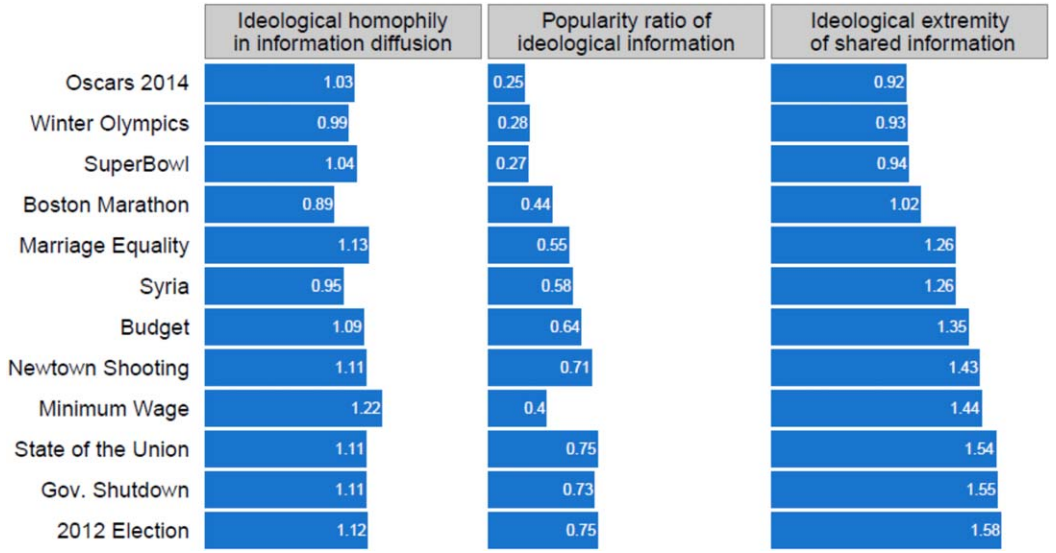

Figure 7. Topic variability in the degree of ideological homophily, popularity, and extremity in retweet networks. This figure is adapted from Barberá, Jost, Nagler, Tucker, and Bonneau (2015a, Supplementary Materials). In the left column, we display the ratio of retweets generated by ideologically extreme (vs. moderate) users. Higher values suggest that ideologically extreme content is more popular and more likely to be retweeted. The middle column displays the slope coefficient of an OLS regression of the ideology of the "retweeted" on the ideology of the "retweeter." If individuals were retweeting only content shared by other users with an identical ideological position, then this coefficient would be equal to one. If ideological proximity were unrelated to the probability of retweeting, then the slope would be zero. The right column represents the average absolute distance between the author of a tweet and the ideological center (for retweets only). Higher values imply that the information shared via retweets features content that is more ideologically extreme. [Color figure can be viewed at wileyonlinelibrary.com]

Online communication about other issues, such as the 2012 tragic elementary school shooting in Newtown, Connecticut, reflected a dynamic process. Discussion of this topic began as a national conversation but morphed into a highly polarized exchange, as the conversation shifted from the tragedy to debates surrounding gun control policies (see Figure 8, which illustrates the degree of polarization on a daily basis). A similar pattern was observed concerning the prospect of U.S. military intervention in Syria. Polarization increased over time as liberals and conservatives debated the issue, before attention to the topic subsided on Twitter.

To determine whether an ideological asymmetry existed with respect to information exposure, Barberá et al. (2015a) built a statistical model that accounted for the observed marginal rates of retweeting by liberals and conservatives as well as their likelihood of being retweeted. This enabled us to determine whether cross-ideological retweets were more or less likely to occur than what would have been expected on the basis of chance. As illustrated in Figure 9, the analysis revealed that liberals were more likely than conservatives to engage in cross-ideological dissemination with respect to both political and nonpolitical issues. For 11 of the 12 issues under investigation (all except the Winter Olympics), a statistically significant difference was obtained, indicating that liberals were more likely than conservatives to engage in cross-ideological retweeting behavior. These findings are consistent with the theory of political ideology as motivated social cognition (Jost, Glaser, Kruglanski, & Sulloway, 2003).[8]

[8] Boutyline and Willer (2017) documented a similar ideological asymmetry in network structure, drawing on a sample of over 260,000 followers of liberal and conservative politicians and nonprofit organizations. Specifically, they found that Twitter users who were politically conservative, such as followers of the Cato Institute, tended to have more homophilous online networks than those who were politically liberal, such as followers of Amnesty International.

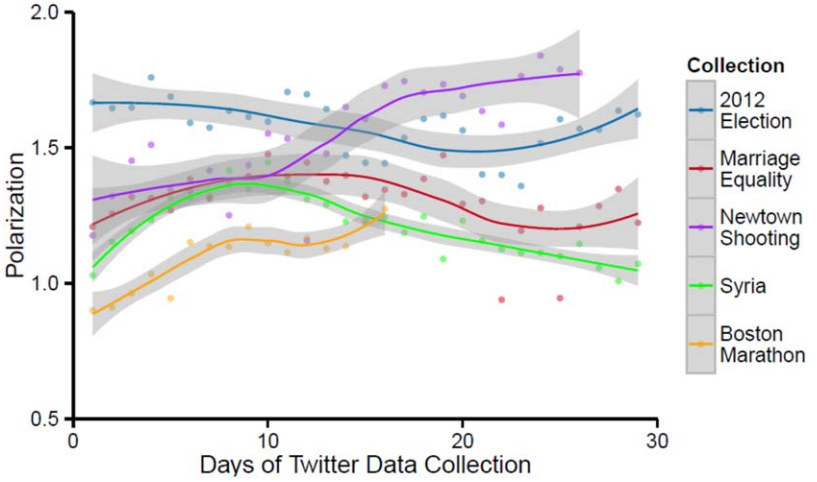

Figure 8. Dynamic variability (over time) in the degree of ideological polarization in retweet networks as a function of topic. This figure is adapted from Barberá, Jost, Nagler, Tucker, and Bonneau (2015a). [Color figure can be viewed at wileyonlinelibrary.com]

Although Barberá et al. (2015a) were unable to directly investigate the role of epistemic, existential, and relational motives in this study, we did explore two related factors, namely age and personality traits. With regard to the first, it is well known that individuals tend to become more conservative as they grow older (Sears & Funk, 1999), and it seems plausible that younger people would make more sophisticated use of Twitter as a social media platform by following more political accounts, being more active, and retweeting more often. If so, it is conceivable that the effect of liberalism-

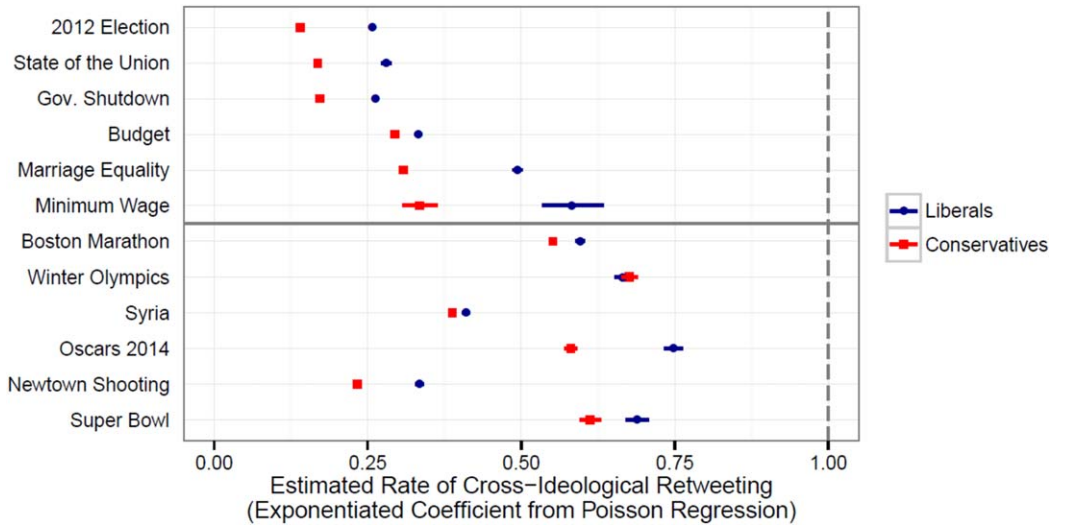

Figure 9. Liberal-conservative differences in cross-ideological retweeting behavior as a function of topic. This figure is adapted from Barberá, Jost, Nagler, Tucker, and Bonneau (2015a). Each point in the figure corresponds to an exponentiated coefficient of a Poisson regression for each topic and ideological group. The lines indicate confidence intervals at the 99.9% level, some of which are invisible because of the very large sample size of tweets. The dashed vertical line corresponds to a value of 1, which would indicate identical retweeting rates for individuals of the same versus different ideological orientations. [Color figure can be viewed at wileyonlinelibrary.com]

conservatism on cross-ideological retweeting was due to age differences between liberals and conservatives. Although we did not have access to the ages of Twitter users in our full sample, we were able to obtain birth-year information for a subset of users (27,613 voters, resulting in a data set of 166,795 retweets) by matching Twitter accounts with voting registration records (as described above). As shown in Figure 10, liberals were more likely than conservatives to engage in cross-ideological retweeting in all age groups except for one—the youngest group (18–24 years). Young conservatives were just as likely as young liberals to engage in cross-ideological retweeting of political messages, although they were less likely to engage in cross-ideological retweeting of nonpolitical messages. With increasing age, cross-ideological retweeting became less frequent in general, but the decline was steeper for conservatives than liberals.

Given past research on ideological differences in "Big Five" personality characteristics (Carney, Jost, Gosling, & Potter, 2008; Gerber, Huber, Doherty, Dowling, & Ha, 2010; Jost et al., 2003), we also considered the possibility that liberals would score higher on "Openness to New Experiences" and lower on "Conscientiousness" and that these characteristics might be related to retweeting behavior. Although we lacked personality data for our sample of Twitter users, we were able to conduct exploratory analyses by comparing statewide ideological estimates with personality scores calculated by Rentfrow, Gosling, and Potter (2008). Consistent with prior evidence, we observed that states in which the average voter was more liberal also tended to rank higher in Openness (Pearson's $r = 0.41$, Spearman's rank $= 0.43$, both $ps < .01$) and lower in Conscientiousness (Pearson's $r = -0.36$, Spearman's rank $= -0.44$, both $ps < .01$).

Next we compared personality scores with statewide rates of cross-ideological retweeting, focusing on a random sample of 300,000 Twitter users whose location we were able to determine. These results should be taken with a grain of salt, because they are potentially subject to "Simpson's paradox," which points out that aggregate-level trends may be very different from individual-level patterns. Nevertheless, the findings were congenial to theoretical expectations: At the statewide level of analysis, cross-ideological retweeting was positively correlated with Openness (Pearson's $r = 0.24$,

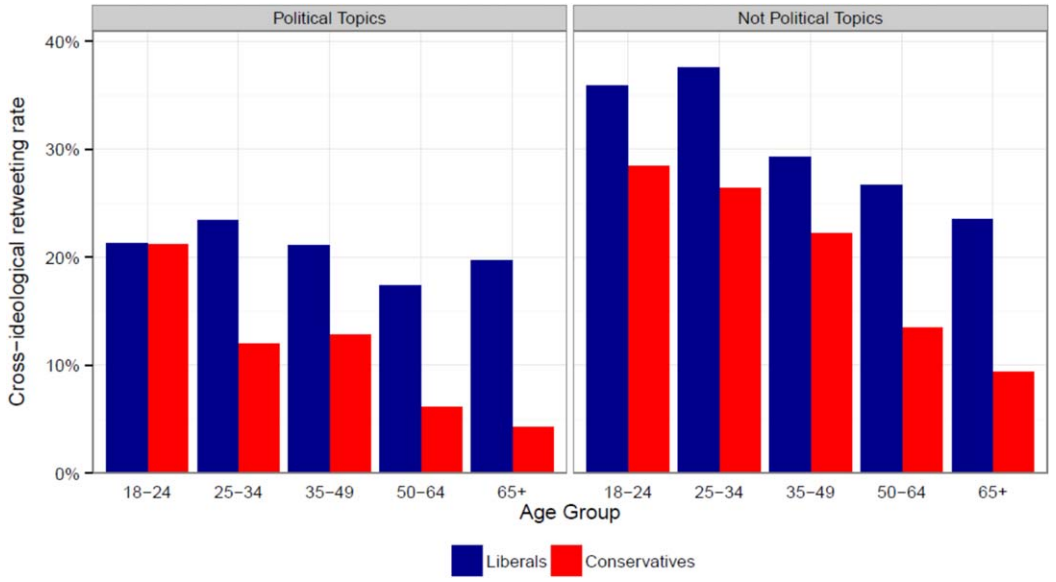

Figure 10. Liberal-conservative differences in cross-ideological retweeting behavior as a function of age. This figure is adapted from Barberá, Jost, Nagler, Tucker, and Bonneau (2015a, Supplementary Materials). [Color figure can be viewed at wileyonlinelibrary.com]

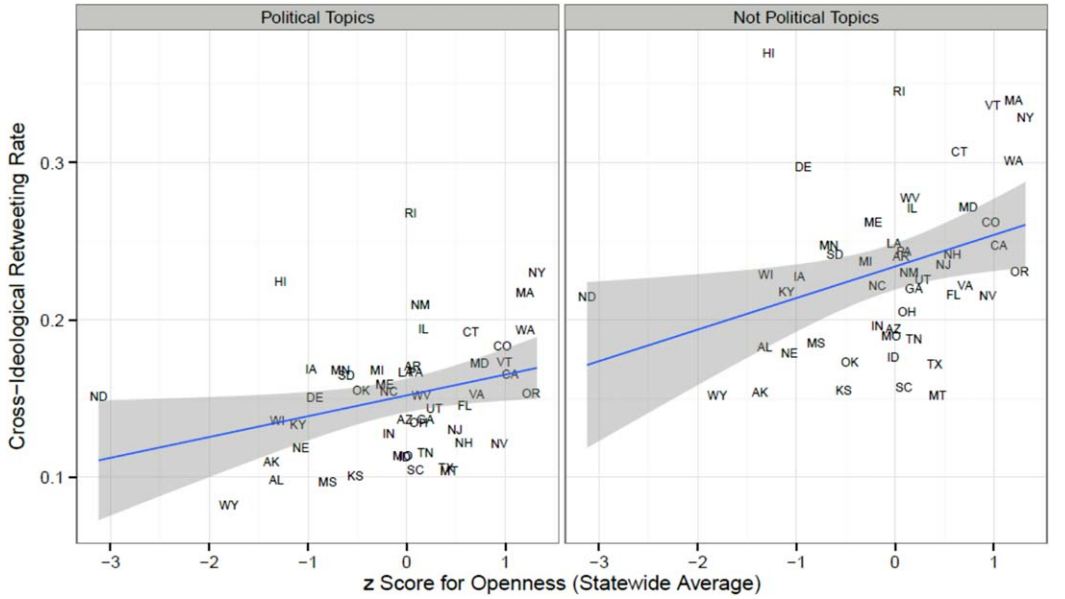

Figure 11. Statewide comparison of average openness (personality) scores and cross-ideological retweeting behavior for political and nonpolitical topics. These figures are adapted from Barberá, Jost, Nagler, Tucker, and Bonneau (2015a, Supplementary Materials). [Color figure can be viewed at wileyonlinelibrary.com]

Spearman's rank = 0.25, both $ps \leq .02$) and negatively correlated with Conscientiousness (Pearson's $r = -0.19$, Spearman's rank = -0.21, both $ps \leq .05$). For the sake of illustration, the relationship between Openness and cross-ideological retweeting rates is depicted in Figure 11. None of the other Big Five personality characteristics were associated with liberalism-conservatism or rates of cross-ideological retweeting. Taken as a whole, results obtained by Barberá et al. (2015a), which have been conceptually replicated and extended by Boutyline and Willer (2017), suggest that there may be an important and underappreciated ideological asymmetry with respect to information exposure and the structure and function of online social networks.

This ideological asymmetry may turn out to have extremely meaningful consequences for political communication, reasoning, deliberation, organization, and mobilization. There is evidence, for instance, that the market for "fake news" is concentrated on the right of the political spectrum (Ingraham, 2016; Sydell, 2016). A study of 1.25 million media articles collected during the 2016 U.S. presidential campaign demonstrated that Trump supporters paid more attention than Clinton supporters to "insulated knowledge communities" that spread disinformation (Benkler, Faris, Roberts, & Zuckerman, 2017). Another study based on more than 12 million Twitter users revealed that conservatives in the United States were more likely than liberals to expose themselves to pro-Russian disinformation campaigns (Hjorth & Adler-Nissen, 2017). There is also evidence that conspiracy theories diffuse more rapidly and extensively when it comes to conservative (vs. liberal) online social networks (Miller, Saunders, & Farhart, 2015). All of these findings, which are disconcerting from the perspective of normative democratic theory, are consistent with the notion that meaningful ideological asymmetries exist when it comes to epistemic, existential, and relational sources of motivation (Jost, 2017).

The Political Significance of Friendship Networks: A New Research Agenda

The pervasive use of social media in political contexts highlights the need to update theorizing in the cost-benefit tradition due to the fact that "information" is now received very differently, in

comparison with traditional modes of information transmission—such as newspaper or television coverage. We would emphasize two aspects in particular. First, information received through social media channels is mediated by a social network that the individual has *chosen to join*. On Facebook, for instance, this is a network of "friends" (in which both parties have agreed that some kind of relationship exists), and on Twitter, it is a network of "followers" in which each user can decide whom to "follow." In both cases, the informational source is essentially "pre-vetted." There is a good chance that the message recipient has recently seen photos of the source's children online or celebrated his or her birthday or promotion at work. Decades of research in social psychology would suggest that political information shared in this way would be far more impactful than messages conveyed through newspapers, direct mailings, or other conventional forms of strategic political communication (Eagly & Chaiken, 1993; Hardin & Conley, 2001; McGuire, 1985).

Second, information obtained through social media channels is not only coming from sources who are liked, trusted, and respected; much of the information is also "prevalidated," in the sense that it has already been "liked," "shared," "favorited," or "retweeted" by other members of one's virtual community (Ackland, 2013; see also Festinger, 1954; Hardin & Higgins, 1996; Turner, 1991). The net result is that much of the information one encounters through social media has not only received a "stamp of approval" from several valued members of one's social network; it is frequently encountered in a context in which one learns precisely which members of the social network agree or disagree with it. For instrumental as well as motivational reasons, this information should be extremely useful, insofar as it helps individuals to calculate the costs and benefits of various forms of political participation and also helps them to figure out how (and from whom) they can acquire additional information, encouragement, and support.

Researchers have only recently discovered—or perhaps rediscovered (e.g., see Tedin, 1980)—the significance of friendship networks for the development of political attitudes. For instance, Lazer, Rubineau, Chetkovich, and Neblo (2010) followed a cohort of masters' students as they entered a graduate program to investigate how preexisting political attitudes affected friendship formation and how friendship affected subsequent attitudes. They found little evidence that students selected social ties on the basis of ideological orientation, but there was clear evidence of social influence over time: By the second semester of the program, students had shifted their political attitudes in the direction of social (but not task-related) ties. An even more dramatic demonstration of the power of friendship to influence political behavior comes from an experiment involving 61 million Facebook users. This study demonstrated that people were more likely to vote in the 2010 U.S. Congressional election if they learned through Facebook that one or more of their "close friends" had just voted (Bond et al., 2012). A third and final example pertains more specifically to protest organization. González-Bailón et al. (2011) observed that patterns of recruitment and information diffusion in the "Indignados" movement in Spain followed complex contagion processes such that exposure to repeated messages about the protest seemed to "activate" users—but only when these messages came from multiple sources in the users' personal networks. Users who were most effective at spreading protest information were not necessarily those who recorded the greatest number of followers, but rather those who occupied a central position in the social network and were therefore closely connected to other well-connected users.

It is clear that the informational and motivational effects of social media are mediated by or transmitted through social networks, especially friendship networks (Burt, 1990; Burt & Minor, 1983; Diani & McAdam, 2003; Levitan & Visser, 2009; McAdam & Paulsen, 1993; Paluck, 2011; Visser & Mirabile, 2004). At the same time, there are fundamental questions that have yet to be answered definitively. Do messages received from direct social contacts—such as friends and family members—exert stronger but similar or qualitatively different motivational effects than messages received from indirect social contacts, such as strangers and journalists? To what extent do messages of social support, such as reassurance or encouragement, from friends (and perhaps even strangers) help potential

activists overcome inhibitions and apprehensions about whether or not to protest? How can social media sites become more successful in creating virtual communities that offer a strong sense of shared reality, social identification, and group efficacy? How much does online success in this regard really translate into offline political activity? Future research is needed to address these and related questions.

One social psychological perspective that should be especially useful in addressing the role of friendship in politics is shared reality theory, which focuses on the close connections between epistemic and relational sources of motivation (Hardin, 2004). According to shared reality theory, individuals are motivated to seek "common ground"—a mutually established understanding of reality—with close or valued others (Hardin & Higgins, 1996). To satisfy this motivation, people "tune" their attitudes, beliefs, and behaviors so that they are consistent with those of close others—and inconsistent with those of distant or undesired others (Sinclair, Huntsinger, Skorinko, & Hardin, 2005). There are at least two principal ways in which the need to "share reality" is likely to affect the relationship between social media usage and political participation. First, the perceived intimacy of social network contacts should increase the psychological impact of political appeals (Davis & Rusbult, 2001; Yu, 2016). Given that people today receive much more of their information about politics from close friends and family members than ever before, the impact of relational motivation on political participation can scarcely be exaggerated. Second, it seems likely that processing information about weighty political events from a shared perspective (e.g., agreeing that "The police crackdown on protestors is terrible," or "The demonstrators are out of control") should facilitate perceived closeness. Experiencing ideological congruence and behavioral coordination with other people, in other words, strengthens relational ties. Future research would do well to document both of these types of effects, which may form a reciprocal relationship, such that (1) relational sources of motivation, including the desire for friendship, amplify ideological motives to challenge the societal status quo (or defend it), and (2) ideological sources of motivation amplify relational motives to befriend like-minded others.

Concluding Remarks

In this article, we have sought to review and—as much as possible—integrate findings from a number of convergent and divergent research programs designed to illuminate the ways in which social media usage facilitates political protest. Specifically, we have summarized evidence from a variety of studies of protest movements in the United States, Spain, Turkey, and Ukraine demonstrating that social media platforms such as Twitter and Facebook do indeed serve as important tools for information exchange and the coordination of collective action. Three general conclusions are offered. First, *information* that is vital to the coordination of protest activities, such as news about transportation, turnout, police presence, violence, medical services, and legal support is spread quickly and efficiently through social media channels. Second, social media platforms also transmit *emotional* and *motivational* messages both in support of and in opposition to protest activity; these include messages emphasizing moral indignation, social identification, group efficacy, and concerns about fairness, social justice, and deprivation—as well as explicitly ideological themes. Third, the structure of online *social networks*, which may differ as a function of contextual factors, including political ideology, has significant implications for information exposure and the success or failure of protest movements. The long-term goal of research programs such as these on the effects of social media usage on collective action is to leverage new methods, including machine-learning algorithms, to observe and monitor informational and motivational resources as they permeate through social networks and to highlight their precise roles in facilitating and/or inhibiting participation in protest activity. To tackle these problems, researchers will need to know more about the ways in which *friendship* networks contribute to political participation, insofar as online sources of information and motivational appeals are "prevetted"; in many cases, they also represent close, meaningful interaction partners as well.

These are early days, to be sure, and the situation is akin to that faced by systems biologists, who were tasked in the early twenty-first century with the job of making sense of prodigious amounts of data generated by genome-wide studies of cellular function in hundreds of organisms. Despite initial resistance in the field of biology to disciplinary changes initiated by the rise of genomics and the inductive, quantitative analysis of massive data sets, researchers soon developed innovative computational tools that helped to reduce and process complex, time-series data in order to test functional hypotheses involving thousands of genes. In behavioral science today, online data sources and new web-based data collection schemes are generating an explosion of observations that will be enormously useful in understanding the causes and consequences of political behavior. Whether we are focusing on individual actions, such as voting or making campaign contributions, or collective actions, such as demonstrations and political protests, the pervasive and ever-increasing use of social media will not only shape the actions themselves but also the ways in which those actions are studied and understood by political psychologists and others. The example of genomics suggests that once the "hype" and apprehension that accompanies new scientific technologies subside, genuine progress will come quickly.

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