ONLINE ACTIVITIES, SPATIAL PROXIMITY, AND THE DIFFUSION OF THE OCCUPY WALL STREET MOVEMENT IN THE UNITED STATES*

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We advance social movement and diffusion theories by exploring the role of online activities in the spread of the Occupy Wall Street movement. The results from event history analyses suggest that, after controlling for community characteristics, online activities on Facebook and Twitter are associated with the spread of protests. The association is stronger for Facebook than other Internet-enabled technologies. The importance of Facebook activities increases over time, but the importance of community characteristics such as population size decreases over time. While intermunicipal contagion does not affect the diffusion process directly, it affects the diffusion in combination with online activities: the effect of spatial proximity to prior sites of contention increases in cities where Facebook activities preexist. The results provide a better understanding of how the Internet and social media activity create new communication channels among potential sites of contention and facilitate the rapid diffusion of contentious collective actions across wide areas.

Since the great recession of 2008, the financialization of the U.S. economy has been identified as the major cause of the economic crisis and the growing inequality (Lin and Tomaskovic-Devey 2013; Tomaskovic-Devey and Lin 2011). While income inequality and unemployment had often been regarded as a personal failure in the American cultural context (Gilens 2000; Schlozman and Verba 1979), these issues have increasingly been regarded as societal problems and have been attributed to political and institutional failure (Brooks and Manza 2013; McCall and Percheski 2010). This public discontent was the main source of the occupy movement, which started on September 17, 2011, when a few hundred people gathered in lower Manhattan to "occupy Wall Street."

The occupation of New York City's Zuccotti Park ignited a movement that spread around the United States and the world. Benefiting from intense mediation through Facebook, Twitter, and other online forums, protesters gathered in central city locations for days, weeks, and months on end. The successful diffusion of the movement took many by surprise, and it was celebrated by some as "the moment when resistance to the inequalities of capitalism finally emerged" (Pickerill and Krinsky 2012: 279). While the spread of protests gradually slowed, and the occupy movement almost disappeared from the public forum by 2012, it had a significant impact on U.S. society by creating a public debate around the topic of rising socioeconomic inequality—or, as one author put it, by helping to "turn the climate—at least a bit—against the impunity of the wealthy" (Gitlin 2012: 48).

The occupy movement is often discussed in scholarly literature as an example of activism during the age of the Internet and online social networking. Scholars have argued that social net-

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working sites have played a crucial role by linking potential supporters and realizing the sharing of information and stories (Gaby and Caren 2012; Nielsen 2013; Rushkoff 2013). Yet, as Pickerill and Krinsky (2012: 285) note, "there remains an interesting tension between the utility of online social networks for protest and the place-based utility of personal ties. . . . There is still a need to move beyond the superficial celebration of digital mediation and unpack the implications of this use of mixed media." Because the occupy movement occurred in the Internet age, we can use it to advance social movement and diffusion theories about the role of Internet-enabled communication technologies in the spread of contention and civic participation (Morozov 2011; Castells 2012; Karpf 2012).

We focus on two interrelated, yet insufficiently examined topics. First, we compare the effect of different types of online activities for actual protests. Most social movement scholars agree that the Internet and social networking sites allow movements to disseminate information and engage with very large audiences, without the filter of mass media (Earl 2010; Earl and Kimport 2010, 2011; Gaby and Caren 2012; Rane and Salem 2012). However, researchers have just begun mapping various forms of Internet activism such as the transmission of information over the Internet, the online facilitation of offline protests, or online participation and organizing (Earl 2010; Earl and Kimport 2010, 2011; Rane and Salem 2012). We identify the social media tools used most frequently by organizers and then compare how they contribute to the spread of offline protests. Since Facebook, Twitter, and other social media platforms are widely used by activists and ordinary citizens nowadays, two scenarios are possible. On the one hand, if these tools are used primarily by activists committed to organizing and participating in actual protests, then the use of social media tools could accurately predict the emergence of offline protests. Moreover, as the protests spread to places with fewer committed activists, the importance of social media tools is likely to increase over time. On the other hand, if these tools are used mainly by individuals seeking a low-cost substitute for offline activism (Lewis, Gray, and Meierhenrich 2014), then information about online activities will be superfluous for understanding the diffusion of offline activities. Given how easy it is to create a Facebook or Twitter account dedicated to almost any cause, it is conceivable that social media usage is not a reliable indicator of impending offline protests—although it may predict what Earl and Kimport (2011) call "e-movements," ones that unfold entirely online.

Second, we examine if spatial proximity to sites of contention still has an influence on actual protests in the Internet age. Research on social movement diffusion has shown that existing protests influence the emergence of protests in neighboring sites. Spatial diffusion occurs for two primary reasons: 1) because events are more visible to people in neighboring communities; and 2) because protests are more likely to spread through interpersonal networks embedded between adjacent localities (Conell and Cohn 1995; Hedström 1994; Myers 1997; Vasi and Strang 2009; Steil and Vasi 2014). Yet, it is possible that the effect of spatial proximity has diminished in contemporary times, not only because the Internet has made it easy for activists to find information about geographically distant protests, but also because social media has made it easy for geographically distant activists to connect. Thus, we scrutinize two possible effects: a direct effect, in which spatial proximity directly influences diffusion of protests, and a mediated effect, in which spatial proximity interacts with online activities.

Using event history analyses, we examine these issues in the case of the spread of occupy protests or occupations, terms used synonymously throughout. We advance diffusion research by testing hypotheses on the effect of different types of online activities and on the proximity to previous sites of contention on offline activism.

THE RISE OF THE OCCUPY WALL STREET MOVEMENT

The contemporary Occupy Wall Street movement emerged in a historical context characterized by an increasingly large financial system and growing income inequality. Not surprisingly, a significant proportion of the population supported efforts to reduce inequalities

and prosecute executives of the financial institutions responsible for the financial meltdown in 2008.[1] The financial crisis and the mounting distrust of financial institutions eventually led to the emergence of the Occupy Wall Street movement. On July 13, 2011, Canadian activists associated with the Adbusters magazine proposed an occupation of America's financial epicenter; the occupation began on September 17, 2011. Social media such as Facebook and Twitter provided a public space in which people shared opinions and disseminated information about the movement (Gerbaudo 2012; Nielsen 2013; Rushkoff 2013). It spread rapidly to numerous cities in the U.S. and around the world, mainly because of its heavy reliance on the Internet. According to one author, "the rapid geographical spread of the movement reflected its viral diffusion on the Internet. The movement was born on the Internet, diffused on the Internet, and maintained its presence on the Internet, as most occupations set up their own websites, as well as their specific groups and other social networks." (Castells 2012: 168)

The occupy movement has two unique characteristics. First, it has no formal governing bodies. Although the NYC General Assembly was the coordinating body of the initial protests held in New York City, neither prominent leaders nor a centralized structure exists anywhere within the movement. When the protests diffused to other places, each created and maintained its own independent coordinating body and goals. This amorphous structure enabled the movement to spread rapidly and to effectively mobilize heterogeneous groups of occupiers. Second, the movement popularized a distinct, nonviolent repertoire: the occupation. People began to occupy Zuccotti Park—also known as Liberty Park—because of its unique nature as a privately owned public space open to the public twenty-four hours a day. The coordinators also provided legal advice to the occupiers when marches and demonstrations were held in the streets. During the protests undertaken within various local communities, the act of occupying certain places, such as parks, squares, buildings, and campuses, aimed at sharing experiences and organizing, "using a non-binding consensus based collective decision-making tool known as a 'people's assembly.'"[2] Because the movement is a "product of an online age of 24/7 interaction and rampant social networks" (Pickerill and Krinsky 2012: 285), it allows us to advance theories on the role of the Internet and social networking sites in the spread of contention.

THEORIES OF DIFFUSION OF CONTENTION AND SOCIAL MEDIA

Research on the spread of contentious politics indicates that information is transferred between social movements along established lines of interaction in three different ways. Some studies focus on relational diffusion, or on the direct interaction between prior and potential sites of contention (Hedström 1994, 2000; Davis and Greve 1997). Other studies focus on mediated diffusion, assuming that social movement actors are connected through a mediator or translator (Han 2009; Suh 2014; Vasi 2011). The main mechanism of mediated diffusion is brokerage, which is defined as "the linking of two or more previously unconnected social sites by a unit that mediates their relations with one another and/or with yet other site" (McAdam, Tarrow, and Tilly 2001: 26). Still other studies focus on nonrelational diffusion; they argue that contentious politics may spread even in the absence of direct communication between social movement actors in the case where individuals in potentially contentious sites define themselves as similar to transmitters (Chaves 1996; McAdam and Rucht 1993; Strang and Meyer 1993; Soule 1997; Soule and Zylan 1997). Mass media plays an important role in nonrelational diffusion because it creates communication channels between prior and potential sites of activism in the absence of interpersonal networks (Myers 1997, 2000; Oliver and Myers 2003; Andrews and Biggs 2006; Biggs 2013).

While the literature on the diffusion of contention is both theoretically and empirically sophisticated, it remains somewhat limited for a number of reasons. First, an important issue that has received relatively little attention from scholars is the relationship between online and

offline activism. Social movement scholars have identified a number of categories of Internet activism (Earl and Kimport 2010, 2011; Rane and Salem 2012; Nielsen 2013; Rushkoff 2013; Lewis, Gray, and Meierhenrich 2014). The Internet may be used simply as an information transmission medium, similar to other broadcast media—for example, websites are created to disseminate information about a movement campaign. It may also be used to facilitate offline protests, as in the case where it provides information about specific protest events. Thus, Internet-enabled technologies change the scale of activism and make social movement participation easier, faster, and more effective (Vasi, Strang, and Van De Rijt. 2014). Studies have shown, for example, that the Zapatista and global justice movements relied heavily on the Internet to broadcast their message globally (Martinez-Torres 2001; Bennett 2003); that Twitter acted as a news sharing system during crises such as the Tunisian and Egyptian revolutions (Howard and Hussain 2011; Papacharissi and Oliveira 2012); and that Facebook was widely used in the occupy movement (Gaby and Caren 2012). However, thus far no studies have systematically examined the influence of different types of online activities on the spread of offline protests.

Social movement research has indicated that protests spread faster through brokerage than through direct diffusion. Brokers enable the transfer of information between previously unconnected social sites, thus transcending the fragmentation which characterizes modern society (McAdam 2003; Suh 2014; Tarrow 2005; Vasi 2011). However, existing research has not recognized that Internet-enabled technologies such as Facebook or Twitter can act as "cyberbrokers" and can substitute for traditional brokers such as social movement organizations or governmental agencies. Therefore, we examine which cyberbroker technologies—Facebook, Twitter, or websites created for specific communities—contribute to the emergence of offline protests in these communities.

Second, while the spatial structure of diffusion has been of increasing interest in research on diffusion, it is not known how the advent of social media influences spatial proximity between contention sites. Previous studies on diffusion have shown that protests in potential sites are influenced by existing protests in neighboring sites; spatial diffusion occurs because events are not only more visible to people in neighboring communities, but are also more likely to spread through interpersonal networks embedded between adjacent localities (Conell and Cohn 1995; Hedström 1994; Myers 1997; Vasi and Strang 2009; Steil and Vasi 2014). We do not know, however, whether the effect of spatial proximity has diminished in contemporary times since the Internet has made it easy for activists to find information about geographically distant protests and to connect with one another. Therefore, research has yet to examine whether protests continue to spread first to geographically adjacent communities, and whether online activity is more easily translated into offline protests by the presence of protests in spatially proximate cities.

We address the above shortcomings by comparing the effects of various cyberbroker technologies (Facebook, Twitter, websites) and by examining how geographical proximity influences protest activities.

HYPOTHESES

We examine the effect of different types of online activities for actual protests. As with researchers who have argued that Internet activities can be used to facilitate the organization of offline protests (Earl and Kimport 2010, 2011; Rane and Salem 2012), we argue that the Internet is an essential organizing tool for activists. In contrast to the early days of the Internet Age, when activists could only use websites or email lists to broadcast information about a movement, nowadays activists can use both Twitter and Facebook to rapidly disseminate information about grievances and to organize offline events. We expect that the effect of online activities on Facebook is larger than the effect of online activities on Twitter or websites, for two reasons. First, Facebook is used more often than Twitter; for example, by 2011

Facebook was used by approximately 75 percent of all U.S. Internet users, and Twitter was used by approximately 13 percent of them.[3] Facebook and Twitter are also likely to be used more often than websites, since creating a Facebook or Twitter account dedicated to the occupy movement in a specific location is technically easier than creating a website. Second, Facebook is a more flexible organizing tool than Twitter. Facebook accounts allow multiple individuals to post stories and discuss with each other. On the other hand, Twitter accounts are managed by single individuals, tweets in Twitter are limited to 140 characters, and the platform is only appropriate in spreading the messages and causes via the followers' retweets.[4]

We also anticipate that the effect of certain online activities will increase over time because early protests are likely to be organized in communities with numerous experienced activists who know each other through direct personal ties and, therefore, are less dependent on social media. As time passes, protests will spread to communities with fewer experienced activists due in part to online social networking. The increasing legitimacy of the movement lowers the costs of mobilizing people and transitioning online activities to offline protests. Given that Facebook is the most flexible and most widely used social media platform, we expect that the effect of Facebook activity—but not Twitter or website activity—will increase over time. On the other hand, both Twitter activity and websites will be useful in spreading the movement's messages in the earlier stage, but their role will be diminished over time. Hence:

Hypothesis 1a: Cities that experience online activity will experience actual occupations.

Hypothesis 1b: The effect of Facebook activity will be stronger than the effect of Twitter activity, which will be stronger than the effect of website activity on actual occupations.

Hypothesis 1c: The effect of Facebook activity will increase over time.

We examine the diffusion structure of occupy protests across municipalities. Previous research has shown that intermunicipal contagion is a spatial phenomenon because events that occur in nearby communities are visible and influential (Hedström 1994; Conell and Cohn 1995; Myers 1997; Vasi and Strang 2009). Research on the diffusion of sit-ins through the American South in 1960, for example, has found that cities were more likely to experience sit-ins if they were spatially proximate to ones that had already experienced them, yet the effect of prior contention elsewhere diminished as the distance between cities increased (Andrews and Biggs 2006). While older movements depended on local mass media to convey information on protests elsewhere, recent movements are less dependent on local media coverage of contention since people can find information from various online sources: blogs, YouTube, social media platforms, etc. We investigate whether spatial proximity to sites of contention has both direct and mediated effects on the diffusion of the occupy movement. In addition to the possibility that spatial proximity to previous sites of contention influence the spread of the movement directly, we analyze the possibility of a mediated influence: spatial proximity influence the spread of protests but only in cities that experience online activities. Similar to the above arguments, we expect that Facebook activities have the largest effect because Facebook is the most widely used and most flexible organizing tool. Therefore:

Hypothesis 2a: Cities that are spatially proximate to actual occupations will experience actual occupations.

Hypothesis 2b: The effect of spatial proximity to actual occupations will increase if cities experience Facebook activities.

DATA AND METHODS

We collected data on U.S. cities with more than 25,000 people in 2010 for two reasons. First, we consider that cities below this threshold are relatively unlikely to establish an occupation, in particular one that involves a significant number of people, receives media coverage, and has a starting date that can be clearly recorded. Second, we could only obtain data for all measures of interest for cities above this threshold. The data was organized for event history analysis: the time period starts on September 16, 2011 because this is the day prior to the first occupy protest that occurred in New York City. The time period ends after 60 days, on November 15; after this day very few new occupations emerged.[5] Indeed, both the colder weather at the beginning of winter and the evictions forced by municipal governments made occupations unfeasible after this date.[6]

We used discrete-time data in which there is an observation for each city for each day of the time period. We organized the data in four different data sets. In the first, which is used to estimate the effects of online activities, spatial proximity, and public attention on actual occupations, the dependent variable is the time until the first occupy protest emerges. Each city is given a 0 for each day that it does not experience an occupation, and a 1 for the day when it does. Once a city experiences an occupy protest, it is dropped from the analysis for the remaining days. While we recognize that "all occupations are not equal" —in other words, that some occupations were larger and outlasted others—we used discrete-time data because we are interested in predicting the diffusion of occupations and not the size or duration of protests.

We identified the date when an occupy protest was first organized in a city using the following two-step strategy. First, we searched the occupytogether.org website, which collects information about all protests associated with the Occupy movement in the United States and around the world. As a supplementary source, we used the interactive data that *The Guardian* collected about occupy protest activities (http://www.guardian.co.uk/news/datablog/2011/oct/17/occupy-protests-world-list-map).[7] Second, we conducted a Lexis Nexis search of all U.S. newspapers during this period as well as a Google search, including the terms "occupy" and the name of the cities listed on the occupytogether.org and *Guardian* websites. In cases where a city experienced protests on multiple days, we recorded the first day of protest.

In the second data set, which is used to estimate the effects of spatial proximity and public attention on online activities, the dependent variable is the time until a Facebook account to organize local protests is opened. Each city is given a 0 for each day that it does not open a Facebook account, and a 1 for the day when it does. Once a city opens a Facebook account, it is dropped from the analysis for the remaining days. A similar strategy is used for the two other datasets, in which the dependent variable is either the time until a Twitter account is opened, or the time until a website is created.

Main Predictors

We used as main predictors the opening of Facebook or Twitter accounts or of websites. The variables *Facebook*, *Twitter*, and *website* had a value 0 if no account or website was created on a day, and 1 for a day when an account or a website was created and all subsequent days. Thus, our measures indicate the presence of an organized group, not actual usage of social media or the volume of communication. We generated an extensive list of city-level Facebook accounts using a public list[8] and additional searches for key terms on Facebook. We identified the day when a Facebook account containing the term "occupy" and the name of a city was created, using information from Facebook. We considered the first day a Facebook user posted anything related to the occupy protests on Facebook as the account opening date. In addition, we searched for key terms within Twitter and created a full list of city-level Twitter accounts. We identified the day when a Twitter account containing the term occupy and the name of a city was created, using information from Twitter. [9] In rare cases where there were multiple accounts for a single city, we used the earlier date as the opening date. Finally, we identified the day when a

website was created, using information from DNSstuff, by searching for domain names that contained the term occupy and the name of a city (for example, occupyChicago.org).[10]

We modeled intermunicipal diffusion to capture the impact of occupations elsewhere. We adapted a model used by Hedstrom, Sandell, and Stern (2000); Myers (2000); and Andrews and Biggs (2006), which assumes that the effect of prior events diminishes with the geographical distance between cities. To calculate the diffusion variable we use a common functional form: the inverse of the square root of the distance. We take the square root of this functional form because the resulting sum is highly skewed. Following Andrews and Biggs (2006: 762), we treat distances less than 10 miles as 10 miles because the inverse square root would give excessive weight to very close events. Unlike Myers (2000) and Andrews and Biggs (2006), however, we did not examine only the effect of events that took place during the previous week because, while these previous studies examined riots or sit-ins—which are mostly one-day events— we study occupations—which are multiple-day events.[11] Thus, we consider that once an occupation occurs it continues to remain influential for the entire period of the study. The formal notation is:

$$D_{it} = \sqrt{\sum_{\tau=1}^{t-1}\sum_{j=1}^{J}\frac{S_{j\tau}}{\sqrt{d_{ij}}}}$$

where $\mathrm{S_{i\tau}}$ $S_{j\tau}$ represents a dichotomous variable coded 1 if occupations took place in city j in time τ τ, and 0 otherwise, and d_{ij} represents the geographical distance between a city ii and a city j in which the occupation has occurred in a previous day.[12]

Covariates

We included a number of control variables: *city population*, since larger cities are more diverse and more likely to experience protests; *income change*, since cities where personal income declines rapidly are more likely to experience protests; *Internet speed*, since access to the Internet may determine the level of online activities; and *type of local government*—since cities that have a mayor/council form of government may have a higher frequency of protests (Eisinger 1973; Snow, Soule, and Cress 2005). The variable city population was measured with data from the U.S. Census Bureau for the year 2010; we used the natural logarithm to stabilize skew in the variable population. The variable income change was measured using data from the American Community Survey. This variable was measured as the decrease in income between 2000 and 2006, the most recent years for which city-level statistics were available. The variable access to the Internet was coded with data from the National Broadband Map at the lowest possible level of measurement: the county. We used the common measure of combined download speed as greater than 3 megabits per second and upload speed as greater than 768 kilobits per second. The variable *mayor-council* was measured using data from the U.S. Census Bureau on the type of local government.

The spread of occupy protests is also likely to be influenced by the political orientation of the local population. The movement's most popular slogan—"We are the 99 percent"—draws attention to the rising socioeconomic inequalities and the gap between the very rich and the rest. Not surprisingly, a survey of over 5000 participants in the movement found that about three quarters of respondents voted for Barack Obama in the 2008 presidential election.[13] Therefore, we measure the left-of-center political orientation of the population as the *percent of voters* for Barack Obama during that election. We coded this variable using data from David Leip's Atlas of U.S. Presidential Elections.

Additionally, mobilizing structures are likely to be important for the spread of the movement (McCarthy and Zald 1973, 1977). Despite its amorphous structure, the occupy movement is likely to have benefited from preexisting organizational resources. The "miscibility" of multiple formal organizations and causes (Vasi and Strang 2009) is likely to contribute to the spread

of occupy protests. Indeed, the above-mentioned survey of movement participants found that almost sixty percent of respondents have previously been involved in other social movements, and that a similar number of respondents belong to nonprofit organizations. We measured organizational resources in a number of ways. First, we created the variable *labor unions*, since unions have expressed their support for the occupy protests. Second, we created the variable *civic and social associations*, since these associations may provide organizational resources for protesters. These two variables were coded using data from the 2010 U.S. Bureau of Labor Statistics Quarterly Census of Employment and Wages; we standardized these variables per 10,000. Third, we created the variable *number of universities* because student debt has been a main grievance of occupy protesters and many protest participants were students. This variable was coded with data from the Higher Education General Information Survey; we standardized the number of universities variable per 10,000 people.

Finally, we created a variable to capture the recent *history of activism* on progressive issues in a community since these communities are likely to have experienced activists who may initiate occupations. We collected data about three major and widespread campaigns that resulted in the adoption of local resolutions during the last fifteen years: living wage, civil liberties, and antiwar. We obtained data on living-wage ordinances from the Association of Community Organizations for Reform Now (ACORN); data about the passage of civil liberties came from the Bill of Rights Defense Committee (BORDC); and the data about the passage of peace resolutions was acquired from the Institute for Policy Studies.[14] The progressive community index was calculated by totaling the number of ordinances adopted by each city—the three items covaried rather strongly, with a Cronbach's alpha of .63. Table 1 shows descriptive statistics and correlations for all of the independent variables.

Table 1. Means, Standard Deviations, and Correlations of Variables

		Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Facebook account	.037	.001	1.00												
2	Twitter acccount	.030	.001	0.73	1.00											
3	Websites	.014	.001	0.53	0.59	1.00										
4	Proximity	1.623	.005	-0.08	-0.06	-0.05	1.00									
5	Population (ln)	10.985	.003	0.34	0.34	0.27	-0.14	1.00								
6	Mayor-council	.322	.002	0.07	0.08	0.08	0.00	-0.05	1.00							
7	Income change	-4.447	.024	0.03	0.05	0.04	-0.04	0.10	-0.02	1.00						
8	Internet speed	.976	.001	0.01	0.00	-0.01	0.01	-0.02	0.01	-0.13	1.00					
9	Democratic Party	58.032	.059	-0.04	-0.01	0.00	0.01	-0.03	0.03	0.04	0.13	1.00				
10	Labor unions	5.209	.023	0.05	0.05	0.07	0.00	-0.05	0.20	-0.14	0.10	0.35	1.00			
11	Civic/social assoc.	14.436	.045	0.05	0.06	0.05	-0.01	-0.06	0.24	-0.03	-0.04	0.10	0.41	1.0		
12	Universities	.037	.001	0.14	0.14	0.09	-0.06	0.05	0.10	0.12	-0.02	0.03	-0.01	0.09	1.00	
13	PCI[a]	.166	.002	0.24	0.27	0.21	-0.10	0.32	0.10	0.09	0.05	0.19	0.11	0.13	0.28	1.00

Note: [a] PCI = Progressive Community Index

Estimation

Because the dependent variables are the day when the first occupy event occurred in a city, we use hazard models for our estimations (Bennett 1999; Box-Steffensmeier and Jones 1997, 2004). Event history models are also used in analyses of the adoption of policies or protest events—yet, they seek to understand why some units of analysis experience events

protest events—yet, they seek to understand why some units of analysis experience events sooner and others experience them later or not at all—see, for example, Vasi and Strang (2009). In our case, the conceptual difference between using a more conventional logit or probit model and a hazard model is whether one looks at cities as "cities without protests," as in a logit or probit analysis, or as "cities that have not yet experienced protests," as in a hazard analysis (Box-Steffensmeier and Jones 1997). Therefore, event history analyses allow us to examine not only why some cities experience protests and others do not, but also why some cities experience protests early and others experience protests late.

We use Cox proportional hazards models with exact marginal likelihood because of ties in our data—see Box-Steffensmeier and Jones (2004).[15] The estimation of proportional hazards models when hazards are nonproportional can result in biased estimates, incorrect standard errors, and faulty inferences about the impact of independent variables (Box-Steffensmeier and Jones 2004). We use the Grambsch and Therneau tests for nonproportional hazards and find that a number of variables have nonproportional hazards. We address the violations of proportionality by estimating standard Cox models with the addition of interaction effects between offending covariates and a function of time (Box-Steffensmeier and Zorn 2001; Box-Steffensmeier and Jones 2004).[16] We also test the effect of time by splitting the dataset in two: an early adoption period, which corresponds to the first thirty days, and a late adoption period, which corresponds to the last thirty days.

RESULTS

Results are presented in tables 2 and 3 on the next page. Model 1 in table 2 examines the effects of covariates, while model 2 adds the effect of Facebook, Twitter, and websites. The only variables that have significant effects are Facebook and Twitter, and the largest effect is that of Facebook: opening an occupy account on Facebook increases the probability of a city experiencing an actual protest by 26.8 times (=exp[3.288]), while opening a Twitter account and a website increases the probability of a city experiencing protests by 2.2 times (=exp[2.168]) and 2.0 times (=exp[2.020]), respectively.[17] In addition, we find that the variables population, universities, and progressive community have significant effects; more specifically, larger cities, cities with more universities per capita, and cities with a history of mobilizations on progressive issues are more likely to experience actual occupations than other cities.

Model 3 adds the interactions between variables that have nonproportional hazards (population and Facebook) and a function of time.[18] In accordance with our theoretical expectations, results indicate that the effect of Facebook increases over time; however, the effects of Twitter and websites do not significantly increase over time, while the effect of population decreases over time. These findings are also supported when we split the dataset in an early and a late adoption period (models 4 and 5). The effect of Twitter is significant in the early adoption period (model 4) but not in the late adoption period (model 5). The size of the Facebook coefficient is larger in the late adoption period than in the early adoption period, providing additional confirmation to hypothesis 1c.

Figure 1 shows that the use of social media and websites generally precedes the emergence of protests—but important differences exist between the different types of social media. In general, Facebook accounts are opened earlier than Twitter accounts, which in turn are opened earlier than websites. Taken together, table 2 and figure 1 support hypotheses 1a through c: cities that experience online activity are more likely to experience actual occupations than cities that do not experience online activity, but the effect of Facebook is stronger than the effect of Twitter, and the effect of websites is nonsignificant. Moreover, the effect of Facebook increases over time.[19]

Table 2. The effect of online activities on the diffusion of occupations between September 16 and November 15, 2011 (Cox regression, exact marginal likelihood)

	Model 1 Total	**Model 2** Total	**Model 3** Total	**Model 4** Early	**Model 5** Late
Controls					
Population (ln)	1.284***	.377***	1.457***	.659***	.231
	(.084)	(.103)	(.334)	(.140)	(.509)
Population X Time	–	–	-.038***	–	–
			(.012)		
Mayor-Council	.067	-.366*	-.367*	-.492*	-.830
	(.168)	(.182)	(.183)	(.245)	(1.125)
Income change	.036	.045*	.048*	.048	.103
	(.018)	(.020)	(.020)	(.030)	(.067)
Internet speed	-.465	-.694	-.643	-.513	19.318
	(.578)	(.587)	(.603)	(.937)	(14.195)
Democratic Party	-.025***	-.001	.001	.001	.093*
	(.006)	(.006)	(.007)	(.010)	(.042)
Labor unions	.018	.001	.001	.003	.024
	(.016)	(.016)	(.016)	(.021)	(.122)
Civic assoc.	.024***	.008	.009	.013	-.036
	(.007)	(.007)	(.007)	(.010)	(.062)
Universities	3.047***	1.301*	1.237*	2.604***	1.723
	(.351)	(.565)	(.570)	(.646)	(2.709)
Progressive index	.459***	.214*	.235*	.268*	-1.340
	(.092)	(.105)	(.106)	(.130)	(1.210)
$H_{1a\&b}$: Online activities					
Facebook account		3.288***	-1.230	1.756***	9.153***
		(.280)	(.905)	(.387)	(1.717)
Facebook X Time		–	.157***	–	–
			(.031)		
Twitter account		.774**	.703**	1.074**	.729
		(.234)	(.232)	(.379)	(.964)
Website		.126	.128	.093	1.933
		(.194)	(.196)	(.261)	(1.734)
Chi-square	397.39***	733.69***	761.77***	332.30***	143.09***
Number of obs.	48,055	48,055	48,055	25,509	20,834

Note: *p < .05; **p < .01; ***p < .001

Figure 1. Social media and the Spread of Occupy Wall Street Contention

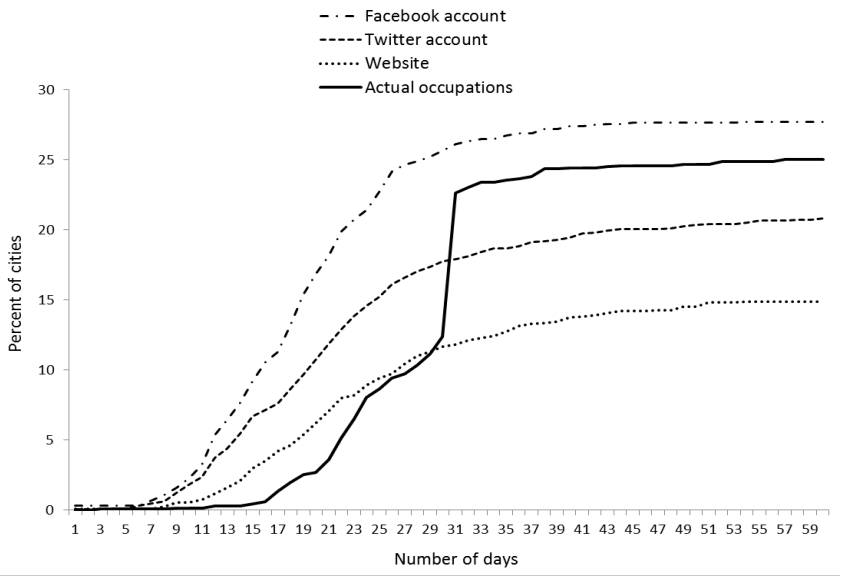

Table 3. The effect of spatial proximity on the diffusion of occupations between September 16 and November 15, 2011 (Cox regression, exact marginal likelihood)

	Model 1	Model 2	Model 3
Controls			
Population (ln)	1.202***	.349***	.385***
	(.087)	(.104)	(.103)
Mayor-Council	.099	-.374*	-.306
	(.170)	(.182)	(.186)
Income change	.024	.038	.042
	(.019)	(.021)	(.021)
Internet speed	-.455	-.682	-.517
	(.589)	(.593)	(.604)
Democratic Party	-.025***	-.001	.001
	(.006)	(.006)	(.006)
Labor unions	.024	.004	.002
	(.016)	(.016)	(.016)
Civic assoc.	.024***	.009	.010
	(.007)	(.007)	(.007)
Universities	3.019***	1.409*	1.345*
	(.345)	(.558)	(.563)
Progressive index	.503***	.229*	.276*
	(.094)	(.106)	(.108)
$H_{1a\&b}$: Online activities			
Facebook account	_	3.256***	-.895
		(.281)	(.742)
Twitter account	_	.762**	1.546*
		(.234)	(.743)
Website	_	.127	.679
		(.196)	(.536)
$H_{2a\&b}$: Spatial Proximity			
Proximity to occupations	-2.483***	-1.105	-2.695***
	(.662)	(.679)	(.732)
Facebook X Proximity			2.068***
			(.352)
Twitter X Proximity			-.385
			(.327)
Websites X Proximity			-.317
			(.251)
Chi-square	401.00***	727.32***	770.04***
Number of obs.	48,055	48,055	48,055

Note: *p < .05; **p < .01; ***p < .001

We present results from tests of intermunicipal diffusion in table 3. While model 1 shows that cities that are spatially proximate to existing occupations are significantly less likely to develop an occupation, model 2 reveals that the effect of spatial proximity to occupations disappears after controlling for Facebook, Twitter, or websites. Results in model 3 provide a new finding on spatial diffusion. We find that the effect of spatial proximity is enhanced by the presence of a Facebook account, but not by the presence of a Twitter account or a website. For example, the probability of a city experiencing an occupation increase by 7.9 times (=exp[2.068]) for cities that have already opened an occupy account on Facebook and are geographically proximate to existing occupations. Hence, these results show that hypothesis 2a is not supported but hypothesis 2b is supported.

DISCUSSION

This study contributes to the literature on diffusion and social movements in a number of ways. One contribution is to demonstrate that social media is an important tool for modern activists. Previous studies have argued that online activities can facilitate offline protests (e.g.,

Earl and Kimport 2010, 2011; Rane and Salem 2012), but none has compared the effect of different types of social media platforms. Our findings show that information about Facebook and (to a lesser degree) Twitter activities can be valuable for predicting the spread of occupy protests. The findings also show that Facebook is the most important Internet-enabled technology and that its importance increases over time. Our findings, however, do not demonstrate that Facebook or Twitter activities cause the protests. Instead, we argue that social media activities precede and correlate with the emergence of protests, presumably because they are both consequences of a third "unobservable" variable: the presence of energized activists.

While we cannot claim that social media caused actual protests, we also cannot claim that social media was insignificant. Thus, this study contributes to the general debate on the role of Internet-enabled technologies for civic participation and democratic processes (Gladwell 2010; Morozov 2011; Castells 2012; Karpf 2012). Some social movement practitioners and commentators have argued that social media has a very limited role in actual protests and meaningful social change since it replaces real activism with "clicktivism" or "slacktivism" (Gladwell 2010; Morozov 2011; Lewis, Gray, and Meierhenrich 2014). Others, however, have argued that social networks play an important role in social movements in the Internet Age since they allow activists' experiences to be "communicated and amplified, bringing the entire world into the movement, and creating a permanent forum of solidarity, debate, and strategic planning" (Castells 2012: 169).

Our findings suggest that using Facebook and Twitter does not necessarily lead to "slacktivism."[20] Social media could play facilitating roles in the spread of the occupy movement because it could act as a cyberbroker that coordinates actions between previously unconnected actors. Indeed, as Gaby and Caren (2012) argued, these social networking sites provided important resources for the movement because they encouraged individual contributions, creative use of images, and the sharing of personal stories. Although it would have been very easy for "slacktivists" to create numerous Facebook and Twitter accounts not associated with actual occupations, this was not the case. Remarkably, the number of so-called Facebook occupations was only slightly larger, while the number of Twitter occupations was slightly smaller than the number of actual occupations, which suggests that social media is not simply a substitute for offline activism. Evidently, our study is limited by the fact that our measures indicate the online presence of an organized group, without capturing actual usage or the volume of communication—therefore, future research is necessary to understand how differences in the actual volume of online communication shapes the spread of protests.

Another contribution of this research is to reveal how spatial structures of diffusion are changing in the Internet age. In contrast to previous diffusion research (e.g., Andrews and Biggs 2006; Vasi and Strang 2009), our results show that new protests are not directly influenced by existing activism in neighboring communities. Existing protests, however, contribute to the emergence of online activities, in particular on the social media platform Facebook. Because Facebook activities are associated with actual occupations, spatially proximate protests have an indirect effect on the emergence of protests. These results demonstrate that the advent of social networking technologies has altered traditional patterns of intermunicipal contagion: spatial proximity between prior and potential sites of contention still matters, but it matters mainly for sites that already experience Facebook activism. Thus, Facebook activities have not only a strong effect that grows in importance over time but also one that mediates the effect of spatially proximate protests.

Finally, this research shows that organizational resources still matter for the spread of contemporaneous social movements. It is important to emphasize that occupations spread to about a quarter of the cities we examined, even though social media tools were widely available to activists across the country. Despite the movement's anarchist roots and horizontal organizing structure, it benefited from the presence of universities and a progressive community, which provided organizational resources such as meeting spaces and informal networks between activists. These findings demonstrate that organizational resources matter, even for movements that claim to be decentralized and that rely heavily on cyberbrokerage to

connect activists. Therefore, while our study unambiguously demonstrates the utility of online social networks, it also shows the utility of place-based personal ties and reminds us that we should not superficially celebrate digital mediation.

NOTES

[1] A November 2011 public opinion poll found that approximately six in ten Americans stated that they supported government efforts to reduce disparities in wealth (Gitlin 2012: 37). A *Time Magazine* poll conducted in October 2011 found that 86 percent of those surveyed believed that "Wall Street and its lobbyists have too much influence in Washington" and that 71 percent agreed that "executives of financial institutions responsible for the financial meltdown in 2008 should be prosecuted." See http://swampland.time.com/full-results-of-oct-9-10-2011-time-poll.

[2] See the OccupyWallStreet website, accessed in April 2012 at http://occupywallst.org/about.

[3] For information about Internet usage, see: http://www.internetworldstats.com/am/us.htm. For information about Facebook usage, see: http://techcrunch.com/2011/12/29/2011facebookmarketsaturationus. For information about Twitter usage, see: http://pewinternet.org/Reports/2011/Twitter-Update-2011/Main-Report.aspx.

[4] On Facebook occupy pages, people are able to share stories and discuss with each other. Thus, Facebook has provided an essential platform for movement activists and participants to share information and coordinate actual offline protests. The Twitter occupy page is managed by a limited number of protest participants, and it can only serve as a role of sharing information. Accordingly, Twitter accounts were important in spreading the messages and causes of the occupy protests in the initial stage, but only Facebook accounts became a critical platform when the coordination of protests became important in the later stage of the movement.

[5] As an alternative, we extended the observation period to November 30th, but the main results did not change.

[6] There were 948 cities in total and 208 cities that experienced occupations.

[7] The data on the Occupy Together website were collected based on public listing. Participants of local occupy protests self-reported their protests on The Occupy Directory site. The Guardian data was collected by the Guardian datablog team, which relied on news reports in collecting data. While we cannot completely eliminate selection bias, we compiled these two sources to reduce bias.

[8] See: http://www.dailykos.com/story/2011/10/04/1022722/-Occupy-Wall-Street-List-and-map-of-over-200-U-S-solidarity-events-and-Facebook-pages. The list on this page has been updated to include new Facebook accounts opened after the initial posting date.

[9] To identify the account opening date on Twitter, we relied on a web service named whendidyoujointwitter (http://www.whendidyoujointwitter.com).

[10] We used the WHOIS lookup tool available at: http://www.dnsstuff.com/tools.

[11] We experimented with different "windows of influence" by restricting occupations' influence to two, three, or four weeks after their emergence—and found that results were similar. We do not present these results for simplicity in presentation.

[12] We wrote a program in R (version 2.15.2) to calculate: first, geographical proximity to occupations using information about latitudes and longitudes for each city and the formula for the great-circle distance with the spherical law of cosines (see: http://www.r-bloggers.com/great-circle-distance-calculations-in-r); second, the diffusion formula described above.

[13] See: "Preliminary Findings: Occupy Research Demographic and Political Participation Survey," accessed online in March 2012 at: http://www.occupyresearch.net/2012/03/23/preliminary-findings-occupy-research-demographic-and-political-participation-survey.

[14] Activism on living-wage issues started in the mid-1990s, as a response to the failure of federal and state minimum wage laws to keep pace with inflation and to enable the lowest-paid workers to live above the poverty line. We obtained data about living-wage resolutions from the Association of Community Organizations for Reform Now (ACORN) (http://www.livingwagecampaign.org/index.php?id=1961) in January 2010. Activism to protect civil liberties by adopting Bill of Rights resolutions emerged after the USA PATRIOT Act was signed into law in 2001. Data about civil-liberty resolutions came from the Bill of Rights Defense Committee (http://www.bordc.org/about/index.php) in January 2010. Activism against the war started in 2002. In anticipation of the Iraq War we obtained data about peace resolutions from the Institute for Policy Studies (http://www.ips-dc.org/about) in January 2010. Of the total number of cities with a population above 25,000, 77 cities passed living wage laws, 135 cities passed Bill of Rights resolutions, and 66 cities passed antiwar resolutions by 2010.

[15] An alternative to Cox models is to use event history models that specify or parameterize time dependency, such as Weibull or Gompertz. We experimented with these models but we do not present results because we do not have a good principle for parameterization, which may have a substantial impact on the inferences we make about our process (Box-Steffensmeier and Jones 1997; Box-Steffensmeier and Jones 2004).

[16] While various functions of time are possible (time, natural logarithm of time, time x time, etc.), we choose the simplest one because it is easiest to interpret. Alternative functional forms were explored but are not reported because results were substantially similar. Unlike in traditional tests of interaction effects, this method for addressing the violations of proportionality requires that time is not included as a covariate when it is interacted with other covariates in the Cox model (Box-Steffensmeier, Reiter, and Zorn 2003).

[17] While the variables Facebook, Twitter, and Websites correlate relatively strongly, we did not find this to be a significant problem when we ran the models with mean-centered variables.
[18] We do not include tests for nonproportional hazards for simplicity in presentation.
[19] Additional evidence comes from the following statistics: the percentage of cities that had an actual occupation but no occupy account on Facebook, Twitter, or websites is relatively small (10.3%). The percent of cities with an occupation but no Facebook account is also relatively small (16.7%); the percent of cities with an occupation but no Twitter account is moderate (27.7%); and the percent of cities with an occupation but no website is relatively large (52.3%). The percent of cities that experienced occupations before social media activities is also relatively small (11.2% for Facebook and 15.4 % for Twitter). The median starting date of the occupy movement—as measured by actual occupations—is October 15th, while the median opening dates of occupy accounts in Facebook and Twitter, and of occupy websites for specific communities are, October 3rd, October 5th and October 6th.
[20] We recognize that some individuals were superficially involved in the movement. However, as Nielsen (2013: 175) argues, "It is up to those involved to decide which path to pursue, and it is condescending to assume that people engaging in various forms of Internet-assisted activism cannot tell the difference between relatively superficial forms (sharing a story about the movement on Facebook) and more substantial forms (joining a march organized in part online). A great number of occupy supporters are arguably 'slacktivists' in the sense that they have only weak ties to the movement, but many of them probably prefer it like that. Superficial engagement need not reflect false consciousness."

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