

Seeking Structure in Anarchy: The Emergence of Organization in the Occupy
Wall Street Movement

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This research examines the rapid formation of online social movements as a form of networked organizational structure, and assesses the emergence of a network form of organization in Occupy Wall Street, a well-known social movement. In order to assess the emergence of structure, this work triangulates data comprised of links between Twitter users and keywords, with trends in the amount of news coverage of the movement, and with hyperlinks connecting websites connected to the movement. This study contributes to the understanding of social movements, as well as to literature on emergent organizational forms, providing significant insight into the way movements emerge as organizational forms. It is argued that technologically enabled communication process constituted the emergence of a networked organizational form that supported a geographically dispersed movement with remote but interconnected hubs of leadership. Collectively, these organizational structures exemplify a networked organizational form with distinct subunits. The findings of this research provide a better understanding of the emergence of networked organizational structures, and contribute to knowledge about the formation of social movements as networked organizations.

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This use of social media tools has led to new opportunities for studying how large-scale communication networks are being used to engage with and mobilize individuals. Recent research (Agarwal, Bennett, Johnson, & Walker, 2014; Baldassarri & Diani, 2007; Castells, 2013; Harlow & Guo, 2014; Marchetti & Pianta, 2012) demonstrates that social movements can be viewed as networked entities built on communication ties between people, organizations and media institutions. Yet, research has not addressed the processes by which organizational structures within social movement networks emerge and become entrenched as legitimate, nor have scholars addressed how such structures are impacting social movement sustainability and success.

Social movements are often cited as examples of successful networked organizational forms (Bennett, 2005; Polletta & Jasper, 2001; Snow, Zurcher Jr, & Eklund-Olson, 1980; Strang & Soule, 1998). Stohl (2014) points to movements such as Occupy Wall Street and the Arab Spring as sites of self-organizing and collective action. In her framing, Stohl observes that these movements do not represent the end of formal organizations, but a commingling of institutional structures and decentralization. In striving to better understand such emergent organizational structures it is increasingly critical to understand the underlying network mechanisms that lead these organizations to develop as legitimate and established structures.

Moreover, research on networks and social movements has focused on the individual level, focusing on participation, such as assessing the networks of individuals to understand the division of labor within a movement (Diani, 2003a; Diani & McAdam, 2003). There is a clear need for scholarship that addresses the underlying network structures of social movements, and the ways that social movements can be viewed as multilevel phenomena; for example, nodes in a

network linking to other types of nodes (such as connections between organizations and events) (Diani & McAdam, 2003).

Framing social movements as communities of interaction, Stohl (2014, p. 10) cautions that “crowds and community can no longer be usefully characterized or studied as either digitally based or analogically constituted.” This work picks up that challenge, examining Occupy Wall Street (OWS) as an emerging networked organizational form that relied on digital interconnectivity and traditional legitimacy through media as a means of establishing a new social movement. Thus, this study applies theories of networked organizational forms, social networks, and social movements to analyze how social media and traditional media supported the growth of the OWS protest movement in the United States.

Through the latter half of 2011 and early 2012, the OWS movement has been a major force in American culture, with ramifications globally. There were demonstrations in approximately 952 cities in 82 countries between 2011 and 2012¹. Although the movement appears to have been temporal in nature, its formation and stabilization highlight the rapid and emergent nature of social movements in a technologically enabled society. OWS was first conceived of by the Canadian social activism organization, AdBusters (Schneider, 2012). The movement gained momentum in the U.S. on September 17, 2011 when a small group established an encampment in Zuccotti Park in the Financial District of New York City. Protest sites then started to emerge in cities across the country (Schwartz, 2011). Akin to Marchetti and Pianta’s (Marchetti & Pianta, 2012) definition of global social movements, OWS can be considered an occasional or temporal movement. This research sets forth to assess this movement as a networked form of organizing by leveraged the power of large-scale data. The findings of this

¹ See the Guardian Datablog at <http://www.theguardian.com/news/datablog/2011/oct/17/occupy-protests-world-list-map> for more information.

research provide a deeper understanding of the emergence of network organizational structures, and contribute to knowledge about the formation of social movements as network organizations. In order to understand the exact nature of the OWS movement, we draw on social movement literature in conjunction with research on social networks and network forms of organization. We then frame this discussion in this context of the OWS movement, and present an analysis of the aforementioned data.

Networked Forms of Organizing

The definition of an organization is central to the notion of organizing. A long trajectory of multidisciplinary literature has attempted to define what constitutes an organization by focusing on boundaries and functions in relation to market forces. Coase (1937) and Williamson (1999) represent a starting point for the discussion of forms of organization. Coase (1937) focused on transactions as the drivers that lead to the development of organizations. This perspective asserts that organizations developed when transaction cost inefficiencies in the market emerged: as long as exchanges are “straightforward, non-repetitive and require no transaction-specific investments” transactions will happen in the market (Powell, 1990, p. 296). When there is uncertainty and when costs of transactions increase disproportionately to the market, new organizations develop. This transaction-oriented perspective focuses on the dynamics of markets versus hierarchies as the *modus operandi* for why organizations may form and how organizations are bounded.

Indeed, networked organizational forms are viewed by many as a hallmark of many corporations in the 21st Century. As organizations adapt to an increased paced of change within a digital, global economy, networked organizational forms provide a structure marked by a high degree of interconnectedness and flexibility (Sundström & Deacon, 2002). Podolny and Page

(1998, p. 59) define a network form of organization as “any collection of actors that pursue repeated, enduring exchange relations with one another, and, at the same time, lack a legitimate organizational authority...” Defined as such, networked forms of organizing can exist in a wide variety of forms, but rely on repeated interactions through a network of connections to facilitate structure; the form is marked by the lack of a clear central authority with oversight of the structure. Without a clear authority, networked forms of organizing rely on embedded mechanisms of trust, such as a spirit of good will or a possibility of retribution, to drive compliance within the organization (Uzzi, 1997).

The benefits of networked forms of organizing include the gains the ability to promote the rapid transfer of knowledge through network ties (Contractor & Lorange, 2002; Kogut, 1988), and can enhance the legitimacy of an organization by connecting actors to partners with a high degree of legitimacy (Baum & Oliver, 1992). Connection to others, or recognition from others in a network, can confer legitimacy onto an emerging organization. In addition, network organizational forms are marked by potential economic efficiencies, realized through potentially low transaction costs and increases in the over quality of the relationships due to governance through trusted relationships (Uzzi, 1997; Williamson, 1991).

Some examples of industries in which network forms of organizations exist include craft-based industries, the film and recording industries, regional industrial spaces, and partnerships and alliances. Additionally, a number of scholars point to terrorist or criminal networks as examples of networked organizational forms (Lindelauf, Borm, & Hamers, 2011; Xu & Chen, 2008). The effects of a network organization can lead to “virtual capitalization, meaning that the bonds between the nodes [like organizations] enable the nodes to act as if they were transferring the capabilities of the other nodes to each other, but without actually doing so” (Borgatti &

Halgin, 2011, p. 7). This take on network forms relates to resource exchange as well as the coordination of action and capabilities via networked relationships (Borgatti & Halgin, 2011).

Despite definitions and exemplars of network forms of organization, there is a research gap in the analysis of organizational structures of network forms of organization, and in terms of how organizational structures emerge (Symon, 2000). Symon (2000) defines some assumptions inherent to network organizational forms in comparison to hierarchical organization such as: flatter organizational structures, more permeable boundaries, more lateral and direct communication (between personnel), and greater employee autonomy.

Social Movements and Networked Forms of Organization

Building on the prior discussion of structure and networked forms, some research has begun to assess the organizational structure that underlies social movements. Marchetti and Pianta (2012), for example, examined the structural and strategic features of global social movements. Their research frames global social movements as transnational, coordinated networks of organizations and individuals who provide organizational structure as well as other functions like communication; in other words, they frame global social movements as networked organizational forms. Indeed, Marchetti and Pianta argue that social movements are “characterized by voluntary and horizontal patterns of co-ordination which are trust-centered reciprocal and asymmetrical” (p. 97). This type of organizational form is both flexible and fluid, meaning that it can adapt to changing socio-political situations, and allows for “porous organizational boundaries that do not require enrolment ratified by formal membership” (p 97-98). This framing further reifies a view of social movements as network forms of organization.

Social movements are defined as (1) people “engaged in a social conflict,” (2) who “share a collective identity” while maintaining organizational or individual identities, and (3)

who “exchange practical and symbolic resources through informal networks” (Diani, 2003b) p. 301). As Diani’s (2003b) definition indicates, communication networks are central to the phenomena of social movements in that links between nodes such as participants, organizations, and media and communications technologies can be influential in understanding nuances of collective action.

As of late, technology has played a central role in the formation of a number of important social movements including Occupy Wall Street and the Arab Spring. Social media, such as Twitter, has played a critical role in the emergence of a number of social movements (Castells, 2012). Castells (2012) argues that within contemporary social movements, “networking technologies are meaningful because they provide the platform for this continuing, expansive networking practice that evolves with the changing shape of the movement” (p. 221).

Organizations based in online spaces are often pointed to as examples of emergent networked organizational forms (Zubcsek, Chowdhury, & Katona, 2008). Indeed, we argue that this technologically-enabled communication process constituted the emergence of a network organizational form that supported a geographically dispersed movement with remote but interconnected hubs of leadership. Collectively, these organizational structures exemplified a network organizational form with distinct subunits. Communication is a key mechanism for enabling these types of network forms of organization.

Because of increasing ubiquity and accessibility of information communication technology, activists have a wider range of communication channels and tools through which collective action can take place. Costanza-Chock’s (2003) term “repertoire of electronic contention” encapsulates this by building upon the Tilly’s (1978) notion of “repertoire of contention” to describe the range of tactics available to activists. Bennet and Segerberg (2012)

and Agarwal, Bennet, Johnson, & Walker (2014) connect this concept with the broader understanding of the role of networks in collective action via the “logic of connective action.” This term describes how technology-enabled networks of individuals manage collective action without needing to rely on hierarchical organizational support typical of past social movements (Agarwal et al., 2014, p. 648). Rather than relying on institutionalized structures for coordination, coordination is developed through the overlap of networks and media channels.

Building on the role of technology in social movements, Agarwal, Bennet, Johnson, & Walker (2014) found that Twitter facilitates the bridging of the networks of individuals enabling coordination and organizational dynamics. The results of a content analysis of tweets resulted in a framework describing how Twitter-based networks mimicked bureaucratic organizing functions: resource mobilization, which includes informational resources included domain names and IP addresses, in addition to knowledge and physical resources; “Responsiveness to short-term external conditions,” which means adjusting to external conditions like opportunities, competition, and threats; and “coordinated long-term change, adaptation or decline,” or the way resources are deployed over time during the rise or decline of an organizational system (Agarwal et al., 2014, p. 647). That work recognizes emergent organizational structures that developed through communication networks stemming from Twitter data, and the analysis of the links supporting this social movement.

Extracting Structure from Social Media

In defining the structure of a network organizational form, it is necessary to clarify the actors and relations that constitute such an organization. For example, Marchetti and Pianta’s (2012) view on global civil society position people as actors, whose relationships and activities form collective action. In this study, a key contribution we make is by shifting focus from actors

as people to actants. This shift in perspective expands how networks can be conceptualized and studied. In many contemporary social movements, interpersonal networks between people are just one way of communicating and organizing. Rather than focus on actors as the core structure of an organization or movement, we focus on how people's use of communications technologies create networks that inform process of organizing (Weick, 1979).

Communication is central to the structure of network organizational forms. According to Monge (1998, p. 147):

Network organizational forms are built on generalized communication network structures that link people and knowledge in all parts of the organization to each other (wherever they are located around the globe), while tying them to multiple external network organizations worldwide (Dicken, 1992).

This focus on how communication structures constitute network organizational forms is central to this study. The perspective known as communicative constitution of organization (CCO) is related to this approach to theorizing communication as an organizing process. CCO describes "how complex communication processes constitute both organizing and organization and how these processes and outcomes reflexively shape communication" (Putnam & Nicotera, 2009, p. 159). The CCO perspective focuses on the ways in which communication can foster organizing processes related to the coordination of action and relationship building (Putnam, Nicotera, & McPhee, 2009). This view stems from Weick's influence on organizational communication and how he "changed the conversation" by urging scholars to focus on "processes of becoming" rather than "states of being" (Gioia, 2006). This overarching concept of communication is a useful framework for understanding organizing processes in organizational settings.

Echoing this perspective, actor network theory (ANT) suggests a basis for conceptualizing the interplay of social actors and technology through meaning in social media. This perspective is situated in the sociomaterial view of communication and technology, which

posits that actors and technology are integrated to such an extent that boundaries become largely indiscernible (Leonardi, 2009). The core assumption of ANT is that communicative social action is comprised by both people and technology (Latour, 2005). Both humans and artifacts can therefore be considered “actants,” meaning nodes (human or otherwise) that exist through their relationships with other nodes (Latour, 2005).

The core assumption of ANT is that communicative social action is comprised by both people and technology (Latour, 2005). Both humans and artifacts can therefore be considered “actants,” meaning nodes (human or otherwise) that exist through their relationships with other nodes (Latour, 2005). In the context of the OWS movement, viewing Twitter hashtags as actants enables us to analyze the communication networks used to establish organizational forms. Thus, the interaction between actors, and between actors and hashtags, collectively represent a network form of organization.

Some criticisms have been levied against ANT, such as the assumptions that technologies have certain unquestioned properties, that actants are assumed to be equal in terms of possible interpretations, as in the question “does the aeroplane lend itself to the same set of possible interpretations as the bridge; and if not, why not” (Hutchby 2001 p. 447, as cited in Jones & Orlikowski, 2007), and that human qualities have been projected onto material artifacts. While ANT as a postmodern theory does not resolve these critiques, the strengths of ANT as a framework for analysis enable different ways of conceptualizing networks between humans and technology. This approach can facilitate our understanding of network dynamics, especially in the context of a mediated environment like Twitter in which Twitter handles do not inherently reflect single, distinct individuals but a possible range of entities from individuals to groups to organizations to Twitterbots (automated Tweets).

In the context of the OWS movement by viewing Twitter hashtags as actants, we are then able to analyze the communication networks used to establish organizational forms. Thus, the interaction between actors, and between actors and hashtags, collectively represent a networked form of organization. A network form of organization can be defined as a group of actors connected to each other through “repeated, enduring exchange,” that also “lack a legitimate organizational authority to arbitrate and resolve disputes that may arise during the exchange” (Powell, 1990).

Occupy Wall Street: An Emergent Social Movement

While the role of linkages between actors, such as organizations, has been introduced in social movement literature², the conceptualization of a social movement as an emergent, network form of organizing has not been assessed. In this section we will show how this perspective is a critical approach better understanding how communication informs the trajectory of social movements. Through the latter half of 2011, and early 2012, the OWS movement was a major force in American culture, with global ramifications carrying on from the movement (Juris, 2012). Although the movement appeared temporal in nature, its formation and stabilization highlight the rapid and emergent nature of social movements in a technologically enabled society. Elsewhere, actions such as the Arab Spring and World Trade Organization protests echo similar emergent forms of organizing. OWS was first conceived by the Canadian social activism organization, AdBusters. The movement gained momentum in the United States on September 17, 2011 when a small group established an encampment in Zuccotti Park in the Financial

² Linkages between different types of organizational actors are key parts of collective action movements such as formal organizations (e.g., non-profits), or less formal entities, such as those that stem from the movement itself (e.g., community libraries, governing committees). The ties between organizations can consist of a range of relational ties such as sharing information, joint participation in an event, exposure to certain media or communications technologies, or shared ties to third parties (Diani, 2003a).

District of New York City. Protest sites then started to emerge in cities across the country (Schwartz, 2011).

Social media have become increasingly influential as tools used for the coordination of social movements. One of the most prominent communication tools used by the OWS protesters was the microblog site, Twitter (Juris, 2012). The first Twitter mention of the hashtag #occupywallstreet appeared on July 13, 2011 with a call to action to gather in September. The research collective OccupyResearch estimates that there are 486 distinct occupy “hubs” that developed regionally. In addition, more than 240 distinct hashtags³ have been identified around the OWS movement. Hundreds of thousands of tweets were generated in a 6-month period from September 2011 through February 2012, highlighting the immense nature of the movement. Building on the prior theoretical discussion, the following hypotheses and research question are were posed to examine the emergent nature of organizational structures, and to assess the formation of traditional communication patterns in line with what is expected of a networked organizational form.

As a networked organizational form develops, it is expected that formal communicative structures will emerge exemplifying the connectedness of distinct subunits in the organization (Powell, 1990; Powell, White, Koput, & Owen-Smith, 2005). From a networks perspective, previous research has examined the networked nature of emergent organizational forms (Burt, 1992; Stinchcombe, 1990), but, relatively little is known about how individuals cluster and connect to one another, and how those actions build to broader structures of organization (Zubcsek et al., 2008).

³ Hashtags are topic keywords that are preceded by the hashtag symbol, and are utilized to sustain conversation around a particular topic (i.e. #occupywallstreet).

Thus it follows that there will be a greater degree of clustering as a social movement develops as a network form of organization. It is possible, therefore, to hypothesize this formation of the organizational form as follows. First, and foremost, the network of organizational actors should exhibit a significant increase in the formation of relationships over time:

H₁: Over time, dyadic communication will become prevalent in an emerging networked organization.

Second, and perhaps more substantial, as suggested by Zubcsek, Chowdhury and Katona (2008), it is expected that clustering will increase over time as the organizational form moves towards a clustered state:

H₂: As a social movement develops as an emerging network form of organization, the organizational structure will be increasingly clustered.

At the same time, legitimacy is expected to develop as formal communication structures emerge. Thus, the growth of the emergent-networked organizational form is expected to align with an increase in recognition and legitimacy from adjacent groups, as seen in mainstream media. Indeed, a number of scholars point to media coverage as a central mechanism through which emergent organizations seek to gain legitimacy and recognition (Kennedy, 2008; Mondak, 1994; Pollock & Rindova, 2003). Thus, media coverage is expected to be an indicator of legitimacy of the OWS movement, but the exact pattern of coverage and its connection to the development of the form are not well known. We frame this as a research question for exploration:

RQ₁: How is the OWS movement reflected in mainstream news media in terms of amount of coverage over time?

In addition to mainstream news coverage, the establishment of hyperlinks on websites pertaining to the OWS movement provides a way of triangulating data to assess emergent organizational structures. Past research has established hyperlinks as a deliberate form of communication that

signals connections and affiliations among entities (Shumate, 2012; Author 2012, 2014).

Moreover, Twitter remains a fluid form of communication, and although Twitter is indicative of a pattern in communication it does not indicate permanence (Penney & Dadas, 2014). This suggests that both Twitter and media coverage will be indicators of the emergence of the movement, but the formation of somewhat permanent hyperlinks will be more indicative of the sustainability of the structure. Thus, hyperlinks among OWS websites provides evidence of formal ties among established entities:

H₃: Social media and mainstream news coverage of a social movement can predict the formation of permanent ties amongst organizational entities.

In aggregate, these hypotheses test the development of a networked form of organizing, in relation to the growing legitimacy of the OWS movement.

Methods

In order to assess the emergence of a network form of organizing this research utilized three sources of data: tweets extracted from Twitter, hyperlink networks extracted from the Internet Archive, and newspaper data extracted from Lexis-Nexus. Each source of data and relevant procedures are discussed in the following sections.

Twitter Data. The network foundation of these organizational forms is driven by communication through Twitter (Castells, 2012). According to the Occupy Research General Demographic and Political Participation Survey (ORGS), an online survey of over 4000 OWS participants conducted from December 2011 to January 2012, social media usage was preponderate amongst respondents.⁴ Twitter data were collected via the Gnip PowerTrack, a

⁴ More than half (64%) reported the use of Facebook within the last 24 hours, less than half (43%) reported visiting an Occupy website within the past 24 hours, 52% reported email usage, and 29% reported YouTube usage. Out of 4202 respondents, 23% reported using Twitter within the last 24 hours See <http://occupyresearch.net/2012/03/23/preliminary-findings-occupy-research-demographic-and-political-participation-survey/> for more information.

pay service acquired by one of the participating institutions in this study. Twitter collection during the OWS time period was an emergent process. As new hashtags were created, researchers added the hashtags to the tracking data, and the data set was built as the movement emerged. A number of scholars have pointed to issues utilized API services to collect Twitter data (González-Bailón, Wang, Rivero, Borge-Holthoefer, & Moreno, 2012; Vis, 2013); Gnip PowerTrack allows researchers to search by keywords, and has been shown to capture a larger volume of Twitter data.

The sample utilized for this study covers the period from October 17, 2011, through January 5, 2012. Having assessed the initial data, we focused on the critical two-month period from November 1 through December 31, 2011, following the emergence of the OWS movement. This period provides a stable sample, and eliminates the significant fluctuations present in the early periods of the movement. This analysis focused on the Occupy LA, Occupy Oakland and Occupy Wall Street centers of activity. These three centers of action aligned with available data, and provided a substantive sample of the OWS movement. Data collection from Twitter utilized the following hashtags to filter the data collection:

occupyoakland, occupyla, occupyny, occupy occupynyc, occupytimesquare, occupymanhattan, occupiednyc, Occupiedoakland, occupiedoaklandtribune, occupieroakland, occupy_oakland, occupyla, occupylausd, occupylosangeles, occupy_la, occupy_losan_angeles

The filtering of the data resulting in 750,816 tweets across the two-month period.

Website Hyperlink Data. Website tracking data were collected using an open source data-mining tool that extracts hyperlink data from the Internet Archive. The Internet Archive is the single largest repository of archived web content in the world, with more than 7 petabytes of archived web content. The data collection tool allows scholars to focus on specific websites and time periods. Utilizing a seed list obtained from the OccupyResearch collective, this work

focused on a subset of Uniform Resource Locators (URLs) relating to the focal movement: www.parentsforoccupywallst.com, www.adbusters.org, www.occupywallstwest.org, www.occupytogether.org, www.occupymynews.com, occupywallstreet.tumblr.com, occupywallstreet.newsvine.com, occupywallstreet.net, occupywallstreet.com, occupywallst.org, occupylosangeles.org, occupyeducated.org, and occupyoakland.org. The resulting dataset produced results for all 14 websites; there were 4,504 ties between the websites over a 2-month period.

News Media and Legitimacy. Secondary data were collected to analyze news coverage in and around the Occupy movement. A count of articles from mainstream news sources was used to assess a measure of legitimacy. A Lexis-Nexis Academic search was conducted to assess U.S. newspaper coverage of OWS from the early stages of the movement in September 2011 to the gradual decline of the movement over the next 12 months. While the movement has continued in different forms, newspaper coverage in this time period encompasses the most prominent weeks of this social movement. The sources included in this search were U.S.-based, English-language newspapers, including large market publications like *USA Today* and regional newspapers (<http://www.lexisnexis.com/en-us/products/lexisnexis-academic.page>). Wire service news and international newspaper coverage were not included in this sample. The terms searched included: Occupy Wall Street, Zuccotti Park, Occupy Oakland, Occupy Los Angeles/LA, and Occupy New York. These terms reflect location-based branches of the movement from large metropolitan areas. These terms were selected for their prominence in cumulative news coverage, as well as for their geographic distribution across the US.

Analysis

In order to assess the proposed hypotheses, a combination of social network analysis and regression analysis were implemented to examine the data. To test the emergence of organizational structures within the OWS movement, the data were aggregated and formatted as a sociomatrix. Data were sub-categorized based on region, with a sociomatrix being generated for each sub-region, a higher-level matrix being utilized to represent connections between the subregions. With regards to Twitter, a tie was said to occur between two websites if there was a mention (@) of one user by another. In the context of the Website data, a tie was said to occur if a hyperlink existed between two websites. Subsequently, data were loaded in the R open-source software package; standard statistical analysis commands were utilized in conjunction with the Statnet social network analysis package.

The first hypothesis proposed that over time, dyadic communication would become prevalent in an emerging networked organization. In order to assess the significant of the formation of dyadic communication over time, the formation of pairs between Twitter users, and the formation of hyperlinks between websites were both assessed. In order to measure significance over time, a single-sample t-test measure was implemented. The number of pairs of (a) Twitter users and (b) Websites that were connected via either a direct mention in Twitter or a hyperlink online was measured by counting the number of edges via Statnet. H_1 would be supported if dyadic ties increased significantly over time.

The second hypothesis proposed that as a social movement develops as an emerging network form of organization, the organizational structure would be increasingly clustered. The clustering coefficient was calculated in Statnet for both the Twitter data and the hyperlink data. Following Wasserman and Faust (Wasserman & Faust, 1994), a paired-bootstrap sample technique was used to assess significance (Snijders & Borgatti, 1999). This bootstrap technique

estimates the sample variance by drawing 5,000 random subsamples and constructing a sampling distribution. The standard error can then be constructed, in this case providing a basis for assessing the difference in clustering coefficients. The standard error is calculated, and used to calculate a t-statistic indicating if there is a significant difference in the clustering coefficients across time periods. H_2 would be supported if clustering coefficients increased over time.

The research questions sought to assess how the OWS movement reflected in mainstream news media in terms of amount of coverage over time. In order to assess the research question, the collected data were utilized as a case study to assess the relationship between news media coverage and the formation of the network form of organizing. Finally, the third hypothesis proposed that social media and mainstream news coverage of a social movement could predict the formation of permanent ties amongst organizational entities. A standard linear regression was utilized to assess the third hypothesis. The hypothesis would be supported if there was a significant relationship found between news coverage, twitter data and the formation of permanent ties between websites.

Results

The first hypothesis proposed that over time, dyadic communication would become prevalent in an emerging networked organization. The results for formation of dyadic communication ties are given in Table 1. As the results illustrate, there is no clear pattern of dyadic tie formation with regards to Twitter mentions. On the other hand, there is a significant increase in the formation of ties between Websites during the last three periods of analysis. This suggests that with regards to the formation of permanent ties, there is support for H_1 in the data on Website hyperlinks. This is further illustrated in Figure 1, which shows the growth in tie formation for Websites.

The second hypothesis proposed that as a social movement develops as an emerging network form of organization, the organizational structure would be increasingly clustered. The results for the bootstrap test of the clustering coefficient are given in Table 1. The data indicates that there is no clear pattern in the clustering coefficient for Twitter, but in the 3rd through 6th week of data on Websites there is a significant increase in the clustering coefficient. This suggests that there is some support for H₂, as clustering increases over time. However, clustering is not significant in the later time periods, indicating that the growth in clustering was not sustain.

The research questions sought to assess how the OWS movement reflected in mainstream news media in terms of amount of coverage over time. Figure 2 provides an illustration of the overall media coverage related to OWS, OWS Los Angeles, and OWS Oakland. This presentation of the data reveals two significant spikes in media coverage; the first spike coincides with the launch of the OWS movement, and the second corresponds with the resurgence of the movement during the period of analysis in this study. As a corollary to the assessment of the research question, an ad hoc linear regression was conducted to measure the connection between Twitter coverage and media coverage. Due to the immediacy of Twitter as compared to media coverage, media coverage was lagged by one week. The formation of dyadic ties in Twitter predicted the spike in media coverage, $b = 0.62$, $t(8) = 2.09$, $p < .10$. Although not significant at the ideal level of $p < 0.05$, the results suggest a directional relationship. Twitter coverage also explained a significant proportion of variance in depression scores, $R^2 = 0.39$, $F(8) = 4.375$, $p < .10$.

Finally, the third hypothesis proposed that social media and mainstream news coverage of a social movement could predict the formation of permanent ties amongst organizational

entities. A standard regression was utilized, but the results demonstrate that a significant relationship did not exist. The model failed to account for a significant portion of the variance: a $R^2 = 0.73$, $F(8) = 3.379$, $p < .15$. Therefore, H_3 was not supported.

Discussion

This study set forth to examine the emergence of network forms of organizations in the context of social movements. In particular, this research leveraged large-scale (Big) data to analyze the emergence of Occupy Wall Street as reflect in Twitter data, Website hyperlinks and news media coverage. The results provide a unique perspective on the formation of the Occupy Wall Street movement. Indeed, for many the Occupy Wall Street movement is the antithesis of organizational structure. A 2011 article in *The Nation* commented on the Occupy movement, remarking, “What’s a name for this—organized anarchy or socialism with a beat? What matters is that it’s working for now” (Kim, 2011, p. 21).

The results from this study are significant in that they demonstrate a clear structure underlying the Occupy Wall Street movement. Moreover, the results demonstrate a number of key mechanisms that drove the emergence of structure. First and foremost, the first hypotheses set forth that link formation would increase over time. In fact, link formation did increase over time, but only with regards to the Website data. This suggests that although Twitter was an important communication tool (Penney & Dadas, 2014), the sustainability of hyperlinks was ultimately more central in driving a structure over time. In other words, Twitter served to enable an ongoing dialogue, but Websites created a permanent record.

Indeed, digital and mobile media were been particularly influential in social movements such as the Arab Spring and Occupy Wall Street (Lotan, Graeff, Ananny, Gaffney, & Pearce, 2011). According to Castells (2013), contemporary social movements reflect a new type of

movement due to the ways that social and mobile media have enabled participation. One of the most prominent communication tools used by the OWS protesters was the microblog site Twitter. The first Twitter mention of the hashtag⁵ #occupywallstreet appeared on July 13, 2011 with a call to action to gather in September. More than 240 distinct hashtags were identified around the OWS movement. Hundreds of thousands of tweets were generated in a six-month period from September 2011 through February 2012, highlighting the immense nature of the movement. As this discussion underscores, Twitter communication was fluid. In order to sustain the movement, structure was needed; traditional websites provided that structure. This is reinforced in the findings regarding the second hypothesis. There is clear evidence that clustering among websites increased in the middle period of the analysis. That said, clustering ultimately decreased in regards to both Twitter and Website data; this may be due, in part, to the waning of the Occupy Wall Street movement. Although a networked form of organizing emerged, it eventually began to disband, as often happens (Podolny & Page, 1998).

Legitimacy of the movement was not seen in the emergence of leaders, but in the garnering of media coverage that legitimized the movement. A characteristic of the OWS movement was its rejection of formal leadership roles – a common phenomenon in social movements (Castells, 2012). Thus, rather than analyzing the networks between individual people within the movement itself, this study focused on organizational structures that emerged from the movement for managing and sustaining physical and mediated networks are critical for understanding this social movement. These findings are reflect in the analysis of the research question, which demonstrated that the chatter on Twitter accounted, in part, for the variance in media coverage. The inclusion of website tie formation did not affect this model, but that is not

⁵ Hashtags are topic keywords that are preceded by the hashtag symbol, and are utilized to sustain conversation around a particular topic (i.e. #occupywallstreet).

surprising given that the outward communication from the OWS movement occurred via Twitter (Penney & Dadas, 2014). Finally, the last hypothesis sought to establish a relationship between social media use, media coverage and the development of permanent ties on websites. The lack of significance in this model indicates that it is not possible to make strong claims about the nature of the relationship; this analysis reveals that there is a link between these three data sets, but further research will be needed to establish a clear causal connection.

Limitations and Future Research: There are a number of limitations with regards to the data and analysis in this study. The use of Twitter data in research has received some criticism including the fact that the demographics of those participating in Twitter do not necessarily represent broader demographic trends, the assumption that tweets are assumed to be trustworthy as compared to misleading or spam, and that tweeting is voluntary and thus there is self-selection bias about who is communicating (Gayo-Avello, 2012). With regard to the credibility of tweets, our study is focused more directly on the links between actants rather than the content itself. Finally, the voluntary nature of Twitter, as well as the technical means necessary for accessing the service, indicates that we are not able to analyze communication stemming from all OWS participants; however, that is not the goal of this project. Instead, we analyze how this voluntary usage of a mobile communications tool was utilized as part of an organizing process.

A second key challenge in this research was the leveraging of large-scale data for the analysis of a focused social science phenomena. Big Data⁶ stemming from the use of social media tools present a new opportunity for analyzing social movements as communication-oriented, network forms of organization; this research presented a new approach to the

⁶ While “big data” is often defined in a computer science context as large volumes of data that can be difficult to analyze using existing tools (Manovich, 2011), we approach this definition from a social science perspective in which the term “big data” implies large amounts of data, often stemming from digital sources (Cukier, 2010), that present new opportunities for the analysis of behaviors across large samples and potentially whole populations.

implementation of Big Data, but clearly there is more that could be done with the aggregated data. Future studies should continue to build on this work and expand the range of data utilized.

Conclusion

This work illustrates that in the midst of supposed anarchy, there are clear traces of a networked organizational form. More importantly, social network analysis was implemented to demonstrate that tie formation and clustering may serve as indicators of the emergence of networked forms of organizing. From a social science perspective, this work also presents an important example of the power of Big Data in the context of the social sciences. The final results of this study promise to yield significant insight into the composition and structure of networked organizations and social movements in which social media and the Web play an increasingly important role. This research contributes to theory on emergent forms of organization and to the understanding of how social movements are evolving in relation to the rapidly changing communications technology landscape. We also contribute to network analysis methodology by assessing how communications technology-based networks can be assessed based on conceptualizing nodes as actants in the context of emergent organizational structures.

Figure 1: Growth of Ties Between OWS Websites

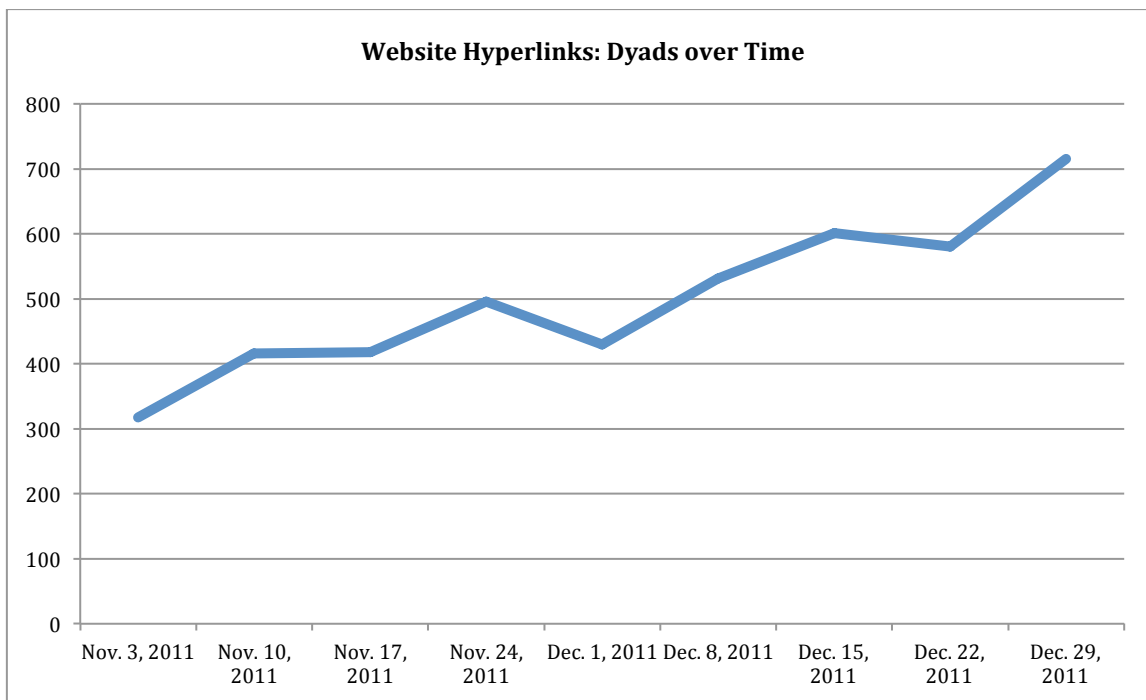


Figure 2: Articles on OWS in Major US Newspapers

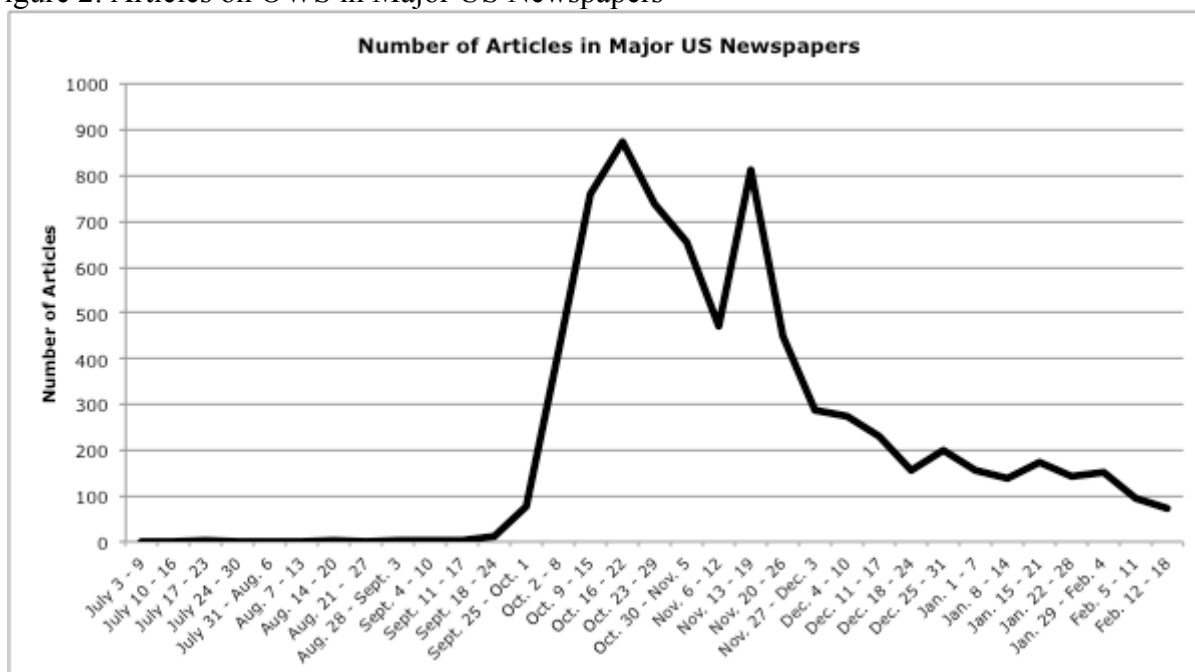


Table 1: Analysis of Twitter and Website Data

Week	Twitter Mentions as Dyads	Website Hyperlinks as Dyads	Twitter: Clustering Coefficient	Website Clustering Coefficient
Nov. 3, 2011	112889	317	0.0037	0.545
Nov. 10, 2011	151114*	416	0.0068*	0.495
Nov. 17, 2011	93249	418	0.0043	0.672*
Nov. 24, 2011	251406*	496	0.0043	0.689*
Dec. 1, 2011	78935	430	0.0026	0.677*
Dec. 8, 2011	66290	531	0.0043	0.661*
Dec. 15, 2011	35516	601*	0.0071*	0.629
Dec. 22, 2011	30902	580*	0.0048	0.629
Dec. 29, 2011	34980	715*	0.0052	0.428

* = $p < 0.05$ with regards to respective statistical test; t-test was utilized for dyads, and bootstrap t-test was utilized for clustering coefficient

Bibliography

- Agarwal, Sheetal D, Bennett, W Lance, Johnson, Courtney N, & Walker, Shawn. (2014). A Model of Crowd Enabled Organization: Theory and Methods for Understanding the Role of Twitter in the Occupy Protests. *International Journal of Communication*, 8, 27.
- Baldassarri, Delia, & Diani, Mario. (2007). The Integrative Power of Civic Networks1. *American Journal of Sociology*, 113(3), 735-780.
- Baum, Joel A.C., & Oliver, Christine. (1992). Institutional embeddedness and the dynamics of organizational populations. *American Sociological Review*, 57(4), 20.
- Bennett, W Lance. (2005). Social movements beyond borders: understanding two eras of transnational activism. *Transnational protest and global activism*, 203-226.
- Bennett, W Lance, & Segerberg, Alexandra. (2012). The logic of connective action: Digital media and the personalization of contentious politics. *Information, Communication & Society*, 15(5), 739-768.
- Borgatti, Stephen P., & Halgin, Daniel S. (2011). On network theory. *Organization Science*, 22(5), 1168-1181.
- Burt, Ronald S. (1992). *Structural Holes: The Social Structure of Competition*. Cambridge, UK: Harvard University Press.
- Castells, Manuel. (2013). *Networks of outrage and hope: Social movements in the internet age*: John Wiley & Sons.
- Coase, Ronald H. (1937). The nature of the firm. *economica*, 4(16), 386-405.
- Contractor, Farok J, & Lorange, Peter. (2002). *Cooperative strategies and alliances*: Elsevier Science Boston, MA.

- Costanza-Chock, Sasha. (2003). Mapping the repertoire of electronic contention. *Contributions to the Study of Mass Media Communication*, 66, 173-191.
- Cukier, Kenneth. (2010). *Data, data everywhere: A special report on managing information*: Economist Newspaper.
- Diani, Mario. (2003a). Introduction: Social movements, contentious actions, and social networks: "From metaphor to substance"? In M. Diani (Ed.), *Social movements and networks: Relational approaches to collective action* (pp. 1-18). New York, NY: Oxford University Press.
- Diani, Mario. (2003b). Networks and social movements: A research programme. In M. Diani (Ed.), *Social movements and networks: Relational approaches to collective action* (pp. 299-319). New York, NY: Oxford University Press.
- Diani, Mario, & McAdam, Doug. (2003). *Social movements and networks : relational approaches to collective action*. Oxford ; New York: Oxford University Press.
- Dicken, Peter. (1992). Global shift: The internationalization of economic activity.
- Gayo-Avello, Daniel. (2012). " I Wanted to Predict Elections with Twitter and all I got was this Lousy Paper"--A Balanced Survey on Election Prediction using Twitter Data. *arXiv preprint arXiv:1204.6441*.
- Gioia, Dennis A. (2006). On Weick: an appreciation. *Organizaiton Studies*, 27(11), 1709.
- González-Bailón, Sandra, Wang, Ning, Rivero, Alejandro, Borge-Holthoefer, Javier, & Moreno, Yamir. (2012). Assessing the bias in communication networks sampled from twitter. *arXiv preprint arXiv:1212.1684*.

- Harlow, Summer, & Guo, Lei. (2014). Will the Revolution be Tweeted or Facebooked? Using Digital Communication Tools in Immigrant Activism. *Journal of Computer - Mediated Communication*.
- Jones, M., & Orlikowski, Wanda J. (2007). Information technology and the dynamics of organizational change. In R. Mansell, C. Avgerou, D. Quah & R. Silverstone (Eds.), *The Oxford handbook of information and communication technologies*. Oxford, UK: Oxford University Press.
- Juris, Jeffrey S. (2012). Reflections on# Occupy Everywhere: Social media, public space, and emerging logics of aggregation. *American Ethnologist*, 39(2), 259-279.
- Kennedy, Mark Thomas. (2008). Getting Counted: Markets, Media and Reality. *American Sociological Review*, 73, 270-295.
- Kim, Richard. (2011). The Audacity of Occupy Wall Street. *The Nation*, 21.
- Kogut, Bruce. (1988). Joint ventures: Theoretical and empirical perspectives. *Strategic Management Journal*, 9(4), 319-332.
- Latour, Bruno. (2005). *Reassembling the social : an introduction to actor-network-theory*. Oxford ; New York: Oxford University Press.
- Leonardi, P. (2009). Why Do People Reject New Technologies and Stymie Organizational Changes of Which They Are in Favor? Exploring Misalignments Between Social Interactions and Materiality. *Human Communication Research*, 35(3), 407-441.
- Lindelauf, Roy, Borm, Peter, & Hamers, Herbert. (2011). Understanding terrorist network topologies and their resilience against disruption *Counterterrorism and Open Source Intelligence* (pp. 61-72): Springer.

- Lotan, Gilad, Graeff, Erhardt, Ananny, Mike, Gaffney, Devin, & Pearce, Ian. (2011). The Arab Spring| the revolutions were tweeted: Information flows during the 2011 Tunisian and Egyptian revolutions. *International Journal of Communication*, 5, 31.
- Manovich, Lev. (2011). Trending: the promises and the challenges of big social data.
- Marchetti, Raffaele, & Pianta, Mario. (2012). 4 Global Social Movement Networks and the Politics of Change. *Global Justice Activism and Policy Reform in Europe: Understanding When Change Happens*, 93.
- Mondak, Jeffery J. (1994). Policy legitimacy and the Supreme Court: The sources and contexts of legitimation. *Political Research Quarterly*, 47(3), 675-692.
- Monge, Peter. (1998). Communication structures and processes in globalization. *Journal of Communication*, 48(4), 142-153.
- Penney, Joel, & Dadas, Caroline. (2014). (Re) Tweeting in the service of protest: Digital composition and circulation in the Occupy Wall Street movement. *New Media & Society*, 16(1), 74-90.
- Podolny, Joel M., & Page, Karen L. (1998). Network forms of organization. *Annual Review of Sociology*, 24, 20.
- Polletta, Francesca, & Jasper, James M. (2001). Collective identity and social movements. *Annual Review of Sociology*, 283-305.
- Pollock, Timothy G, & Rindova, Violina P. (2003). Media legitimation effects in the market for initial public offerings. *Academy of Management Journal*, 46(5), 631-642.
- Powell, Walter W. (1990). Neither market nor hierarchy: Network forms of organization. *Research in Organizational Behavior*, 12, 42.

- Powell, Walter W., White, Douglas R., Koput, Kenneth W., & Owen-Smith, Jason. (2005). Network dynamics and field evolution: The growth of interorganizational collaboration in the Life Sciences. *American Journal of Sociology*, 110(4), 75.
- Putnam, Linda, & Nicotera, A. M. (2009). Communicative constitution of organization is a question: Critical issues for addressing it. *Management Communication Quarterly*, 158-165. doi: 10.1177/0893318909351581
- Schneider, Nathan. (2012). Some assembly required: Witnessing the birth of Occupy Wall Street. *Harpers*.
- Schwartz, M. (2011). Pre-Occupy: The Origins and Future of Occupy Wall Street. *The New Yorker*.
- Snijders, Tom AB, & Borgatti, Stephen P. (1999). Non-parametric standard errors and tests for network statistics. *Connections*, 22(2), 161-170.
- Snow, David A, Zurcher Jr, Louis A, & Eklund-Olson, Sheldon. (1980). Social networks and social movements: A microstructural approach to differential recruitment. *American Sociological Review*, 787-801.
- Stinchcombe, Arthur L. (1990). *Information and organizations* (Vol. 19): Univ of California Press.
- Stohl, Cynthia. (2014). Crowds, Clouds, and Community. *Journal of Communication*, 64(1), 1-19.
- Strang, David, & Soule, Sarah A. (1998). Diffusion in organizations and social movements: From hybrid corn to poison pills. *Annual Review of Sociology*, 24(1), 265-290.

- Sundström, Gunilla A, & Deacon, Carol C. (2002). *The evolution of possibility: From organizational silos to global knowledge networks*. Paper presented at the Proceedings of the 11 th European Conference on Cognitive Ergonomics.
- Symon, Gillian. (2000). Information and communication technologies and the network organization: A critical analysis. *Journal of Occupational and Organizational Psychology*, 73(4), 389-414.
- Tilly, Charles. (1978). *From mobilization to revolution*: McGraw-Hill New York.
- Uzzi, Brian. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative Science Quarterly*, 42, 33.
- Vis, Farida. (2013). A critical reflection on Big Data: Considering APIs, researchers and tools as data makers. *First Monday*, 18(10).
- Wasserman, Stanley, & Faust, Katherine. (1994). *Social network analysis: Methods and application*. Boston, MA: Cambridge University Press.
- Weick, Karl. (1979). *The Social Psychology of Organizing* (2nd ed.). Reading, MA: Addison-Wesley Publishing.
- Williamson, Oliver E. (1991). Comparative economic organization: The analysis of discrete structural alternatives. *Administrative Science Quarterly*, 269-296.
- Williamson, Oliver E. (1999). Strategy research: governance and competence perspectives.
- Xu, Jennifer, & Chen, Hsinchun. (2008). The topology of dark networks. *Communications of the ACM*, 51(10), 58-65.
- Zubcsek, Peter Pal, Chowdhury, Imran, & Katona, Zsolt. (2008). Information communities: the network structure of communication. *09. 17 H. Gatignon/Intern. J. of Research in Marketing* 27 (2010) 16, 17.