The Strength of Tweet Ties

Rob Schroeder, Sean F. Everton, and Russell Shepherd

Abstract While in 2011 protesters took to the streets and gathered in Tahrir Square in Cairo, people in Egypt and across the world started discussing the protests on Twitter. With its short and simple messages, Twitter turned out to be an effective venue for diffusion of ideas and opinions. This chapter explores how social movements and other forms of collective action may be able to use Twitter to frame grievances in ways that resonate with their target audience. In particular, using Twitter data collected during the protests in Egypt, this paper examines whether the use of Twitter by Egyptian activists helped to diffuse the Arab Spring frame across Egypt and generate greater social cohesion around their messages. Our results lend tentative support to the hypothesis that it in fact did. When activists or members of the traditional media are in positions of brokerage, the level of cohesion within a community is greater than it would be otherwise. That highly central activists have the largest effect suggests that because their position within the network allows them to broker the flow of information, they are able to use Twitter to frame events in ways that resonate with others.

1 Introduction

Around 11:30 in the morning on December 17, 2010, a young man walked in front of the governor's office in a rural Tunisian town, dowsed himself with gasoline purchased from a nearby gas station, and lit himself on fire. Earlier that day, police officers had beat 26 year-old Mohamed Bouazizi in the street for selling fruit without a permit—his sole means of supporting his family. In the aftermath, it

R. Schroeder (✉) • S.F. Everton • R. Shepherd
Naval Postgraduate School, Monterey, CA, USA
e-mail: rcschroe@nps.edu

N. Agarwal et al. (eds.), *Online Collective Action*, Lecture Notes in Social Networks,
DOI 10.1007/978-3-7091-1340-0_10,

became apparent that Bouazizi simply lacked the money necessary to bribe a local official, who responded by having her aides rough him up and confiscate his wares. Mohamed's quest to retrieve his scales and cart took him the local governor's office, where his complaints fell on deaf ears. Fed up with the corruption, unable to find work in a town with a 30 % unemployment rate, his applications rejected by the army and the government, Bouazizi caught the peoples' attention with an extreme act of protest. What happened next shocked everyone in Tunisia, across North Africa and even around the world. Protests sprung up from town to town, such that by the time Mohamed died on January 4th, the entire country was engulfed by outrage at the government. That is the story of how a theretofore unknown town in rural Tunisia became birthplace to a revolution.

As the story of protests spilled out across news services, satellite feeds, and fiber optic cables, people across North Africa began identifying with the popular sentiment of what was quickly becoming a full-scale revolution in Tunisia. In addition to protests at home, Bouazizi's suicide coalesced individuals to recognizing that they too had similar grievances. These individuals acted on those grievances by actively protesting against the government in public spaces as well as sharing their experiences and protesting in the digital space (Howard and Hussain 2011). Information about these protests spread across North Africa and Middle East, including Egypt where the grievances resonated across various opposition movements. Similar to Tunisia, these Egyptian opposition movements used social media to congregate in the digital realm where connections between previously disconnected groups were brokered, shared grievances among these groups and activists, and spread their messages around the world (Lim 2012).

The protest model that emerged was primarily comprised of young protestors and organized through extensive use of online communications (particularly social media); it garnered widespread international attention and united previously disparate groups under the larger anti *status quo* movement. There is a continuing debate on the ability of social media to affect states more generally, not just in the context of the Arab Spring as applied here. On the one hand, social media enthusiasts point toward the success of the revolutions in Tunisia and Egypt as evidence of social media's power. They argue that because Internet-based communications operate independent of the state apparatus and external to the concept of the nation-state, this borderless public forum allows for debate across political, ethnic, religious and class lines, essentially nullifying the divide-and-conquer strategies of many authoritarian regimes. Conversely, skeptics point to the inability of Internet communications to escape well-established methods of state control and manipulation, such as how the Egyptian regime cut off Internet access in response to early protests, although this did have the unintended consequence of driving even more people to the street.

If social media did play a decisive role in fomenting the protests in Egypt, how did it do so? Lynch (2011) observes there are four ways through which social media could affect contemporary Arab states, "(1) promoting continuous collective action; (2) limiting or enhancing the mechanisms of state repression; (3) affecting international support for the regime; and (4) affecting the overall control of the public

sphere." Although these are all interrelated, this chapter focuses on the dynamics between social media and revolution via Lynch's fourth channel. Using social network data extracted from Twitter messages (i.e., "tweets") related to the 2011 Egyptian Revolution, we examine how this social network changed and evolved in ways that helped frame the grievances of the Egyptian people in such a way that they helped give birth to the revolution. We nest our evaluation of social media's role within the context of contemporary social movement theory (in particular, the collective process generally referred to as framing), in order to illuminate the underlying structural causes of Twitter's role in modern activism. To be clear, we do not argue that social media tools were all that activists needed in order to mobilize the Egyptian people. Rather, we see it as one tool among many that activists used to frame and spread their revolt against the Mubarak regime. The remainder of the chapter proceeds as follows: We begin with a very brief overview of the events leading up to and including the Egyptian revolution. We then turn to a discussion of social movement theory, focusing primarily on the role that the framing of grievances plays in a social movement's emergence; we then consider how social media tools, such as Twitter, can possibly facilitate the framing process. Next, we present our data and the methods we use to analyze them before examining the results of our analysis. This section is followed with a brief reflection on the implications of our findings.

2 Background

On January 25th, demonstrators mounted a protest in opposition to Hosni Mubarak's government in Egypt that ultimately led to him to step down from power. This event was just one in a number of popular protests that led to the collapse of authoritarian regimes across North Africa that collectively have been labeled the Arab Spring. These uprisings were not entirely surprising. Since the turn of the century, political demonstrations have massed in the streets of North African and Middle Eastern countries numerous times, such as the demonstrations in 2000 that supported the second Palestinian intifada, the ones in 2002 that protested Israeli operations in the West Bank, and those in 2003 that protested the Iraq War (International Crisis Group 2011). Political demonstrations against Mubarak were also not new. Take, for instance, the Kefaya movement, which emerged in 2004 in response to changes in the Egyptian constitution that allowed Mubarak to remain in power for a fifth term. It successfully organized numerous demonstrations in 2005 and 2006 and united a number of political parties holding a wide range of different ideologies—communists, nationalists, Islamists—under the banner of regime change (Oweidat et al. 2008). More pertinent to our purposes here, Kefaya utilized new information technology in pursuit of its goals. For example, it created a website that allowed users to post grievances online, it regularly communicated with members and others via electronic messages, it posted advertisements online and in independent media outlets, it published banners and political cartoons on the

Internet, it gathered and distributed video and photographic evidence that documented sexual and physical harassment by state security officers, and so on (Oweidat et al. 2008). Although the Kefaya movement eventually disbanded, other movements adopted portions of its organizational structure as well as its methods of using new technology.

Two examples of this are the April 6th Youth movement, which was formed to support striking textile workers, and the "We Are all Khaled Said" movement, which began in response to the death of an Alexandrian man, who allegedly died at the hands of Egyptian police. Shortly after the Tunisian movement swept President Zine el Abidine Ben Ali from power, activists from these two movements (as well as others) created a Facebook page that called for a large scale protest on January 25th, the National Egyptian Police Day holiday. This initial protest gained large scale support from various groups of differing ideologies and resulted in demonstrations across the country, where protesters often outnumbered police and led those protesting in Cairo to converge on Tahrir Square (International Crisis Group 2011).[1] As the protests continued, the movement picked up more and more supporters that helped enable it to resist attempts by the Mubarak regime to shut it down, and on February 11th, Mubarak was forced to resign.[2] As noted earlier, during the Egyptian protests individuals used Twitter and other social media tools to spread the word about the protests, not only inside Egypt but across the world (Salama 2011). The questions we take up in this chapter, however, are whether social media played a decisive role in fomenting the Egyptian protests, and if it did, how? To begin to answer these questions, we turn to consideration of social movement theory, the process of framing, and how social media tools, such as Twitter, might play a role in the framing of grievances.

3 Social Movement Theory, Framing, and Twitter

It is often assumed that all that is required for a social movement, an insurgency, or other form of collective action to emerge is for enough individuals to become sufficiently angry about a particular social condition or set of conditions. There is an element of truth in this assumption. Grievances are generally necessary in order for collective action to occur. However, they are not enough. As social movement scholars have noted, while in most societies there are plenty of individuals who are dissatisfied with the status quo, few become activists, form a social movement, or engage in contentious politics (McCarthy and Zald 1977). Instead, other factors

[1] Tahrir Square is a major public square in downtown Cairo. It is formerly the site of British barracks, and after the British left Egypt in 1949, King Farouk raised the Egyptian flag and renamed the square Tahrir "Liberation" square. It has also been the site of numerous protests and marches prior to the ones in January 2011 (International Crisis Group 2011).

[2] For more information on the Egyptian demonstrations, see International Crisis Group (2011).

need to fall into place before a disaffected group of individuals is able to mobilize successfully (McAdam 1982; McAdam and Snow 2010; McAdam et al. 1988, 2001).

Not only do people need to harbor grievances of some kind, but (1) the grievances have to be framed in such a way that people recognize they share them with others and believe that collectively they can do something about them (i.e., *insurgent consciousness*), (2) the disaffected population needs to have access to and be able appropriate sufficient resources (i.e., *sufficient mobilizing resources*), and (3) the group needs to perceive (either correctly or incorrectly) that the broader sociopolitical environment is vulnerable to collective action or that it represents a significant threat to the group's interests or survival (i.e., *expanding opportunities or increased threats*) (McAdam and Snow 2010; McAdam et al. 2001). Figure 1 illustrates the interaction of these factors. In isolation, none of them is sufficient to generate and sustain an insurgency. Together, however, they make collective action more likely (Smith 1991: 64–65).[3]

As one might guess, however, the development of an insurgent consciousness is anything but automatic, and scholars have devoted considerable attention to the process by which movements frame grievances in ways that resonate with their target audience so that they are compelled to act in order to alter the social situation:

> The framing perspective on collective action and social movements views movements not merely as carriers of existing ideas and meanings, but as signifying agents actively engaged in producing and maintaining meaning for constituents, antagonists, and bystanders. . . The verb *framing* is used to conceptualize this signifying work, which is one of the activities that social movement leaders and their adherents do on a regular basis (Snow and Byrd 2007: 123–124).

David Snow and his colleagues (Snow and Benford 1988; Snow and Byrd 2007; Snow et al. 1986) have identified three stages in the framing process: diagnostic, prognostic, and motivational (Snow and Benford 1988; Snow and Byrd 2007). The first stage, diagnostic framing, focuses on questions such as, "What's the problem?" "What went wrong?" and "Who or what is to blame?" Answers to these questions and others can "recast features of political or social life that were previously seen as misfortunes or unpleasant but tolerable facts as intolerable injustices or abominations that demand transformation" (Snow and Byrd 2007: 124). The second stage seeks answers to the question, "What is to be done?" If framed appropriately, these offer specific remedies and/or solutions to the problems raised in the first stage and the means for achieving them (Snow and Byrd 2007: 126). The final stage may be the most important. It seeks to motivate people to act (Snow and Benford 1988: 202). It seeks to overcome the fear of risks often associated with collective action and the free-rider problem (i.e., why participate in a risky and/or costly movement when I know someone else will, and that I will still benefit from their activism?) (Olson 1965; Snow and Byrd 2007: 128).

[3] The combination of these factors does not guarantee that a social movement will emerge, however.

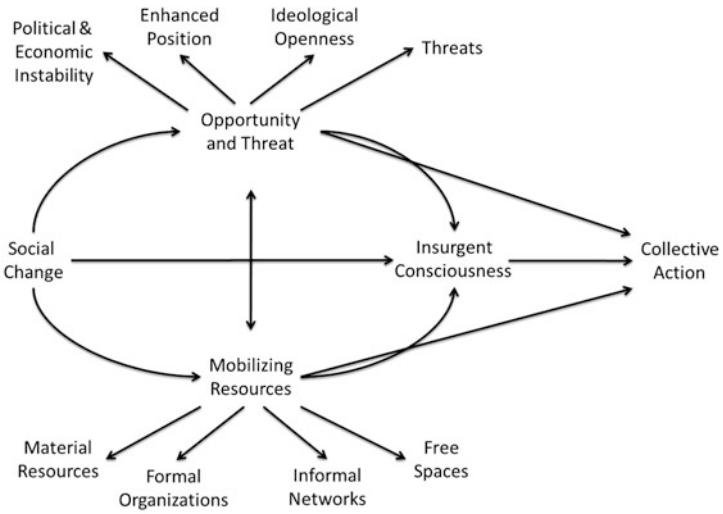

Fig. 1 Contemporary collective action model

Of course, a budding social movement's leaders generally do not expect that all potential members will be able to fully grasp the group's ideology or possess a sophisticated understanding of its history, which is why they often reduce their group's core message into generalized ideological snippets, bumper-sticker versions of the movement's broader ideology (Robinson 2004: 129), that are easily communicated to (and resonate with) potential followers and the general public (Snow et al. 1986). What becomes important, then, for those studying social movements is not only identifying the grievances that helped give rise to them but also how their leaders framed the movement's ideology in ways that helped them attract, retain, and motivate followers.[4]

Once frames are established, they can spread from one movement to another. Activists will often borrow slogans, songs, and various tactics from other movements. Diffusion can result with or without direct personal contact. When there is no direct contact, diffusion can occur when information is available through other channels, and the movements must have some elements in common (McAdam and Rucht 1993).

Scholars have noted that the media often plays an important role in interpreting social movement activism. Individuals, who are not directly involved in a particular protest or are geographically removed from it, often rely on some sort of media outlet, whether television, print, radio, or an Internet news source, to learn about it. Indeed, the news media often serve as a gatekeeper of movement information

[4] Given the 140 character limitation of Twitter messages (see discussion below), Twitter appears to be an ideal tool for the broadcasting of ideological snippets and the framing of grievances to a budding social movement's target audience.

(Koopmans 2004), choosing which events to report, which ones to ignore, and which ones to devote less time to. Interestingly, the news media are also somewhat dependent on social movements because the latter provide the drama, conflict, and action that sell newspapers and attract viewers. Nevertheless, evidence suggests that the media holds most of the power in the relationship (Gamson and Wolfsfeld 1993).

With mobile devices now able to access the Internet and broadcast to the entire world, the power relationship and the gatekeeper status appears to be changing. Twitter, a microblogging service that began in 2006, enables users to describe what they are doing, send a message to another user, embed a URL to another site, and broadcast their message to anyone else with a connection to the Internet. On its website, Twitter describes itself as a "real-time information network that connects you to the latest information about what you find interesting."[5] Anyone with a phone that has access to the Internet or SMS messaging (a form of text messaging) can send "tweets" from their phone, while those with computers with Internet access can post tweets through Twitter's website.[6] In addition to broadcasting tweets to others, users can choose to follow other users, so that they are constantly updated with new information when those they follow "tweet." Users can also describe their tweet as a topic, by placing a "#" before a word. If they want to pass on another person's message, they can "retweet" that message to their own followers or another user. Retweets contain the original message along with the original tweeter's name, but they can be passed on to other users with additional new content if the retweeting user so desires.

Kwak et al. (2010) studied the basic topology of Twitter. They found that a majority of the trending topics were headline or persistent news[7] and that retweeted messages reach, on average, 1,000 users, suggesting a fast diffusion of information across Twitter. Other research has found that although Twitter allows users to follow and communicate with many different people, users can really only entertain a maximum of 100–200 stable social relationships (Gonçalves et al. 2011), most of which reflect the process of homophily (i.e., "birds of a feather flock together"). For example, one study measured each user's general happiness and found that Twitter users exhibiting the same level of general happiness tended to associate with one another (Bollen et al. 2011). However, a study of political polarization on Twitter found that while highly polarizing messages that were retweeted tended to be sent to users sharing similar political leanings, messages sent directly to different users did cross political lines (Conover et al. 2011).[8]

[5] See http://www.twitter.com/about.

[6] A "tweet" is a message that is limited to 140 characters or less.

[7] Twitter tracks phrases, words, and phrases in order to find topics that become popular quickly and label as trending topics; these are published on its website and platform.

[8] Twitter's real-time capability has helped it be used in response to natural disasters both in the United States (Sutton et al. 2008) and abroad (Acar and Muraki 2011), response to acts of terrorism (Stelter and Cohen 2008), and for reactions to political debates (Shamma et al. 2009).

Social media also appears to be playing a larger part in protests although how, exactly, is unclear. For example, a 2010 report by the United States Institute of Peace noted that while social media is increasingly used as a tool for promoting freedom, there is still little understanding of its causal effects on political struggle (Aday et al. 2010). Social media can change the dynamics of mobilization by increasing speed and interactivity not found in traditional mobilization techniques (Eltantawy and Wiest 2011). Using the 2009 Iranian election protests as an illustrative case study, the authors show that social media not only played a role in the mobilization of protestors but also in the regime's own countermeasures (Aday et al. 2010).[9] As Evgeny Morozov (2011) notes, technology is a "double-edged" sword. It can be used just as easily to counter protest movements as it is to foster them.[10] Indeed, regimes from China to Egypt all employ technological barriers to communicate to one extent or another. Moreover, technology firms, including Twitter and even Google, have often failed to promote free political speech and instead struck deals with political authorities in order to facilitate business. This, however, has not kept activists from viewing social networking sites as a useful tool for collective action (Harlow and Johnson 2011).

Through continued pressure on Internet-based communications, authoritarian regimes are seeking to eventually attain something similar to their current control of traditional media (namely newspapers, radio, and television). In the past, oppressive regimes relied on the monopoly of information held by state-controlled traditional media to frame the discourse surrounding political action. One of the reasons why the aforementioned Kefaya movement failed was that state-controlled media portrayed the movement's goals as being daydreams funded by the U. S. Central Intelligence Agency (Oweidat et al. 2008). During the power of authoritarian regimes to control, information has been changing due to advances in information technology and the Internet. Minority groups or opposition groups that previously found it difficult to find information about their concerns now can find it online or delivered to their phone (Howard 2010).

Traditional media tends to favor the *status quo*, which in the case of the Arab Spring is the regime and leaders themselves, and focus on the negative aspects of protest movements. This tendency, sometimes referred to as the *protest paradigm* (Chan and Lee 1984) has been observed even in societies that are more liberal. McLeod and Detenber (1999: 3) analysis of traditional media coverage of protestors found that

> news stories about protest tend to focus on the protesters' appearances rather than their issues, emphasize their violent actions rather than their social criticism, pit them against the police rather than their chosen targets, and downplay their effectiveness.

[9] After officials declared incumbent Mahmoud Ahmadinejad the winner, supporters of opposition candidate Mir-Hussein Mousavi took to the streets to protest what they saw as a rigged election.

[10] See http://www.newscientist.com/article/mg20928026.100-the-internet-is-a-tyrants-friend.html.

This phenomenon is even more exaggerated in states with extensive control over the media. For example, after the Egyptian state-controlled media stopped ignoring the protests, it portrayed the protestors as agents of foreign meddling, radical Islam, Israel, or the West (International Crisis Group 2011). Repeatedly portraying protestors as misguided, delinquent, or violent, the media can (but not necessarily) delegitimize their grievances in the eyes of the public. The association of such negative qualities with protest movements can affect whether individuals join a movement or not. For example, an overrepresentation of negative impressions can increase the likelihood for individuals to adopt a similarly negative opinion of a movement (Iyengar 1990). However, it may not be feasible for governments to exert the same level of control over new media. Recent empirical work has shown traditional and social media to be functionally different as well. Harlow and Johnson (2011) show the content of Arab Spring-related social media posts was more positive and diverse than traditional media outlets, which tended to rely on government accounts.

Nevertheless, Twitter has helped alter the relationship between traditional news media and protesters. Protesters use Twitter to air their grievances and advertise their actions, and the news media use it to collect and verify information about newsworthy events. Hermida (2010: 302) suggests that journalists can use Twitter as an awareness system for journalists, allowing them to be alerted to "trends or issues hovering under the news radar." One case study looked at tweets by Andy Carvin, a journalist for National Public Radio, during the Egyptian Revolution and found that alternative voices had a greater influence over the content of Andy Carvin's tweets than other journalists or elite sources (Hermida et al. 2012). However, more "elite" traditional news organizations appear to be more reluctant to incorporate a new relationship between the news media and their audience than are less "elite" organizations (Lasorsa et al. 2011). Another case study that analyzed the content of tweets during the Egyptian Revolution found that Twitter can crowdsource the creation of information elites either by retweeting particular user's tweets or by encouraging other users to follow a particular user (Papacharissi and de Fatima Oliveira 2012). While traditional journalists became one trusted source of information, a parallel source of information was coming from accounts consisting of bloggers, activists, and intellectuals. This parallel source of information interacted with the traditional news media through tweets and retweets but also incorporated their opinions and emotions of solidarity with the protestors into the content of their tweets.

Is there a structural difference between traditional and social media that immunizes the latter to the *protest paradigm*? If such a mechanism were present, what form would it take? Below we offer one possible way to test for the effects of decentralized communication on this essential step of the political contention process.

4 Data, Methods, and Analysis

In order to understand the relationships among users of Twitter, we examined the pattern of tweets about Egypt during the Egyptian Revolution using social network analysis. Social network analysis is a useful method for researching discussion on Twitter because it can analyze the networks that emerge through response and retweeting patterns (Bruns and Burgess 2012). For example, centrality measures such as betweenness can help us identify users who are potential conduits of information, community detection algorithms can help us locate distinct clusters within the network, and triadic analysis can help us detect the presence (or absence) of complete triads (defined below) within such clusters. In this chapter, we tested whether particular aspects of clusters (i.e., which actors or what types of actors are most central) help explain structural features of those clusters (i.e., the number of complete triads). To be more precise, we tested whether activists who are in a position to broker the flow of information through a cluster are positively associated with greater cohesion within that cluster. If this proves to be the case, we argue that such results are consistent with the notion that highly central activists can use social media tools such as Twitter to frame grievances in ways that bring other actors together and mobilize them for action.

To test this, we analyzed over one million tweets about Egypt from January 28, 2011, and February 4, 2011, that were downloaded using the Twitter application programming interface (API), which is a function that allows other programs to receive and send data from and to Twitter. In our case, a program interacted with the Twitter API by requesting and storing all the data it could in regards to users tweeting about Egypt. Key aspects of the data that were collected and stored included the user's Twitter name, the content of each tweet, and a description of each user (from the user's public profile). Using these data, we generated a user-by-user network where a directed tie exists between two users if (1) one of the users sent a message to the other or (2) a user retweeted the message of another. In the case of the latter, a tie was drawn from the author of the original message to the user who "retweeted" the message. In the end, our user-by-user network included 196,670 users with 526,976 ties between them. From this, we extracted the largest weakly connected component that contained 176,447 users with 468,243 ties between them.

While the network as a whole is interesting, it is unlikely that an individual's framing of the events will transfer across such a wide network. Instead, the influence of a user will most likely have a larger effect among smaller clusters of users inside the larger conversation about Egypt. To identify and extract these clusters, we used a community detection algorithm developed by Blondel et al. (2008). This algorithm assigns users into different clusters in terms of the partition that yields the highest modularity score, which is a measure of fit developed by Mark Newman (2006) that compares ties within and across clusters to what one would expect in a random graph of the same size and having the same number of ties. Formally, it is the fraction of internal ties in each cluster less than the

expected fraction, if they were distributed at random across the network. The higher the net fraction, the better the fit. The algorithm identified a number of distinct clusters. Clusters that contained at least 1,765 accounts or 1 % of the entire network were analyzed further. In this case, 30 communities contained at least 1,765 accounts.

We began by estimating betweenness centrality (Freeman 1979) of each of the users inside their individual communities. Betweenness centrality measures the extent to which each actor in a network lies on the shortest paths (i.e., geodesics) connecting all pairs of actors in the network. It is often used as a measure of brokerage; here we use it to identify users who are potential conduits of information and have the best opportunity to frame how information is portrayed. We examined the profiles of the top ten users and coded them as either traditional media (affiliated with television, radio, or print media), new media (affiliated as a blogger, online news, or portrayed himself or herself as a news source but lacking affiliation with traditional media), activist (self-identified as an activist or affiliated with human rights, social justice, political movement, or other movement), or other (e.g., celebrities, government accounts such as the State Department, users not portraying themselves as either activist or media, etc.). Table 1 summarizes the results of this analysis.

Next, we ran a triadic census for each community in order to examine their triadic structure.[11] A triad consists of three actors that may or may not be tied to one another.[12] Analyses of triadic dynamics generally focus on the property of *transitivity*, which describes the tendency for open triads to close, and *reciprocity*, which is when a tie exists in both directions. A triad is considered *transitive* if there is a directed connection A → B, B → C, and A → C, for any arrangement of the actors A, B, and C. Conversely, if the directed ties A → B and B → C both exist, but there is no A → C tie, the triad is considered *intransitive*.[13] Fritz Heider (1977) based his structural balance theory, the earliest study of transitivity, on the assumption that people seek to avoid cognitive dissonance, leading people with similar attributes or relationships to cluster together. This effect, known formally as *homophily*, is often described as "birds of feather flock together" or "the enemy of my enemy is my friend." Mark Granovetter (1973, 1983) has argued that transitivity occurs when strong ties are present among actors and tends to create small, tightly knit groups. *Reciprocity*, on the other hand, occurs when A has a tie to B, and B has a tie to A. *Reciprocity* is important because it is a source of social cohesion (Emerson 1962, 1972a, b, 1976). For the Twitter network we examine here, we consider a tie reciprocal if A sends a message to B and B sends a message to A and define a complete triad as one that is both transitive and all of its ties are

[11] The triadic census was estimated using the social network analysis program, Pajek (Batagelj and Mrvar 2012; de Nooy et al. 2005, 2011).

[12] Georg Simmel (1950) famously asserted that the triad is smallest irreducible unit of sociological analysis.

[13] For a full description of all possible triad types, see de Nooy et al. (2005: 209).

Table 1 Clusters from overall network

Cluster	Number of users	Average degree	Activists	New media	Traditional media	Other	Top user	Complete triads
1	19,062	3.422	7	3	0	0	New Media	282
2	13,645	1.641	1	2	7	0	New Media	84
3	11,421	1.250	1	1	5	3	Traditional Media	13
4	8,460	1.701	3	3	2	2	Other	2
5	8,069	1.333	0	0	6	4	Traditional Media	7
6	7,776	1.157	1	2	6	2	Traditional Media	0
7	6,946	1.474	4	6	0	0	New Media	4
8	7,375	1.218	2	1	6	1	Traditional Media	3
9	7,567	1.079	0	0	6	4	Traditional Media	0
10	6,036	1.212	5	3	0	2	New Media	0
11	5,875	1.291	1	2	6	1	Traditional Media	3
12	4,321	1.519	4	3	0	3	Activist	46
13	4,025	1.505	1	5	1	3	Other	2
14	4,216	1.342	1	3	2	4	Other	2
15	4,267	1.014	0	0	0	10	Other	0
16	3,754	1.380	0	2	8	0	Traditional Media	3
17	2,878	1.303	1	2	1	7	Traditional Media	3
18	2,969	1.171	0	4	5	1	Traditional Media	1
19	2,695	1.341	0	0	9	1	Traditional Media	14
20	2,280	2.318	7	3	0	0	New Media	20
21	2,329	1.284	0	2	4	4	Traditional Media	1
22	2,681	1.199	1	4	3	2	Activist	5
23	2,195	1.200	2	0	6	4	Traditional Media	3
24	2,090	1.282	2	0	3	5	Other	0
25	2,149	1.102	1	7	2	0	Traditional Media	0
26	1,899	1.450	2	1	3	4	Traditional Media	2
27	1,800	1.511	3	2	1	4	Activist	1
28	2,015	1.014	1	0	0	9	Other	0
29	1,875	1.126	1	5	1	3	New Media	1
30	1,768	1.278	1	0	6	3	Traditional Media	7

reciprocal. We focus on the presence of complete triads in this chapter because they are indicators of cohesion, and research has shown that members of cohesive subgroups tend to perceive (and by extension frame) similarly (de Nooy et al. 2005: 61; Everton 2012: 170). Interestingly (but perhaps not surprisingly), complete triads were the least common type of triad found in our analysis and were completely absent in some of the communities (see Table 1).

To determine whether the presence of activists, traditional media, or new media contributed to the presence of more complete triads, we estimated a multivariate count model that controlled for each community's number of users and average degree. We estimated a count model because the dependent variable is the count of the number of complete triads within each community. We used a negative binomial model because it best fit the distribution of counts within the dataset.[14]

Table 2 presents the results in terms of the incidence-rate ratios (IRR), which are similar to odds ratios in that they are equal to the natural log of the estimated coefficients (Long 1997; Long and Freese 2006). As the table indicates, when compared to number of "other" users (the reference category), the number of activists, members of the traditional media, and members of the new media ranked in the top 10 in terms of betweenness, centrality does not exert a statistically significant effect on the count of complete triads within a community. However, when the top user in each community is a member of the traditional media or is an activist, there is a positive and statistically significant effect on the count of complete triads in the community. In particular, when a member of the traditional media ranks first in terms of betweenness centrality, it increases the expected number of complete triads by more than three times than when an "other" user (the reference category) ranks first. A substantially larger effect occurs when activists rank first. When they do, it increases the expected number of complete triads by more than 11 times than when an "other" user ranks first. These results indicate that when activists or members of the traditional media are in positions of brokerage, the level of cohesion within a community is substantially greater than it would be otherwise. That highly central activists have the largest effect suggests that their position within the cluster may be providing them with the opportunity to use Twitter to frame events in ways that bring people together and possibly mobilize them. It is interesting that when a member of the new media ranks first, there is not a statistically significant increase in the number of complete triads. This may be due to some new media users being better at engaging other users than other new media users. However, the size of the new media IRR is almost as large as that of the traditional media, and its lack of statistical significance may simply be a function of the small sample size we are working with here. Moreover, since this is not a random sample, measures of statistical significance should be taken with a grain of salt (McCloskey 1995; Ziliak and McCloskey 2008). Indeed, because we

[14] We estimated the model using the generalized linear model (GLM) function implemented in StataCorp (2011), using a command by Hardin and Hilbe (2012), modifying the α so that the dispersion statistic was as close to 1.0 as possible.

Table 2 Multivariate regression results comparing the type of central accounts to the count of complete triads

	Model 1	Model 2
	IRR	IRR
Number of new media accounts in top 10	1.051	
Number of activist accounts in top 10	1.562	
Number of traditional media accounts in top 10	1.294	
New media as top account in cluster		3.245
Activist as top account in cluster		11.730*
Traditional media as top account in cluster		3.355*
Number of accounts in cluster	1.000	1.000*
Average degree in cluster	3.378	6.281*
AIC	6.010	5.701
BIC	−60.907	−54.166
Alpha dispersion	2.305	1.195

*$p < 0.05$

only analyze 30 clusters here, our conclusions should be considered tentative at best. Clearly, analyses of much larger Twitter datasets are in order.

5 Conclusions

In this paper, we have examined how social movements may be able to use Twitter to frame grievances in ways that resonate with their target audience. We saw how during the Egyptian Revolution, many people used Twitter to discuss the events that were taking place. We examined counts of complete triads, what we regard as an indicator of cohesion, and found them to be positively associated with the presence of activists or members of the traditional media in positions of brokerage. Because highly central activists exhibited the largest effect, we tentatively concluded that their network position appears to have helped them frame grievances in ways that brought people together and possibly helped mobilize them for action. Engaging other users and creating cohesive pockets of actors who view issues similarly increases the likelihood for a specific topic to become a trending topic and gain much more visibility.

Social movements will continue to use new tools that enable them to access a wider audience. In this case, people worldwide used Twitter to discuss events taking place in Egypt in early 2011. Not all social movements that have used Twitter have been successful. For example, Occupy Wall Street, a U.S. social movement, seeking to change the relationship between banks and the government, has yet to be successful although its members use Twitter frequently. While we do not claim that using Twitter will make a movement successful, it will be interesting to see whether other social movements that do achieve triadic closure are successful, and this closure is positively associated with the activists being in positions of information brokerage.

References

Acar A, Muraki Y (2011) Twitter for crisis communication: lessons learned from Japan's tsunami disaster. Int J Web Based Communities 7(3):392–402
Aday S, Farrell H, Lynch M, Sides J, Kelly J, Zuckermand E (2010) Blogs and bullets: new media in contentious politics. United States Institute of Peace, Washington, DC
Batagelj V, Mrvar A (2012) Pajek 2.04. University of Ljubljana, Lubjlijana
Blondel VD, Guillaume J-L, Lambiotte R, Lefebvre E (2008) Fast unfolding of communities in large networks. J Stat Mech arXiv:0803.0476v2
Bollen J, Gonçalves B, Ruan G, Mao H (2011) Happiness is assortative in online social networks. Artif Life 17(3):237–251
Bruns A, Burgess J (2012) Researching news discussion on twitter. Journal Stud:1–14
Chan JM, Lee CC (1984) The journalistic paradigm on civil protests: a case study of Hong Kong. In: Arno A, Dissanayake W (eds) The news media in national and international conflict. Westview Press, Boulder, CO
Conover MD, Ratkiewicz J, Francisco M, Gonçalves B, Flammini A, Menczer F (2011) Political polarization on twitter. In: Proceedings of the 5th international conference on weblogs and social media, Barcelona, Spain
de Nooy W, Mrvar A, Batagelj V (2005) Exploratory social network analysis with Pajek. Cambridge University Press, Cambridge
de Nooy W, Mrvar A, Batagelj V (2011) Exploratory social network analysis with Pajek. Revised and expanded. Cambridge University Press, Cambridge
Eltantawy N, Wiest JB (2011) Social media in the Egyptian revolution: reconsidering resource mobilization theory. Int J Commun 5:1207–1224
Emerson RM (1962) Power-dependence relations. Am Sociol Rev 27(1):31–41
Emerson RM (1972a) Exchange theory, part I: a psychological basis for social exchange. In: Berger J, Zelditch M, Anderson B (eds) Sociological theories in progress. Houghton-Mifflin, Boston, MA, pp 38–57
Emerson RM (1972b) Exchange theory, part II: exchange relations and network structures. In: Berger J, Zelditch M, Anderson B (eds) Sociological theories in progress. Houghton-Mifflin, Boston, MA, pp 58–87
Emerson RM (1976) Social exchange theory. In: Annual review of sociology. Annual Reviews Inc., Palo Alto, CA, pp 335–362
Everton SF (2012) Disrupting dark networks. Cambridge University Press, Cambridge and New York, NY
Freeman LC (1979) Centrality in social networks I: conceptual clarification. Soc Networks 1:215–239
Gamson WA, Wolfsfeld G (1993) Movements and media as interacting systems. Ann Am Acad Pol Soc Sci 528:114–125
Gonçalves B, Perra N, Vespignani A (2011) Modeling users' activity on twitter networks: validation of Dunbar's number. PLoS ONE 6(8):e22656
Granovetter M (1973) The strength of weak ties. Am J Sociol 73(6):1360–1380
Granovetter M (1983) The strength of weak ties: a network theory revisited. Sociol Theory 1:201–233
Hardin JW, Hilbe JM (2012) Generalized linear models and extensions, 3rd edn. Taylor & Francis, London
Harlow S, Johnson TJ (2011) Overthrowing the protest paradigm? How The New York Times: global voices and twitter covered the Egyptian revolution. Int J Commun 5:1359–1374
Heider F (1977) Attitudes and cognitive organization. J Psychol 21:107–112
Hermida A (2010) Twittering the news. Journal Pract 4(3):297–308
Hermida A, Lewis SC, Zamith R (2012) Sourcing the Arab Spring: a case study of Andy Carvin's sources during the Tunisian and Egyptian revolutions. Paper presented at the international symposium on online journalism, Austin, TX

Howard PN (2010) The digital origins of dictatorship and democracy: information technology and political Islam. Oxford University Press, New York, NY
Howard PN, Hussain MM (2011) The upheavals in Egypt and Tunisia: the role of digital media. J Democracy 22(3):35–48. Retrieved from http://www.journalofdemocracy.org/upheavals-egypt-and-tunisia-role-digital-media
International Crisis Group (2011) Popular protest in North Africa and The Middle East (I): Egypt victorious? International Crisis Group, Brussels
Iyengar S (1990) The accessibility bias in politics: television news and public opinion. Int J Public Opin Res 2(1):1–15
Koopmans R (2004) Movements and media: selection processes and evolutionary dynamics in the public sphere. Theor Soc 33:367–391
Kwak H, Lee CC, Park H, Moon S (2010) What is twitter, a social network or a news media? In: Proceedings of WWW 2010, Raleigh, NC
Lasorsa DL, Lewis SC, Holton AE (2011) Normalizing twitter. Journal Stud 13(1):19–36
Lim M (2012) Clicks, cabs, and coffee houses: social media and oppositional movements in Egypt, 2004–2011. J Commun:231–248. http://onlinelibrary.wiley.com/doi. doi:10.1111/j.1460-2466.2012.01628.x/abstract
Long JS (1997) Regression models for categorical and limited dependent variables, Advanced Quantitative Techniques in the Social Sciences Series. Sage Publications, Thousand Oaks, CA
Long JS, Freese J (2006) Regression models for categorical dependent variables using stata, 2nd edn. Stata Press, College Station, TX
Lynch M (2011) After Egypt: the limits and promise of online challenges to the authoritarian Arab state. Perspect Polit 9:301–310
McAdam D (1982) Political process and the development of black insurgency, 1930–1970. University of Chicago Press, Chicago
McAdam D, Rucht D (1993) The cross national diffusion of movement ideas. Ann Am Acad Polit Soc Sci 528(1):56–74
McAdam D, Snow DA (eds) (2010) Readings on social movements: origins, dynamics, and outcomes. Oxford University Press, New York, NY and Oxford
McAdam D, McCarthy JD, Zald MN (1988) Social movements. In: Smelser NJ (ed) The handbook of sociology. Sage, Beverly Hills, CA, pp 695–737
McAdam D, Tarrow S, Tilly C (2001) Dynamics of contention. Cambridge University Press, New York, NY and Cambridge
McCarthy JD, Zald MN (1977) Resource mobilization and social movements: a partial theory. Am J Sociol 82(6):1212–1241
McCloskey D (1995) The insignificance of statistical significance. Sci Am April:32–33
McLeod D, Detenber B (1999) Framing effects of television news coverage of social protest. J Commun 49:3–23
Morozov E (2011) The Internet is a Tyrant's Friend. New Sci. Retrieved from http://www.newscientist.com/article/mg20928026.100-the-internet-is-a-tyrants-friend.html
Newman MEJ (2006) Modularity and community structure in networks. Proc Natl Acad Sci 103 (23):8577–8582
Olson M (1965) The logic of collective action: public goods and the theory of groups. Harvard University Press, Cambridge, MA
Oweidat N, Benard C, Stahl D, Kildani W, O'Connell E, Grant AK (2008) The Kefaya movement: a case study of a grassroots reform initiative. RAND Corporation, Santa Monica, CA
Papacharissi Z, de Fatima Oliveira M (2012) Affective news and networked publics: the rhythms of news storytelling on #Egypt. J Commun 62(2):266–282
Robinson GE (2004) Hamas as social movement. In: Quintan W (ed) Islamic activism: a social movement theory approach. Indiana University Press, Bloomington, IN, pp 112–139
Salama A (2011) How to advertise a revolution. TEDxCairo. Retrieved from http://www.tedxcairo.com/index.php?show=Talks&id=6

Shamma D, Kennedy L, Churchill EF (2009) Tweet the debates: understanding community annotation of uncollected source. In: Proceedings of WSM'09, Beijing, China
Simmel G (1950) The triad. In: Wolf KH (ed) The sociology of Georg Simmel. The Free Press, New York, NY, pp 145–169
Smith CS (1991) The emergence of liberation theology: radical religion and social movement theory. University of Chicago Press, Chicago
Snow DA, Benford RD (1988) Ideology, frame resonance, and participant mobilization. Int Soc Mov Res 1:197–217
Snow DA, Byrd SC (2007) Ideology, framing processes, and Islamic terrorist networks. Mobilization 12(1):119–136
Snow DA, Burke Rochford E Jr, Worden SK, Benford RD (1986) Frame alignment processes, micromobilization, and movement participation. Am Sociol Rev 51(4):464–481
StataCorp (2011) Stata statistical software: release 12. StataCorp LP, College Station, TX
Stelter B, Cohen N (2008) Citizen journalists provided glimpses of mumbai attacks. N Y Times. Retrieved from http://www.nytimes.com/2008/11/30/world/asia/30twitter.html
Sutton J, Palen L, Shklovski I (2008) Back-channels on the front lines: emerging uses of social media in the 2007 Southern California wildfires. In: ISCRAM conference, Washington, DC
Ziliak ST, McCloskey DN (2008) The cult of statistical significance. The University of Michigan Press, Ann Arbor, MI