# THIS PROTEST WILL BE TWEETED

Jennifer Earl , Heather McKee Hurwitz , Analicia Mejia Mesinas , Margaret Tolan & Ashley Arlotti

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## Twitter and protest policing during the Pittsburgh G20

*This article examines the use of Twitter at protests surrounding the G20 meetings held in Pittsburgh, PA in September 2009. Based on work on information communication technologies and protest, and on more recent work on Twitter usage at protests, we develop several hypotheses about the content of tweets during protests. Most significantly, we argue that Twitter is a widely available mobile social networking tool that can be used to reduce information asymmetries between protesters and police. Examining the content of 30,296 tweets over a nine-day period, we find that protesters frequently used Twitter to share information, including information about protest locations, as well as the location and actions of police, which is information that was formerly monopolized by the police. Twitter use may be creating a new dynamic in protester and police interaction toward information symmetries. We conclude by identifying implications for policing practices and for protesters.*

Protest events are at the heart of social movement studies – from the first civil rights sit-ins to the hot Chicago nights during the 1968 Democratic National Convention to protests against the wars in Iraq and Afghanistan. Social movement scholars seek to understand what leads to these mobilizations, the dynamic processes that guide their unfolding, and their consequences. Given how important protest events are to the study of social movements, it is surprising that most research on the intersection of social movements and new

information communication technologies (ICTs) focuses on how these technologies are used before (e.g. Fisher et al. 2005) and after offline protest events (e.g. Garrett 2006 on framing), or how they drive online protest (Earl & Kimport 2011). However, little is known about how these technologies are used *during* offline protest events. This research frontier is critical to explaining the social impacts of ICTs and advancing our understanding of contemporary protest, which increasingly utilizes these technologies.

Moreover, this gap grows ever more problematic as technologies whose designs are uniquely suited for use during events become more endemic to protest situations. Twitter is a prime example. It has risen from an obscure application created in 2006 to one whose usage has been celebrated, and even regarded by some as transformational, in the recent Arab Spring (Zhuo et al. 2011), in the 2011 riots in Britain (Kirkpatrick & Afify 2011), and in domestic protests in the United States (Ems 2009). Yet, there has been very little rigorous empirical research on Twitter use during protest events, despite substantial scholarship on Internet activism (see Garrett 2006 for a review).

In order to fill this theoretical gap, we develop and test a series of hypotheses about Twitter usage *during* protest events. We test those expectations using a unique dataset of 30,296 'tweets' sent under the G20 hashtag in the week surrounding the G20 meetings held in Pittsburgh on 24–25 September 2009. The Pittsburgh G20 protests offer an excellent case through which to study Twitter use: it was one of the first events for which comprehensive data is available; it is the first US event at which police were roiled enough by Twitter use to actually arrest people for tweeting; and, yet, there is no reason to believe that Twitter was used differently at the Pittsburgh G20 meetings than at other major protest events since. After examining each hypothesis in turn, we discuss how our findings together point to trends in Twitter use across the life course of protest events.


## Prior research on Twitter

Research on Twitter has addressed a wide variety of academic questions. Researchers have studied: whether interaction on Twitter reinforces ideological commitments or promotes dialog (e.g. Yardi & boyd 2010); how Twitter is used by voluntary organizations (e.g. Briones et al. 2011) and politicians (e.g. Shogan 2010); how information from Twitter crosses over into mainstream media and/or how Twitter breaks news (e.g. van der Zee 2009); how people use Twitter to stay connected (e.g. Chen 2011); and how information diffuses through Twitter (e.g. Romero et al. 2011), among other topics.

Despite the growth in research on Twitter generally, Twitter use during protests has less often been the subject of research. Ems (2009) examines media coverage of Twitter usage at the G20 (but not actual Twitter usage).

Bajpai and Jaiswal (2011) examine the content of tweets from a set of Thai protests, but do not advance a larger theory of Twitter usage at protest events. Segerberg and Bennett (2011) examine Twitter usage in terms of gatekeeping and social networks related to climate protests. Chen and Pirolli (2012) examine followers of @OccupyWallSt and their online actions, but are not focused on Twitter use at particular events. In fact, none of these works provide a larger set of theoretical expectations about the content of hashtags across protest campaigns. We argue that such a model is sorely needed and in the next section, we draw on existing work on Twitter and on ICTs more broadly to develop such a model.

## Explaining Twitter content during protest campaigns

Earl and Kimport (2011) argue that in order to develop a theory of technology usage, theorists should begin by considering what the technology affords, compared to competitor technologies. In our case, this implies identifying what unique affordances Twitter provides over other social media platforms and ICTs more generally. We argue that Twitter's comparative advantage over other Internet-enabled technologies is the ability to use it on the go during events. Other technologies, such as websites or Facebook, might be used prior to an event to publicize it and drive participation, or after an event as postmortems are conducted on the action. But, we expect that Twitter is primarily useful *in situ* during events and that protest-related hashtags will see the most traffic during protest events and the hours directly surrounding events. More formally, we expect:

> Hypothesis 1: Twitter use will peak during protests and have smaller levels of usage in the days preceding and following protest events.

Our hypothesis is consistent with work on Twitter use following disasters or other emergencies, which finds sharp spikes in Twitter use surrounding the disaster (Mills et al. 2009).

### Spreading information and reducing information asymmetries through Twitter

Although Twitter has a mobile advantage over other ICTs, we nonetheless think that there will be commonalities between how Twitter is used and how other ICTs have been used by social movements. Most importantly, a great deal of research suggests that the Internet is a powerful information engine that makes locating and disseminating information easier (Bimber 2001). In economic terms, ICTs reduce information costs and, in doing so, reduce information asymmetries between different parties (Grewal et al. 2003). A classic example is the

effect of ICTs on prices – whether in travel (e.g. Kayak.com), buying gas (e.g. the 'Gas Buddy' app), or buying a home (e.g. Zillow), consumers are increasingly able to learn about pricing easily and act upon that knowledge. We argue that Twitter is likely to be used in a similar spirit – as a means of sharing information, and thereby easing information access and reducing information asymmetries. More formally:

Hypothesis 2: Twitter will be used primarily to broadcast information.

In addition to being consistent with how the Web has been used in a variety of social arenas, our expectation is also consistent with research on Internet activism. One of the most robust findings in this area has been that the Web tends to be used to disseminate information about movements and their issues. For instance, Stein (2009) and Earl et al. (2010) find that the Web is very frequently used by activists to disseminate movement-related information.

Initial evidence on Twitter also supports our expectation. Researchers studying Twitter use during emergencies have found that Twitter is largely used to spread information. For instance, Hughes and Palen (2009) study the use of Twitter during major 'non-routine' events and find that Twitter was typically used to broadcast information. Similarly, Starbird et al. (2010) find that Twitter is frequently used to provide information in disaster situations and that it is uniquely well suited to this purpose. The only study that looks at this phenomenon during a protest campaign also finds evidence for our claim (Bajpai & Jaiswal 2011).

Although the use of Twitter to broadcast information might not be different from other Internet-enabled technologies, we do expect that the *kind* of information that is broadcasted will differ substantially. Since Twitter is uniquely useful for sharing information *in situ,* we expect Twitter users to be more likely to share particular kinds of information, which harness its novel mobile capacities.

First, we expect the sharing of location-sensitive information to be common. Twitter allows people to share their *situated* observations about protest locations, the location of police, or other real-time, geo-sensitive information. Initial evidence from other work supports this expectation (Bajpai & Jaiswal 2011). More formally:

Hypothesis 3: Location will be a frequent information component of tweets.

Second, we expect information on policing to be shared prominently. Police have historically had a large advantage over protesters in terms of surveillance and information sharing to coordinate action. The protesters' bullhorn only broadcasts so far, and other mobile technologies, such as cell phones and text messaging, only allow people to share information with others in the crowd

whom they already know. But, Twitter allows a broad range of protesters and bystanders to monitor and report on police activity in real time, which should allow protesters to make individual and collective decisions about how to proceed based on new developments. Thus, our final hypothesis anticipates:

> Hypothesis 4: Twitter will be used to share a broad array of police-related updates (e.g. location, action).

Although scholars have been slow to discuss police-related updates and its potential consequences, authorities are keenly aware of it and have tried to limit the impact of Twitter, or turn its usage to their advantage. The Egyptian government attempted to deny access to some social media, including Twitter (Zhuo et al. 2011; but see Liedtke 2011 on Google's efforts to keep Twitter accessible). The Iranian government took a different route according to Burns and Eltham (2009, p. 7): 'Iran's Revolutionary Guard and the paramilitary Basij used Twitter to hunt down and target Iranian pro-democracy activists, a pattern in earlier unsuccessful revolutions'. The British government, following the 2011 riots there, considered restricting access to social media, including Twitter, during civil disturbances and has been engaged in high-level meetings with social media providers to do so in future disturbances (Somaiya 2011). Following the widely reported use of Twitter by protesters against the G20 meetings in Pittsburgh, Pennsylvania State Police arrested two men for tweeting about police actions during the protests and Federal Bureau of Investigation officials raided one of their homes in New York (Moynihan 2009; Citizen Media Law Project 2011). These examples illustrate a pervasive unease by authorities about how Twitter may be altering protest and its policing. O'Rourke (2011) discusses the need, more generally, for law enforcement to adapt to these capacities. After evaluating this hypothesis, we consider its larger implications in the discussion section.

## A lifecourse to Twitter usage at protest events?

It is possible that Twitter is used in different ways prior to, during, and after a protest event. With so little research on the use of mobile technologies at protest events, and therefore, so little theoretical or empirical basis for speculation, we refrain from hypothesizing about what that usage lifecourse might look like. However, we do look across our findings to discern whether there is evidence of time patterning in usage that could suggest hypotheses for future research to test. More formally, we ask:

> Research Question 1 (RQ1): Are there time trends that could further contribute to a developing theory of how Twitter is used before, during, and after protest events?
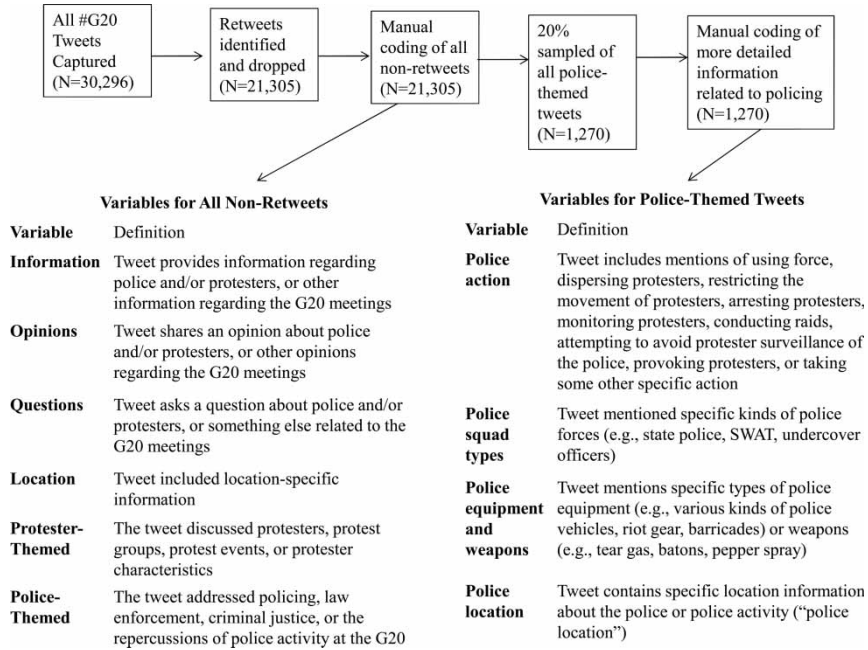
## Data and methods

We draw on data from quantitative content coding of 30,296 tweets posted from midnight on 21 September 2009 to midnight on 29 September 2009 to the #G20 hashtag[1]. Our data covers several days before and after the 24–25 September G20 meetings and protests. Tweets were collected and archived by Alex Halavais and made available for download on his website (see Halavais & Garrido 2009 for more detail). The raw data from the Halavais archive contained a date/time stamp for each tweet, Twitter username, and the text of the tweet. The documentation provided by Halavais suggests that all tweets to this hashtag were captured, but that attempts to also archive all URLs linked to/from tweets were incomplete. We do not analyze the linked websites. Halavais used The Archivist to archive the tweets and followed the #G20 hashtag over the period of observation in overlapping segments to ensure comprehensive mirroring (and subsequently removed duplicates).

We used Stata 9SE to search and tag tweets that included the 'RT' marker for retweets. We then excluded retweets from further analyses because we were interested in the volume of new content flowing through the hashtag and did not want our results to be skewed by a smaller number of popular tweets. This approach is consistent with other Twitter research in both rationale and practice (e.g. Chew & Eysenbach 2010).

We then manually coded a small number of variables for all non-retweets ($N = 21,305$). Two coders independently coded each tweet and when a disagreement existed about how to code a tweet, a third coder joined the discussion and the coding was discussed until consensus was reached on the coding decision. There were no situations in which consensus could not be reached amongst the three coders.[2] Figure 1 summarizes the variables used in the analyses. The information, opinions, and questions variables were categorical variables, where coders could indicate that the information, opinions, or questions were about (1) police; (2) protesters; (3) both police and protesters; or (4) other, respectively.[3] Coding all non-retweets, versus a sample, was necessary because we needed to identify all police-themed tweets.

Once all police-themed tweets were identified, we were able to conserve resources and sample from police-related tweets to do more in-depth coding. We reduced the dataset to tweets that were police-related ($N = 6,350$) and took a random sample of 20 percent of these tweets from each of the nine days under investigation ($N = 1,270$). We stratified the sample by day to ensure that by random chance, our daily aggregations did not misrepresent the overall volume of police tweets by day. Figure 1 lists variables from this detailed coding used in our analysis. Two coders again assessed each tweet and disagreements were discussed with a third coder until consensus was reached.

| Variable | Definition |
|---|---|
| **Information** | Tweet provides information regarding police and/or protesters, or other information regarding the G20 meetings |
| **Opinions** | Tweet shares an opinion about police and/or protesters, or other opinions regarding the G20 meetings |
| **Questions** | Tweet asks a question about police and/or protesters, or something else related to the G20 meetings |
| **Location** | Tweet included location-specific information |
| **Protester-Themed** | The tweet discussed protesters, protest groups, protest events, or protester characteristics |
| **Police-Themed** | The tweet addressed policing, law enforcement, criminal justice, or the repercussions of police activity at the G20 |

**Variables for Police-Themed Tweets**

| Variable | Definition |
|---|---|
| **Police action** | Tweet includes mentions of using force, dispersing protesters, restricting the movement of protesters, arresting protesters, monitoring protesters, conducting raids, attempting to avoid protester surveillance of the police, provoking protesters, or taking some other specific action |
| **Police squad types** | Tweet mentioned specific kinds of police forces (e.g., state police, SWAT, undercover officers) |
| **Police equipment and weapons** | Tweet mentions specific types of police equipment (e.g., various kinds of police vehicles, riot gear, barricades) or weapons (e.g., tear gas, batons, pepper spray) |
| **Police location** | Tweet contains specific location information about the police or police activity ("police location") |

**FIGURE 1**  Schematic of coding process and variables.

This more detailed coding allows us to focus on the kinds of police-related information that tweets shared.

Subsequent analyses were conducted in Stata 9SE. While the timestamps on tweets place them in continuous time, we aggregate by day to analyze overall patterns of usage across the nine-day window of observation. Shorter time frames would have predominately shown diurnal patterns, while obscuring larger trends.

## Findings

Data support all of our hypotheses. Figure 2 examines the flow of tweets on the #G20 hashtag over our observation period. The figure shows that tweeting was more common during the G20 meetings and on days of major protests than on other days (i.e. 24–25 September), as we expected in our first hypothesis. The G20 hashtag averaged 3,366 tweets per day, with a high of 9,547 and a low of 456 during this nine-day period. According to the figure, the number of unique users tweeting also peaked on the two days of the meetings.

Our second hypothesis anticipated continuity between prior uses of ICTs and Twitter, particularly in terms of broadcasting information. As Figure 3 shows, we found substantial support for this hypothesis. As a proportion of all
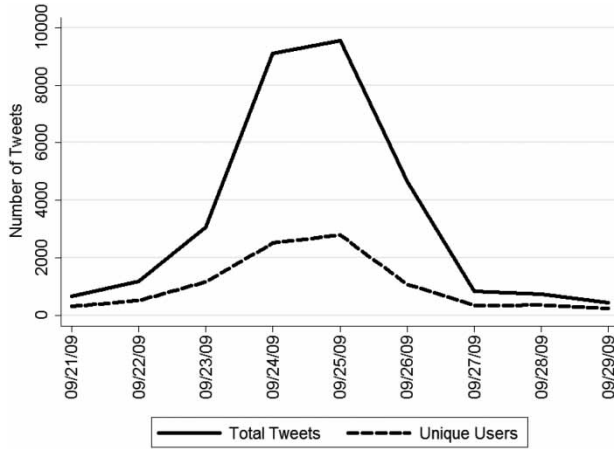
**FIGURE 2**    Total volume of tweets and users (all tweets, $N = 30{,}296$).
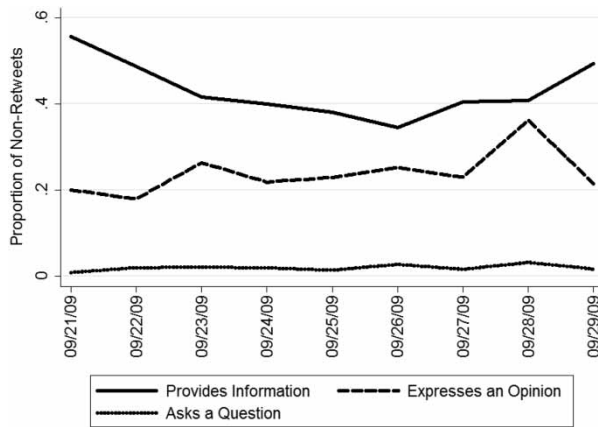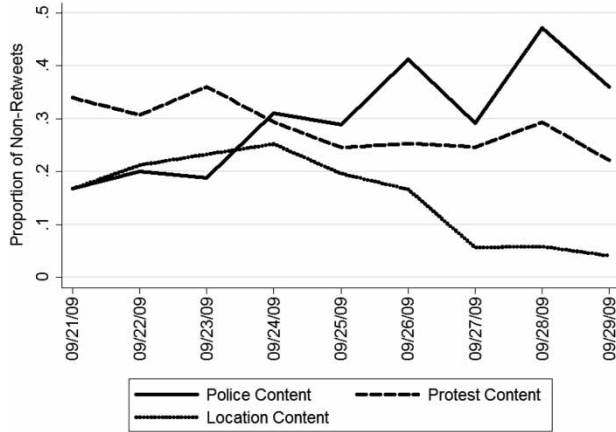


**FIGURE 3**    Purpose of tweets (all non-retweets, $N = 21{,}305$).

Note: Actual $N$ is slightly lower due to missing data from foreign language tweets; the $N$ for all non-retweets is reported so readers can identify which figures share a common set of tweets, net of missing data.

non-retweets, even at its lowest point, more than one out of every three tweets was providing information; at its peak, more than one out of every two tweets was providing information.

Our third hypothesis suggested that location-related Tweets would be common, and Figure 4 provides notable support for this hypothesis. Indeed, location was a major theme in tweets until its frequency began to decline after the G20 meetings ended. For most of the period of observation, location-themed tweets made up nearly one in five non-retweets. Location

**FIGURE 4**   Major themes tweets (all non-retweets, $N = 21,305$).
Note: Actual $N$ is slightly lower due to missing data from foreign language tweets; the N for all non-retweets is reported so readers can identify which figures share a common set of tweets, net of missing data.
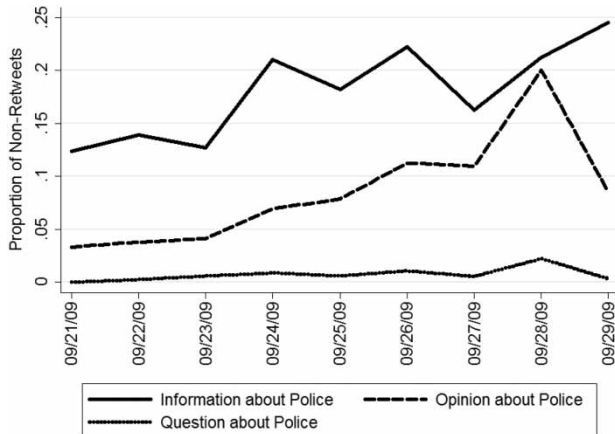


**FIGURE 5**   Major themes of police-themed tweets (all non-retweets, $N = 21,305$).
Note: Actual $N$ is slightly lower due to missing data from foreign language tweets; the $N$ for all non-retweets is reported so readers can identify which figures share a common set of tweets, net of missing data.

themes took a precipitous decline on 27 September and then remained very low through the end of the observation period, as there was far less need to transmit information about location by then.

Our final hypothesis anticipated extensive and varied tweeting about police and protest policing during the G20 and surrounding protests. As Figure 5

shows, at its highest point police-themed tweets made up a substantial portion of the traffic on the G20 hashtag. From the beginning of the protest period through the peak on 26 September, there was an increasing police presence on the ground that was reflected in an increasing proportion of tweets about police. The crescendo of police-protester interaction occurred late on 25 September, and into the early morning of 26 September, when police dispersed more than 500 students by shooting smoke canisters, firing rubber bullets, and making over 100 arrests. The proportion of tweets on 26 September are attributable to ongoing protests before 3am and to sharing links, articles, and videos about police brutality throughout the day and evening.

Figure 5 shows that while information and opinions about police were common and grew over time, questions about police, in particular, were rare. During the two most heated days of protester and police interaction, about one in five non-retweets provided information about the police. For instance, some tweets described particular police units (e.g. '5 K9 units just showed up on south bouquet street . . .') while others discussed the actions of police (e.g. 'Pittsburgh Police: cleared the Quad. Mobile again on Forbes . . .').

After the end of major protests, the proportion of tweets expressing opinions about policing rose to one out of every five tweets (see Figure 5). Some tweets expressed negative views of police action, such as: 'This is what a police state looks like . . .' and 'Civil Liberties Groups: Police Overreacted at #G20 . . .'. But, other tweets were more supportive of police (e.g. 'Police action tonight is a ok by me. Cops being badly antagonized'). A qualitative examination of tweets during this period suggests that while there was a decreasing volume of tweets because the protest activities ended on the 25th, the discussion of police brutality, arrests, jail solidarity, and bail continued after the main protest period in response to arrests late on the 25th and early on the 26th. The additional spike in police content on 28 September was related to Monday morning news programs that recapped the weekend activities, a press conference held by protesters to discuss police issues, and the decision by police to drop the charges against many protesters.[4]

In addition to these qualitative impressions about police-themed tweets, we used the detailed coding of a 20 percent sample of police-themed tweets to systematically identify topics addressed. As Figure 6 shows, the most common topic in the sample of police-related tweets was about police actions, such as crowd dispersal, police raids, and arrests. Representative tweets include: 'Police impede peace group's effort to feed #g20 protesters . . .'; or 'cops trying to force march back in to park . . .'. Interestingly, even though protester and police interaction on the ground declined after the formal G20 meetings, police actions continued to be an important theme in police-related tweets as users rehashed police actions after the meetings.

Tweets also carried information about the deployment of various types of police weapons and equipment. Tweets on the types of police included discussion
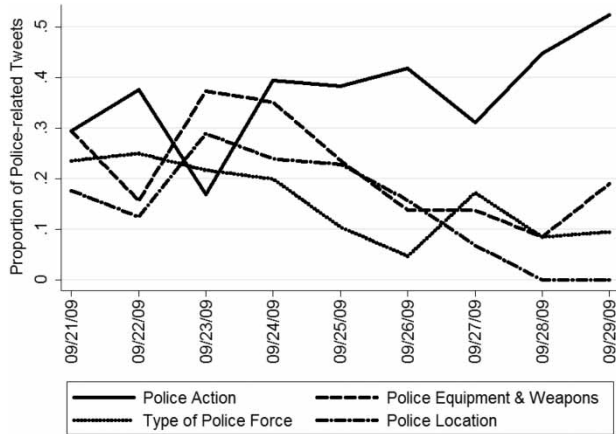
**FIGURE 6**  Detailed description of information in police tweets (20 percent random sample of police-themed tweets, N = 1,270).

of various forces, such as SWAT teams, state police, Secret Service, undercover officers, and law enforcement described as looking like military troops. Also, the location of police officers was a common theme leading into the G20 meetings and protests. Over one out of every five police-related messages contained information about police location on the day before major protests began (23 September) and on the first major day of protest (24 September). Taken as a whole, Figure 6 shows that there was an impressive amount of discussion about police-related themes that would allow protesters to monitor police action and make real-time decisions about participation and tactics based on that information.

Considering our findings together suggests a time trend in Twitter usage as well (see RQ1). There is relatively low usage prior to the start of active protesting, and then tweeting spikes and focuses on information distribution, particularly about policing. Following cessation of events, activity declines, but not immediately to pre-event levels, and focuses on rehashing police and protest action (marked by the rise in opinion-related tweets).

## Discussion

In addition to developing a model of Twitter usage during protest events, which we argue is significant in its own right, we see two additional implications of our findings. First, we argue that when protesters use Twitter to share large amounts of information about police action, location, equipment, weapons, etc., protesters are reducing the information asymmetry that has historically existed between police and protesters. This is significant because contemporary

protest policing protocols in many ways rely on substantial information advantages over protesters.

To make an analogy to changes in other areas brought on by technology use, sellers have historically had access to more information on pricing than buyers and that fact has shaped markets. When information asymmetries between sellers and buyers decreased, it increased competition, drove down seller margins, turned most markets into commodity markets, and changed the role of marketing (Grewal et al. 2003). These reductions even had social effects, such as reducing the premium that racial minorities typically pay for cars to zero, thereby reducing stratification in markets (Morton et al. 2001). We are arguing that just as technology use has remade information access in other arenas, and, as a consequence, destabilized long settled business models, Twitter usage during protest events threatens the information monopoly that authorities have held, which in turn may destabilize current protest policing models. Police, after all, have long had the ability to collect and share information – through surveillance and routine policing – and to use that information to update and coordinate control strategies in real time. This latent advantage has been important to the development of contemporary protest control strategies.

Prior to the 1970s, the so-called 'escalated force' approach dominated protest policing (McPhail et al. 1998). This approach gave a great deal of discretion to line officers, who often engaged in violence and, in doing so, created a major public relations problem for police departments at the time (Earl 2002). Information was at the foundation of the shift away from escalated force to 'negotiated management', which became the dominant protest policing protocol in the 1970s (McCarthy & McPhail 1998). A key tenant of negotiated management is supervisory control over line officers. On the ground, this means that supervisory officers spend significant resources collecting information about protesters prior to protests so that event-specific action plans can be developed. Negotiated management also requires extensive police monitoring of protest events so that signs of disorder can be immediately recognized and relayed to supervisors. Police supervisors react to this incoming information by quickly distributing revised instructions to line officers. When large crowds are involved, police observation and rapid communication up and down the supervisory chain are even more important. For instance, basic police formations, which allow a phalanx of police officers to block off certain areas and funnel individuals toward other areas, require a great deal of coordination and are deployed in reaction to real-time monitoring of events. Many police departments also save on manpower by employing temporary barrier systems, using temporary fencing made of netting and movable metal barricades. These fencing systems also require coordination and are often deployed in reaction to events on the ground. In other words, information lays the groundwork for negotiated management.

Information and communication have only become more important over time to policing, as evidenced by the resurgence of surveillance (della Porta & Reiter 1998; Marx 1998; Noakes & Gillham 2006; Gillham & Noakes 2007; e.g. Dwyer 2007) and the widespread use of mobile command centers. In European countries, surveillance of public spaces is taken to an even greater level – police regularly monitor the flow of protesters into cities, where major events are occurring, including monitoring trains, planes, and CCTV (Ullrich & Wollinger 2011).

By comparison, protesters have had comparatively primitive technologies for information sharing and coordination. The bullhorn is a prime example – this ubiquitous technology at marches allows the broadcast of information to other protesters, but only to a small area and from one central organizer to the rest of the group. It does not allow non-organizer participants to report information back up to organizers and it does not allow access to information to everyone in a crowd.

The capacity to monitor police scanners did not alter this balance of power much, either. Police are aware of the potential to monitor scanners and so can use alternative frequencies and, more recently, computerized communication. Moreover, eavesdropping on police scanners, prior to the introduction of technologies like Twitter, did not allow the eavesdropper to communicate quickly and broadly about what they were learning. Cell phones, which protesters have used to individually call one another during marches and rallies, have also had little impact because phones require knowing others' phone numbers in the march and are limited to person-to-person calls (or, three-way calling in more recent years). In sum, protesters' ability to uptake real-time information and *communicate* it has simply not been on par with police capacities.

Beyond facilitating negotiated management as a policing strategy, the information advantage police hold over protesters provides numerous other advantages to police: lacking knowledge of the event action plan, protesters cannot work to effectively undo police plans, and lacking knowledge of real-time changes in police action, protesters cannot easily thwart police reactions to protest *in situ*. For instance, protesters may be unaware that certain areas are being unexpectedly blocked off along a march area, that police are amassing in certain areas, or that barricades are being deployed elsewhere, but police are certainly aware.

We argue that the kinds of Twitter usage we observed are upending this information asymmetry, and in turn, leveling the playing field between protesters and police to some extent, while challenging core inputs to negotiated management. Thus, our findings are relevant to scholars studying Twitter, as well as scholars studying the policing of protest.

Moreover, our findings suggest that this dynamic needs continuing investigation so that the adjustments that police make to their protest policing practices

in reaction to Twitter usage can be more fully understood. We argue that the current 'business model' for protest policing is likely to crumble as information asymmetries decline. Police may respond to this in a number of ways. They may try to preserve their business model by trying to limit Twitter usage during protest events, as indicated by the arrests of Twitter users following the G20 meetings and British government negotiations with Twitter about disabling their service during future disorders. Alternatively, police may try to co-opt Twitter use by using it as a tool to further surveillance, to identify leaders, and to feed misinformation to protesters, as evidenced in the Middle East. Or, police may create new models for protest policing that are less dependent on information asymmetries.

We also suggest a second implication of our findings: our findings speak to a major, ongoing theoretical debate over how to conceptualize the impacts of technology usage on protest dynamics more generally. One major research camp, the 'scale change' camp (Foot & Schneider 2002) argues that ICT usage accelerates or enlarges existing dynamics, but does not fundamentally alter already well-known social movement processes (see Earl & Kimport 2011 for more on this approach). The alternative research camp, the 'model change' camp (e.g. Bimber et al. 2005), argues that some types of ICT usage can actually lead to changes in the underlying processes driving organizing and activism. For instance, researchers have argued that ICT usage can reduce the importance of resources to movement emergence and thereby fundamentally alter the processes that underlie movement emergence (see Earl & Kimport 2011 for more on this approach as well).

With only a few notable exceptions, however, both camps have focused on Web-based contention. Our findings about the potential for Twitter usage to reduce information asymmetries between protesters and police, and thereby unsettle institutionalized protest policing protocols fits within the 'model change' camp. We are arguing that the information business model that undergirds current protest policing is seriously threatened by the kinds of Twitter usage we described. Future research is needed to trace how policing models change, although we argue that our identification of this area as a likely area for model change is significant even without yet fully knowing the shape that these model changes will take.

## Conclusion

This paper advanced several novel hypotheses about how Twitter would be used *during* protest events and tested those hypotheses using data from over 30,000 tweets sent to the #G20 hashtag during the 2009 G20 meetings held in Pittsburgh. Together, our hypotheses create a model of Twitter use during protest events. We find strong evidence in favor of all of our hypotheses,

and also find evidence of an unanticipated use – for discussion and postmortems of protest and police behavior following the meetings. Looking across our findings, we also argued that there is a meaningful temporal patterning to Twitter usage.

We suggested two other important implications. First, our work suggests that, as Twitter is used to share information about protest policing, protesters are able to diminish the information asymmetry that has typically favored police. In doing so, protesters threaten to upend protest policing protocols that rely on police having superior surveillance, communication, and coordination. Second, we argue that if this leveling of the information playing field becomes common, it will force police to adjust their protest policing protocols, and in doing so, lead to a 'model change' in protest policing.

We do not mean to suggest that these are the only changes in protest that might result from Twitter usage. For instance, wide-scale Twitter usage could facilitate new kinds of diffused leadership, where the hashtag as a whole, rather than any one person, performs the leading tasks that typically are performed by organizational leaders (Earl 2007). Further, it is possible that the ICTs themselves will change over time as well, leading to new usage patterns. For instance, a new application, Vibe, has reportedly been used in Occupy Wall Street protests (Wortham 2011). Vibe allows people to share short posts with others, but unlike Twitter, it allows people to post anonymously, and shows messages sent from people geographically close to you. This increases the ability of people to locate geographically relevant, time-sensitive information. One does not have to know the proper hashtag to follow; you just have to be in the right place at the right time. Celly is another wireless alternative used by Occupy protesters, although it is subscription-based.

Future research is critical to understanding whether our findings describe Twitter use at future protest events, and the use of mobile technologies more generally at protest events. Research should also examine how police respond to the reduction in information asymmetries, including what long-term changes in protest policing follow as a result.

## Acknowledgements

## Notes

1    We focus on a single, prominent hash tag related to the G20 event to mimic Twitter user practices and to contribute to existing Twitter research that analyzes one prominent hash tag per protest event (see Heverin & Zach 2010 and Gaffney 2010 for a similar approach).

2    We do not report an inter-coder reliability score because our coding procedure ensured that there was complete agreement on the final coding (i.e. everything was double-coded and disagreements were discussed until consensus was reached).

3    In Figures 2–4 in the findings section, we dichotomize these variables, while in Figure 5 we report on only information, opinions, and questions that included police.

4    Note that the total number of tweets on the 25th was a little over 9,000, and approximately 4,000 (with many of those coming before 3 am) on the 26th. On the 27th and 28th, there were only about 1,000 tweets each day. Because all figures (except Figure 2) represent proportions, a much smaller number of actual tweets about police were exchanged following the protests even though the proportion of police-themed tweets was greater.

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