

#Memstorm: Twitter as a Community-Driven Breaking News Reporting Tool

This study offers an in-depth exploration of how citizens and journalists in Memphis, Tennessee have come to utilize Twitter and the hashtag #Memstorm as a collaborative breaking news reporting tool when severe weather hits the region. It examines some of the factors that motivate public participation and looks at how this new, always-on community-driven communication system – what scholar Alfred Hermida has called “ambient journalism” - is affecting local journalism, building on previous theory and research revealing how social media has helped make the news process increasingly participatory. Using interviews, a survey, participant observation and content analysis of 1639 tweets with the #memstorm hashtag, this study shows how Memphians are building community online and playing a role in sharing information vital to public health and welfare.

Carrie Brown-Smith, University of Memphis

314 Meeman Journalism Building

Memphis, TN 38152

202-251-5719

cbrown14@memphis.edu

#Memstorm: Twitter as a Community-Driven Breaking News Reporting Tool

In April 2011, a series of powerful storms pounded Memphis, Tennessee and the surrounding region, driving residents not only to their television sets but to their Twitter streams for the latest information on funnel cloud sightings, flash flooding and power outages. Sirens blared and people huddled in basements and bathrooms off and on for two days, but when all was said and done Memphis was relatively lucky; the same system of storms caused much more extreme damage and loss of life in Joplin, Missouri and Tuscaloosa, Alabama.

While wild weather with torrential rain and tornados are not unusual in the Mid-South, the ability to both access and contribute to another real-time source of information in addition to the venerable local television meteorologists and other traditional news outlets is a relatively new phenomenon that exemplifies the participatory, two-way power of today's digital tools. Community members converged around the hashtag #Memstorm to share information, photos, and video on the storm and interact with others; according to data collected by Aaron Prather, a local technology entrepreneur and CEO of startup StiQRd, at the height of the storm, #memstorm impressions reached 1.4 million, with over 200,000 Twitter accounts being reached; 0.01 percent of all tweets on Twitter were being tagged with #memstorm (Howell, 2011).

Using a combination of methodological approaches, including a content analysis of 1639 tweets tagged with the #memstorm hashtag, interviews, a survey, and participant observation, this study offers an in-depth exploration of a concept described by Hermida as "ambient journalism" or an "awareness system that offers diverse means to collect, communicate, share and display news and information,

serving diverse purposes” (2010: 301). This always-on communication system carries significant implications for journalists’ role in society and the larger question of how a community’s information needs are met in a digital world, particularly during a fast-moving breaking news situation. Journalists hoping to harness new tools to continue to play a role as sensemakers and verifiers of information, in a landscape where the public has the ability bypass them, need to understand what this growing online community is doing and what its needs, norms and motivations are. For example, during the storm, Fox 13 asked people to use the hashtag #foxstorm “so we can better monitor affected areas.” The reaction on Twitter was swift and fierce; the community was already using the #memstorm hashtag and many resented an attempt to “brand” the storm response to one particular station.

This study builds on existing theory and research revealing how social media has helped make the news process increasingly participatory, expanding traditional conceptions of news and challenging the role of journalists as gatekeepers who select and edit information for presentation to the public (Singer et. al., 2011). In their book *Participatory Journalism: Guarding Open Gates at Online Newspapers*, Jane Singer, Alfred Hermida and a host of other contributors amass substantial evidence showing that “people inside and outside the newsroom are engaged in communicating not only to, but also with, one another. In doing so, they all are participating in the ongoing processes of creating a news website and building a multifaceted community (2011: 2).” By looking at one specific use case in detail, this study examines further how a community may play a role in covering itself, even outside of any deliberate efforts by journalists.

This study also expands on existing research on uses and gratifications of Twitter by examining what kinds of needs motivate public use of new media in a breaking news situation. Previous research has found that Twitter may be especially useful in comparison to other social networks for news and information (Johnson and Yang, 2009), more so than Facebook, where people go

primarily to connect with their friends made offline (Urista et. al. 2009; Steinfeld et. al. 2007). In addition, examines the back-and-forth among community members using the hashtag and finds that Twitter serves need to connect with others, one of four key communication need states particularly relevant in interactive new media contexts (Thorson & Duffy, 2006).

Literature Review

There a growing body of academic literature on Twitter, a social network that allows users to broadcast information to others using just 140 characters, interact with each other publicly or privately, and “follow” other users, although relatively few studies have examined its implications for journalism or looked at how hashtags are used in a breaking news event. Unlike the larger and older Facebook, reciprocity is not required on Twitter; users can follow others even if others do not follow them in return. Users can share photos, videos, and links to articles or blog posts; links are often shortened to provide more space for additional commentary. About 13 percent of online adults use Twitter, a figure that has grown rapidly, up from just eight percent in 2010 (Smith, 2011). While many new users check the site infrequently or never, one-third check for new material posted by others on a daily basis or even multiple times per day (O’Dell, 2011). Twenty-one percent of Twitter users follow more than 100 people, and 16 percent now have more than 100 followers (Smith and Rainie, 2010). Edison Research also found awareness of Twitter has exploded. The percentage of Americans who say they are familiar with Twitter rose from 5 percent in 2008 to 87 percent in 2010 (Webster, 2010). Twitter users are highly mobile; 95 percent own a mobile phone and half use it to access Twitter (Smith, 2011).

Uses and gratifications theory has been the most common theoretical paradigm applied in the study of social networks thus far, as researchers exploring a still relatively-new phenomena seek to understand how audience members use social media sites like Twitter and the fulfillment they get from their media choices. Uses and gratifications theory is relevant for journalism-related research as a way to

understand and target their audience's needs, ultimately ensuring the best return on investment with social media.

Twitter and uses and gratifications

Research on Twitter uses and gratifications has found people are using it as an important source of news and information, although social needs remain key aspect of user motivation. One 2009 study by Johnson & Yang found people were using Twitter more for informational than social needs, a kind of "one-stop-shop" for obtaining information from a variety of sources, similar to an RSS feed. Their results indicated that "Twitter's strengths in satisfying its users lie with its ability to help users connect and communicate with many other users, while also allowing users to share their thoughts in a public forum and keep track of what other users are talking about (18)." Subjects reported that Twitter served as a filter, allowing them to easily access information recommended by friends or trusted contacts. Aberran et. al. (2010) found similar results in a study of Latino youth on Twitter. When young adult Latinos singled out uses of Twitter from Facebook and MySpace, Twitter emerged as the clear leader for accessing news and information.

Of special relevance to this study given its focus on using Twitter in the context of a local breaking news story, Naaman, Becker and Gravano (2011) found that Twitter serves as what they called a "social awareness stream" and noted that although it enables the possibility of far-flung global connections, it is especially useful for offering local information, because most users tend to be connected to a significant number of people from their geographical area. They also found that in a breaking news event, users tended to, not surprisingly, focus more on information transmission than conversation with other users.

Hughes, Lee, and Palen (2009) also examined Twitter use during major news events or crises with a content analysis of tweets from the Republican and Democratic National Conventions as well as Hurricanes Gustav and Irene. Their findings matched the previous study in that during a crisis, Twitter

users are focused on broadcasting information as opposed to interacting with others. Interestingly, Twitter users who joined during this kind of breaking news event are more likely than others to become long-term users, suggesting that these users found substantial utility in Twitter and may have formed meaningful connections that they could then build upon. They also found that general Twitter use over time has evolved to include more information sharing; in 2007, just 13 percent of Tweets included a URL taking the user to additional information, while two years later in 2009, 24.7 percent of tweets contained a URL. During the two hurricanes, for example, fully 50 percent of all Tweets contained a link. Indeed, social networks have become key drivers of traffic to Web sites through shared links. Pew Research Center reported 55 percent of Twitter users share links to news stories, and about one in 10 do so at least once a day (Smith & Rainie, 2010).

Similarly, search-based ad network Chitika conducted a study that found news is important to Twitter users (2010). They looked at all of the Web sites in the company's network that received traffic from Twitter and found 47 percent of those sites were news-related; technology and celebrity/entertainment sites accounted for 10 percent, movies six percent and how-to articles four percent. A study by Barracuda Networks, a Web security company, described Twitter as "more news feed than social network," finding the majority of Twitter users follow others but do not post messages themselves (Pepitone, 2010). However, uses may be shifting. More recent research indicates people are becoming more active in sharing information themselves on Twitter (Sysomos Inc., 2010).

In addition to serving as an important source of news and information, Twitter also satisfies needs for connection and can build a sense of community, studies show. Crawford (2009), boyd, Golder and Lotan (2010) and Chen (2011) found that Twitter users can develop a deep sense of connection to others, including those that don't post often themselves but instead primarily listen and consume information. Chen (2011) found that the more hours per week you spend on Twitter, the more camaraderie or connection you feel to other users, a

finding that held true across gender, age and other demographic categories. Boyd, Golder and Lotan (2010) describe Twitter and particularly the practice of retweeting other users, often with additional commentary added, as a kind of “distributed conversation,” writing, “whether participants are actively commenting or simply acknowledging that they’re listening, they’re placing themselves inside a conversation. Even when they are simply trying to spread a tweet to a broader audience, they are bringing people into a conversation” (7). Crawford (2009) found that Twitter often provides a kind of steady background of messages that are scanned periodically throughout the day, and that “this process of background listening is critical to the sense of affinity generated in these spaces; access to the minutiae of a person’s life is something normally reserved for family, close friends and lovers” (531). When looking at why people retweet messages, the Boyd, Golder and Lotan (2010) study found that in addition to the desire to share information, various social needs for connection were paramount. They found that the main reasons people retweet include: To spread information to a new audience, to entertain or curate the best information, to comment on somebody else’s tweet and start a conversation, to make one’s presence as a listener visible, to validate another person’s thoughts, as an act of friendship or loyalty, to support less popular/less recognized people or topics, to gain followers and seek reciprocity, or to save tweets for later personal access.

A study that examined the use of Twitter to raise money and awareness of post-earthquake Haiti found that, more than self-expression, users are primarily interested in belonging or connecting with a community of like-minded supporters, as well as promoting involvement and personalizing issues in a way that allows them to declare their individual commitment in a public way (B. Smith, 2010). Retweets were more dominant in this study than personal messages, “enabling users to build off others’ commentary and network on relief efforts” (332), therefore representing a kind of collaborative effort.

Twitter and journalism

Hermida (2010) has described Twitter as a form of “ambient journalism.” News today is all around us, all the time, often held in our hands in the form of a mobile device, but we are also not simply receivers of this news but also contributors to it as we go about our day and share observations and information with the world. The growing volume of Tweets creates a system that helps people maintain awareness of each other and what is going on, and while each individual tweet may not demand much attention or cognitive effort, taken as a whole, it can serve as an important early warning system. He argues that journalists still must play a role in helping the public filter these disparate bits of news and bring it meaning and context (Hermida, 2010).

Research has documented how social media and interactive websites have enabled the creation of “active recipients” of news who are now more likely to take advantage of the two-way nature of these technologies to participate in the news process (Singer et. al. 2012). However, while individual journalists and news organizations have embraced Twitter (Ahmad, 2010; Farhi, 2009), they have only just begun to take advantage of its capacity for interactivity, instead hewing to more of a broadcasting model (Messner and Eford, 2011). Shovelware, or news content taken from news organization’s websites with little customization for Twitter, dominates, and few have embraced the community-building possibilities (Messner and Eford, 2011). For example, a content analysis of tweets from local television news accounts that stations are primarily using it to share news, especially breaking news, with relatively little promotion or interaction; interestingly, they found a positive relationship between the amount of interactivity and the number of followers but noted that engaging did come at a cost of lower overall tweet output (Ferguson and Greer, “Using Twitter for Promotion and Branding” 2011). A similar study of radio Twitter accounts also found that news stations were primarily offering followers a feed of news, although they noted that many of these accounts did have a lively and “human” feel to them (Ferguson and Greer, “Local radio and microblogging,” 2011). A study of Twitter use by business journalists also found that few were using it to find sources or story ideas (Lariscy et. al., 2009).

Few studies have looked at the credibility of information found on Twitter, but one that did bodes well for journalists, at least those who are well-established on the site with a complete bio and a history of consistent Twitter use. It found that users are poor judges of truthfulness based on content, instead relying on peripheral cues like user name, image or bio, as well as reputation, or whether it is somebody a user has heard of before. The importance of these kinds of cues make having an established news brand as part of your bio helpful to telegraph believability. Also rated high in credibility are people with influence, as measured by follower counts, or topical expertise, as established by a history of on-topic tweeting, advantageous for a consistent beat reporter. Rated lowest in credibility were tweets with non-standard grammar, another advantage for seasoned professional journalists.

Although little other academic research has yet explored the phenomena of using Twitter and/or hashtags as a community reporting tool, other communities and news organizations have embraced them as well, although unlike #memstorm, which was driven by members of the community, in other places it was the journalists that took a leading role in promoting the hashtag use. The Portland Oregonian may be the first; it used Twitter in late 2007, which Twitter was new and had barely 500,000 users nationwide, during major storms to post its own links and aggregate citizen tweets about flooding and road closures (Farhi, 2009). The Herald in Everett, Washington did something similar with the hashtag #waflood during flooding in its area (Farhi, 2009) and The Oklamoman newspaper uses #okstorm for weather alerts (Kulicke, 2011). Writing in *American Journalism Review*, Paul Farhi of the Washington Post said that Twitter works best in situations in which things are happening fast and the traditional media can't assemble all the facts at once, and noted that it works well as a kind of early warning system and as a way of helping to spot trends (2009). "Twitter attracts the sort of people that media people should love – those who are interested in, and engaged with, the news," he wrote (2009: 30).

This study will seek to answer the following research questions:

1. How did the hashtag come into use in Memphis as a way of reporting on the storm?
2. What are some of the uses & gratifications of Twitter use during a breaking news situation such as #memstorm? What motivates the public to participate?
3. How is this new system of “ambient journalism” affecting local journalism? What kinds of ongoing role can journalists play in this increasingly participatory, always-on news environment?

Methodology

In order to investigate a relatively new phenomena that has not been extensively documented, this study employs multiple methodologies, thereby enhancing internal validity through data triangulation (Mathison, 1988). This study includes a content analysis of 1639 tweets tagged with the #memstorm hashtag, interviews, a survey, and participant observation. Data from each of these sources were analyzed for corroboration as well as inconsistency or contradiction (Mathison, 1988). The inclusion of qualitative measures offers a more in-depth and open-ended exploration of ways in which this hashtag was utilized and the motivations of participants, and allows for the discovery of possibly unexpected themes.

First, a content analysis of 1639 Tweets tagged with the #memstorm hashtag during the height of the severe April 2011 storm was conducted. The Archivist is a Windows desktop application that archives tweets based on the search operator entered and exports them to an Excel file for systematic analysis. Once a search is begun for a specific search term such as #memstorm on Archivist, it will continuously monitor that search term over time, refreshing every 10 minutes. Tweets were collected between 10:27 pm on April 26 through 5:24pm on April 27, when the storms finally began to dissipate. All tweets were coded by the same person.

Tweets were initially coded as being from journalist or non-journalist accounts, based on Twitter bios and in many cases, Twitter usernames that include the name the news organization. Then they were sorted by regular tweets, retweets (users can share others' tweets with their own followers, designated by an "RT" in front of the Tweet), and replies to other users (designated by an @ sign in front of a Twitter user's username). Finally, the tweets were categorized in the following manner: Witnessing, or tweets including direct observations of weather conditions in the user's area, often including photos or videos; general news or information related to the storm (this category was then subdivided by the source of the information: television/radio, newspapers, an independent weather source such as MemphisWeather.net or the National Weather Service, or an undermined source; the number of Tweets containing a link to a website or article with additional information was also quantified in this category); making a joke/using humor; expressing fear or another emotion such as being fed up with the near-constant severe weather; asking a question of other users/crowdsourcing for information, and other. Additional unexpected categories that emerged during the analysis were Tweets praising journalists and television meteorologists for their efforts to inform the public during the storm, and tweets related to the use of Twitter or the hashtag, which included a number of Tweets discussing the controversy that ensued when the local Fox affiliate attempted to promote the #foxstorm hashtag, upsetting some users who felt that branding the storm to a specific station was in violation of Twitter's community spirit. The codebook can be found in Appendix A.

The second phase of the study involved nine in-depth interviews conducted primarily face to face, although one interview was conducted via email at the request of the interviewee, whose schedule did not permit a sit-down interview.

Interviewees were selected on the basis of their prolific use of the hashtag or their role as local social media influencers who helped initially spread the concept of using the hashtag during severe

weather. To identify prolific Tweeters, on April 26, 2011, the first night of what ended up being a two-day series of storms, a list of the top Tweeters by number of Tweets sent using the hashtag was compiled, also using the Archivist program. Interviews were requested from the top five; one of them was unavailable. Interviewees also included the person widely credited with initially coming up with the hashtag, a local entrepreneur who spoke about it at Ignite Memphis in February 2011, a few weeks before the major April storms. Ignite is an event held in over 100 cities featuring short, five-minute speeches. Interviewees also included some of the most prolific journalistic hashtag users from both print and broadcast media and one independent meteorologist who runs a local weather website. Interviewees were also asked for recommendations on people to interview who they felt were particularly active #memstorm tweeters in order to further diversify the sample. Interview questions can be found in Appendix B.

The third element of the study was an online survey. The survey link was distributed on Twitter using the hashtag. This ensured that not only the researchers' followers would see the survey link, but also everyone who was following the hashtag. The link was Tweeted during a storm to increase the likelihood that others would see it, although the survey period did not coincide with any extreme weather events such as a tornado or other life-threatening situation. The Commercial Appeal, the metropolitan daily newspaper, also Tweeted a link to the survey, further increasing its reach, as did the independent local meteorologist, who has over 4,000 followers on Twitter, and the local Fox meteorologist. The researcher also sent a link to the survey directly to as several who were observed to be heavy hashtag users to further encourage their participation.

The survey included several open-ended, long answer questions to better gauge a relatively new phenomenon, to encourage a richer, more in-depth response and avoid pre-imposing categories that may not accurately capture participants' experiences. Participants were asked to describe the ways in

which they used the hashtag, how they initially found out about the hashtag, what the advantages and disadvantages of Twitter are for a breaking news event like a storm, what they feel the role of journalists should be in using the hashtag, and if and how they feel the hashtag may create or enhance a sense of community and connection among local residents. Basic demographic data including gender, race and age and educational attainment was also collected. A total of 34 surveys were completed and returned. Because the survey technique involved a snowball sample, a response rate cannot be calculated. The survey instrument can be found in Appendix C.

Finally, the study had participant observation component. The author took detailed field notes while actively participating in using the hashtag during the storm and curating some of the best information from Twitter and other social media sources such as Flickr or YouTube using the Storify tool. For many hours during the storm, the researcher continuously monitored the hashtag, occasionally contributed to it by sharing direct observations about neighborhood weather conditions, and selected some of the most valuable or interesting Tweets for the Storify collection, a time-intensive and immersive process. As in all studies involving participant observation, being an active part of the phenomena of interest can induce bias, but having an “insider” status can also increase validity; Yin (2003) wrote that one of the skills of a good researcher involves being able to bring expert knowledge to bear on the case. Being an active participant allows the researcher to better understand the nuances of user motivations, and assisted in shaping the interview and survey questions as well as the codebook.

Results

Analysis of the data collected utilizing all four methodologies revealed the following answers to the research questions.

R1: How did the hashtag come into use in Memphis as a way of reporting on the storm?

The #memstorm hashtag was first suggested by local entrepreneur Aaron Prather, who urged Memphians to adopt it during a five-minute speech at the event Ignite Memphis in February 2011. Prather said that he got the idea while driving home during an unusually significant snowfall in Memphis. The radio wasn't giving him enough localized information, and, increasingly frustrated, he said, "I was thinking man, if we had a hashtag on Twitter, I could find out where the wrecks were, which streets were open, which were closed, and it would be a lot easier for me to get home."

Prather told the Ignite audience that the hashtag would help to centralize storm-related information, allowing people to easily track unfolding events from a single source, and would enable more people to add to the story with eyes and ears on the ground.

The timing was impeccable, as just a day after the Ignite event, Memphis was hit with a storm, and the hashtag first came into public use, as both interview data and participant observation reveal. The owner of a local marketing firm with more than 29,000 Twitter followers as of this writing was in the audience at Ignite and started using the hashtag during this storm, and several interviewees noted that her substantial following helped spread the word quickly. Another early adopter was an independent local meteorologist who was trained at the National Weather Service and now operates a forecasting website. One interviewee said, "It really took off when he embraced it. He gave the #memstorm hashtag authority and legitimacy. If it was not for [him], I think there was a risk it could peter out. But having an expert come in and join the conversation gave it legs." Toward the end of this first storm, two local television stations, WREG-TV Channel Three and WMC-TV Channel 5, were observed beginning to use the hashtag.

Thus by time of the two days of near-constant tornado watches and warnings on April 26 and 27 of 2011, the hashtag was already in use by a influential group of Memphis Twitter users, as measured by follower count, and was poised to explode in use.

The majority of survey respondents (16) said that they found out about the hashtag when they noticed others in their feed using it, showing how a hashtag can easily spread virally as more and more people begin using it; nine specifically mentioned the local independent meteorologist as one of the first places they had noticed it.

As noted earlier, on April 26, the meteorologist at the Fox affiliate, Joey Sulipeck, asked followers on Twitter to tag storm information with #foxstorm. Sulipeck later said on Twitter that it was not his decision and that it had actually been tweeted from his account while he was on air by another employee at the station. Brittany Fitzpatrick, then a graduate student at the University of Memphis, used the Storify social media curation tool to collect over 90 Tweets, the vast majority of which criticized Fox for its attempt to brand the storm when the community had already come together to establish a common hashtag (retrieved March 18, 2012 from <http://storify.com/britfitzpatrick/my-fox-memphis-creates-social-media-disaster>). For example, Twitter user “TheFireTracker2” wrote of #foxstorm: “when business branding collides with common sense.” User “BrennanSomers” wrote: “If u use #foxstorm you've clearly missed the point of community involvement in #memstorm.” A few, however, came to Sulipeck’s defense. Those supporting Sulipeck were less focused on the merits of either hashtag and more focused on chiding other users against being “mean” in their criticism of the local meteorologist or said they did not care enough to make a fuss about it. Following the controversy, Fox stopped attempting to promote the branded hashtag.

Even though the collection of Tweets for the content analysis began a few hours after this controversy erupted, it was still reverberating, and continued to even a day later. Fourteen tweets, 16 retweets, and 21 replies all mentioned the #foxstorm controversy, in a similar vein to those described above. When the survey was conducted nearly a year later, four respondents still remembered and mentioned the #foxstorm controversy unprompted, describing it as contrary to the community spirit of

#memstorm. For example, one survey respondent wrote, “As seen in the case of the #foxstorm hashtag, trying to branch off for personal gain contradicts the purpose of having the community in the first place.”

R2: What are some of the uses & gratifications of Twitter use during a breaking news situation such as #memstorm? What motivates the public to participate?

Not surprisingly, the primary motivation for using Twitter during a severe weather situation is to get and share news, particularly real-time, neighborhood-specific information of the kind mainstream media may have difficulty providing at scale, particularly in a major metropolitan area spread over a large geographic area. Other popular uses of Twitter documented in other research, such as entertainment or passing time (Johnson and Yang, 2009), fade in importance when actionable information about what to expect and prepare for becomes of utmost importance in a threatening weather situation. Secondary motivations for using the #memstorm hashtag included connecting with others and building a sense of camaraderie or community online, which survey and interview respondents said helped to soothe fears during a dramatic event. To a lesser degree, using the hashtag did offer some entertainment for some folks who sought out Twitter to make, read or share jokes about the storm or its local television coverage. Fourth, some people used Twitter to ask questions and solicit specific kinds of information from others. Each of these uses and gratifications will now be explored in greater depth.

Sharing and receiving news: Direct observations and more general information

All four methodological approaches confirmed that the primary use of the hashtag, was, as expected during a breaking news event, sharing and receiving news and information. Content analysis of #memstorm Tweets revealed the popularity of an activity once primarily reserved for journalists: Sharing direct observations about what is going on in a particular area. The majority of all Tweets analyzed, 239, included information about what hashtag users were witnessing, including things like rain

or hail conditions or fallen trees in specifically-mentioned neighborhoods or zip codes; many users included a photo or in some cases, a video. Forty-five retweets and nine replies to other users also contained direct observations; in a handful of cases, Twitter users cc'd journalists using their usernames when offering this kind of information, as though to alert them of potentially useful information for their news reports. In the survey, 13 respondents specifically mentioned the utility of geo-targeted information that is more specific than that generally available on weather broadcasts, such as a flooded street impeding travel in their area. For example, one wrote: "I use it to find out what's going on in my neighborhood, specifically. I share information about direct observations - how hard it's raining, whether sirens are going off, wind intensity, etc." Another survey participant wrote: "In the modern age when the media is not always there for an event, it is average citizens that often step in to do the fact-finding and reporting. Being there is the key, and if accurate, vetted and/or seemingly credible information can be shared in a form like Twitter, it could be a life-saving measure." Several interview participants also noted that since most storms move from west to east through the metropolitan area, getting word of conditions to the west is often a good predictor of what is likely to come to the also heavily-populated eastern suburbs. Another common theme was the ability to get specific information from local utility MLGW on power outages as one unique element of Twitter as opposed to other information sources, and they praised the power provider for embracing this new media form and often using it to answer specific questions.

Hashtag users also shared and received more general news and information, such as warnings and watches or broader reports of especially significant areas of damage in the city, such flooding at a nearby naval base in Millington. Much of this kind of general information originated from traditional media sources, often in the form of retweets. The majority of all retweets examined, 317, shared this kind of general news and information; 180 of those retweets were of local television meteorologists or reporters, which far outpaced newspapers, with just 21 retweets. It is clear that the local independent

meteorologist running the site MemphisWeather.net has also garnered the trust of Twitter users, as he was retweeted 75 times in the sample. To a lesser degree, Twitter users also shared what they were viewing on television or reading on newspaper websites with their followers, with 46 Tweets of this nature; just 10 of those included a link to an article or other content produced by traditional media sources. Interestingly, in a comparison of retweets, traditional media sources were substantially more likely than the direct observations of other Twitters to be shared with others.

Survey and interview participants identified a number of specific reasons why Twitter was an excellent news and information source in a breaking news event. Primary among these was its real-time nature; one interviewee exemplified comments by others when she said she regularly noticed National Weather Service warnings being announced more quickly on her Twitter feed than on the television. As one survey participant wrote, “the advantage of Twitter is the speed that one can obtain information. It’s succinct and immediate that can be utilized by both media professionals and those in the community with the same purpose.” Several survey and interview participants also noted that because it can be easily used on a mobile phone, Twitter can be a more convenient source of information than the television; it can be taken on the go or into the bathroom or closet in the event people are forced to seek shelter during a tornado warning. It is also often at least temporarily useful in the event of a power outage, assuming cell phone batteries have been charged, several people noted.

Connecting with others

The secondary motivation for using Twitter during the storm was connecting with others and building a sense of camaraderie. In interviews and in the survey, respondents said that contributing to the greater good by sharing and receiving information from others gave them a sense of being connected to others in Memphis, and several said they felt a sense of safety or relief when commiserating with others by discussing their fears or other emotions during severe weather on

Twitter. When asked what the greatest advantage of using the hashtag is, one person wrote in the survey: "I feel like I have company, a community, and we are all going through something together." Another wrote: "It gives a sense of comfort to be able to talk to other people, because I am so afraid of tornados." A third said: "Twitter has a huge advantage over traditional sources because it creates more of a community. Everyone is looking out for everyone else during these severe weather events." On Twitter itself, user "ilikedesign" wrote "#memstorm has allowed me to discover some new peeps on twitter."

After sharing direct observations of what is going on in their area, the second largest category of tweets were the 212 expressing some kind of emotion, such as fear or frustration, the latter becoming particularly prevalent after many hours of storms and sirens going off nearly continuously. Although these Tweets could be characterized as simply self-expressive in nature, a close reading often suggested that users were also sharing their feelings as a way of commiserating with others. One user accompanied this kind of Tweet with links to songs mentioning rain or storms, which she began characterizing as a kind of #memstorm soundtrack. Tweets expressing emotion were also retweeted 67 times. Perhaps not surprisingly, this kind of Tweet was the largest category of all replies, with 38. People talking directly to other Twitter users thus were primarily using it for mutual reassurance. Many replies expressed concern for others or echoed concerns of others. For example, user "juliemango" wrote to user "bunnyrama:" "You stay safe. I know they are helpful, but hearing the sirens always makes me panic."

Twitter also is conducive to forming tight-knit sub-communities of people with similar interests. One interviewee described himself as a weather enthusiast and storm chaser who found Twitter useful for connecting with others with similar passions he might not otherwise have found; the searchable

nature of topical hashtags like #memstorm makes it easier to locate people previously unknown to you personally.

Having fun/telling jokes

The third most popular motivation for using Twitter during the storm stands in contrast to the others. While telling jokes was less important than sharing information or connecting with others, some hashtag users were nevertheless able to find humor in the situation to amuse themselves and their followers. As one person wrote in the survey: “I liked the humor involved with an otherwise stressful or occasionally, uneventful, situation.” The third largest number of Tweets analyzed were jokes, with 64 Tweets; jokes were retweeted 52 times and were included in 16 replies. For example, one tweet by @segmacG said “Dave Brown [local television meteorologist] just said this could last 15 hours. But I thought you had to contact a Doctor if it lasted longer than 4 hours;” this was retweeted by several others. Some joked about a storm-related drinking game; one Twitter user created a parody account with the username “memstorm” that humorously personified the storm and was often retweeted. Local meteorologists interviewed, however, were less amused; many felt that these joking Tweets lacked relevance, represented the “wrong” way to use Twitter and overloaded the system, making it harder to find useful and informative tweets during a storm.

Other: Asking questions, praising journalists, discussing Twitter itself

Finally, a few additional lesser motivations for using the hashtags were revealed in the data. Some users tagged tweets with #memstorm in order to ask for specific information from others, a form of crowdsourcing. For example, Twitter user “amphotostudio” wrote “anyone know about Sam Cooper [major local road] this morning?” Similarly, Twitter user “HueysRestaurant” wrote: “We have people concerned about Hernando. Anyone know if Hernando is going to be in any trouble at all?” When a local animal shelter was flooded, several people posted or retweeted a request for temporary help for the

pets. In all, 33 of all analyzed tweets asked a question or requested assistance, 20 were retweeted and just three replies asked a question of one specific user. In the survey, one person wrote: “I also asked for help via Twitter- our home was destroyed by a falling tree and we had no power. We needed a pet-friendly place to stay. I got answers via twitter on my phone.”

Finally, several #memstorm hashtag users discussed Twitter and/or the use of the hashtag itself, noting its ubiquity or utility or observing that it or local meteorologist Dave Brown was trending; this comprised 25 tweets, 18 retweets and 4 replies. Nine tweets, three retweets and 12 replies offered praise for local meteorologists for their non-stop coverage.

Q3 How is this new system of “ambient journalism” affecting local journalism? What kinds of ongoing role can journalists play in this increasingly participatory, always-on news environment?

This study examined what both journalists and non-journalists see as the role of local media when it comes to a community-driven breaking news reporting tool like the hashtag #memstorm. Both seemed to agree that the key ongoing function of journalism in a socially networked world is to not only to engage in reporting but also to help verify, amplify, and curate by selecting some of the best information for wider dissemination. However, at least in April 2011, journalists were primarily using Twitter and the #memstorm hashtag as just another distribution channel like any other.

Journalists

Content analysis of Tweets during the April 2011 storms seem to reveal that most journalists that had embraced the hashtag at that time were still primarily focused on a one-way, broadcast model. While this makes sense during a breaking news event when most journalists may be most focused on getting information relevant to safety out quickly, few news outlets appeared to have brought additional staffers to the task of engaging, helping to verifying others’ posts or curating . The vast majority (92 percent) of all tweets sent from journalists – both individual and organizational accounts –

broadcasted information about the storm to followers, primarily watches and warnings and other meteorological information, and occasionally direct, ground-level reports on what was going on in the area. There were 280 Tweets from journalists of this nature; nearly 70 of those came from an independent local meteorologist running his own website. Just 8 tweets during the study period engaged in crowdsourcing or asking viewers to contribute information. Journalists engaged in relatively little retweeting, with just 38 in the sample, and 31 of those were of other journalists, often those working at the same station. Broadcasters were overwhelmingly represented here, primarily television but also one local radio station, 600 WREC-AM. The Commercial Appeal newspaper and a local suburban paper tweeted as well but to a much lesser degree.

However, interviews with local broadcast meteorologists showed that thinking was beginning to evolve over time with a greater emphasis on engagement; both also mentioned the importance of building trust with followers over time, in part by having a friendly, positive and accessible online personality on sites like Twitter. One said,

I know that by doing this, I am building believers and followers. They feel like I am a safe source of information, they are getting to know me. My first priority is safety, but I'm also building the brand. I think it is crucial to show part of your personality. It's all about who you feel comfortable with. Even when we have good weather, I can be myself, help people get to know me better.

Another local television meteorologist interviewed said that more recently, people have begun tweeting him their address and he responds after looking at the radar, giving them targeted information on what to expect at their location. However, most questions are usually asked specifically of him using a @reply message and do not utilize the hashtag. Indeed, this meteorologist said he did not find much use for the hashtag at all, arguing that most of his followers are either unaware of the hashtag or not interested in searching for it or using it, and instead are just looking at their regular feed of people they follow for information. He also noted that while he was on air, he had made arrangements with another staffer at the television station to keep up the flow of tweets using his account; these tweets were

attributed by appending the other staffer's initials. "I can't correlate Twitter with ratings yet, but from my point of view, I can get information to people that want it. It has just opened up this dramatic dialogue. It's just remarkable. This is a new frontier." Another local television meteorologist said that answering viewer questions from Facebook or Twitter on air offered self-promotion and station-promotion opportunities.

It was the independent local meteorologist who runs his own website, however, who was the most focused on engagement of those interviewed; without a long-established news organization brand behind him, he said that he found it critical to utilize social media to build credibility and ultimately credited it with being a significant traffic driver to his website. He said that during a storm, he probably spends approximately 80 percent of the time broadcasting information on Twitter using the hashtag, and about 20 percent interacting; when things slow down, he switches to a 60/40 ratio. In his view, building relationships through conversation and answering people's questions on Twitter is the best way to develop credibility and establish himself as an expert. "I realized there was a real possibility to take this information and make it two-way," he said.

Although journalists did not appear to be taking a lot of advantage of the crowdsourcing potential of the hashtag beyond some general calls to send them storm-related photos for use on the web or on air, local meteorologists did note the advantage of being able to connect with a community of other experts on Twitter. In many cases, having digital contact with other professionals to the west is valuable in an east-moving storm. One also noted that Twitter offers a rich additional layer of on-the-ground information that weather reporting stations cannot logistically provide.

Non-journalists

When asked about the role of journalists in utilizing a hashtag like #memstorm in a breaking local weather event, both interviewees and survey respondents suggested the primary role is twofold:

helping to verify information in a fast-moving situation, and engaging the audience through two-way communication. However, a few people did also see Twitter as more of a traditional distribution channel to complement existing ones, such as one survey respondent, who wrote “journalists should just keep giving updates on [Twitter].”

In a comment echoed by several others, one survey respondent suggested that journalists needed to do a better job of embracing the two-way nature of the medium to build a greater sense of community and credibility. The respondent wrote: “Journalists can participate by interacting. If they aren’t interacting and just dishing out 140-character bites of news, the advantage is gone and the viewer might as well be reading a news app or watching the weatherman flip his wig. The talkback factor is invaluable.”

One interviewee, a heavy Twitter user who runs a local marketing firm, said in a comment also echoed by others,

The TV stations in New York are now saying, Tweet us a question, and we will ask it on air. I’ve been telling media here, you know, just use Twitter to ask questions and use Twitter to get information you need. Clearly [journalists] are needed. Clearly their jobs are not going away. Clearly they have the responsibility to report non-biased, factual, checked-out, verified information, but that doesn’t mean they have to break [news] all the time. Their job has to be, we may not be first all the time, but we have to be right. Somebody make break that Whitney Houston died, unconfirmed, because they may know it somehow, but that’s okay, the media has to be okay with that, they have to be, we are trying to verify.

Another interviewee remembered a time when an unusual, tornado-like cloud moved across the Mississippi River into downtown Memphis; Twitter exploded with people using the hashtag to post photos and comment on what looked like a potentially ominous situation. The independent local meteorologist was able to quickly assess from the radar that the cloud was not, in fact, a tornado, and offer some reassurance and disconfirmation on Twitter, highlighting the role established members of the local media ecosystem can play, even independent, non-traditional ones.

Indeed, when asked if there were any disadvantages of Twitter, the overwhelmingly majority of interview and survey respondents mentioned the possibility of misinformation, again suggesting that journalists have a role to play in verifying facts and pointing out possible inaccuracies. However, several people said they felt that most Twitter users were generally savvy about ferreting out rumors. One local television meteorologist said that while journalists play a key role in checking out information before spreading it, others do this as well:

I'm the one that goes and searches it up, finds the answer, and then plugs the answer into the equation. But I think people on Twitter...they are going to investigate it first before [retweeting], because your name is on the line, if I retweet something, they are looking at you going, you moron, why did you retweet that if it has no merit to it? So I think the savvy Twitterati are able to justify things.

And indeed, in some cases non-journalists also have a role in debunking weather-related rumors. When Memphis experienced major flooding in May of 2011, a vague tweet by two nurses that suggested that Methodist Hospital was flooding spread rapidly on Twitter, one interviewee recounted. In fact, the nearby Wolf River was overrunning its banks but the hospital itself was fine; the tweet was probably not intentionally misleading but simply imprecisely phrased, he said. The interviewee was contacted by somebody who works in public relations at Methodist who knew him as an avid Twitter user; he contacted another local Twitter user with a large number of followers and local influence and together, they were about to shut down the rumor by letting others know the hospital was fine, he said.

Discussion

Through a multi-faceted examination of how and why community members and journalists utilize the #memstorm hashtag as a breaking news reporting tool during severe weather, this study confirms the rising importance of Twitter as a real-time news and information source and, more broadly, on sheds light on how people are motivated to use social networks to participate in the news process by contributing their own accounts of what is being observed on the ground. This study thus provides further grounding for a concept Hermida (2010) describes as “ambient journalism:” news today is all

around us, but we are not merely passive recipients; through sites like Twitter, citizens are producing small amounts of content that, taken together, are a form of journalism that helps the community maintain awareness of important developments. Participants in this study were highly motivated to participate in activities once primarily reserved for reporters: Documenting and broadcasting newsworthy information. The majority of all tweets analyzed in the sample included direct observations, often accompanied by photos or occasionally videos, of everything from downed trees blocking roads to intense winds and other things that residents witnessed.

In interviews and the survey, study participants also noted the utility of getting this immediate, geo-targeted information from fellow community members about what they could expect when the storms hit their neighborhoods, the kind of information television broadcasts cannot provide at scale in a large metropolitan area. Several participants said they felt they could trust their neighbors as much or more as journalists; for example, one interviewee said, “We are not trained meteorologists. But it had gotten to the point where the traditional media is driven to be sensational. If you have a neighbor or a friend somewhere upstorm who is level-headed, and you know them, if they say, we have quarter-inch hail, you know it really is.” As Singer et. al. (2012) noted in their book about participatory journalism, the audience can now be characterized as “active recipients” (178) of news, engaged not only in consuming news but also in actively contributing to it and communicating with one another.

Results confirmed that Twitter users also use the hashtag as a source for immediate information from more traditional sources of news, particularly local meteorologists. The largest number of retweets in the sample were of information, such as watches and warnings, provided by local news organizations. Twitter also provides opportunities for new media players to establish themselves as subject-matter experts; a local meteorologist running an independent website was retweeted approximately 75 times, second only to local television journalists, and was frequently mentioned in interviews as being an

authoritative source of information on Twitter; in an interview, the local meteorologist credited his active use Twitter as well as Facebook in establishing his credibility in the community and driving traffic back to his site.

Intertwined with this desire to share one's observations for the good of the community was a feeling of connection #memstorm hashtag users said they felt during the storm. This study also reveals how Twitter and particularly the use of a common, searchable hashtag can fulfill not only the need for information but need for connection with others (Thorson and Duffy, 2006), which the study showed is heightened during a potentially threatening situation in which people are seeking comfort and reassurance. As boyd, Golder and Lotan (2010) found, Twitter users are engaged in a distributed conversation with each other; even the act of retweeting without comment invites others into the conversation. Survey and interview respondents said that while clearly not everybody in Memphis was on Twitter, they felt a sense of community with other hashtag users and enjoyed commiserating with them during the storm. The second-highest category of tweets in the content analysis involved people expressing fear, exhaustion, or another emotion; in addition to the gratification of simply expressing themselves, respondents indicated that knowing others had similar feelings and frustrations offered a sense of camaraderie. As one survey respondent wrote in a comment echoed by others:

Sure. #memstorm just like other Memphis hashtags brings the Memphis twitter community together. We have something in common, and it allows us to feel connected. We share stories, photos, happenings at the moment. I think it brings a continuity to the city we haven't had before. No matter what race, religion, economic status - if you're on twitter, it doesn't matter. All the users see is a name. It's hard to judge and dismiss someone based on that alone.

Another form of community documented in the study is a substantial number of tweets and retweets using the hashtag to tell or share jokes. Humor can help bring people together in an online community, although not all may appreciate it. In interviews, local meteorologists in particular said that often these tweets can clog the stream and prevent more important information from being seen; as a result, in March 2012 they suggested using a new hashtag, #mspotter, for weather enthusiasts and

those engaged only in reporting key details and facts about the storm. This tag would prevent extraneous conversation and non-relevant information from getting in the way, they argued.

Finally, this study sheds light on the ongoing role for journalists to not only distribute content on new platforms but also, more importantly, to verify information, facilitate community connections by engaging directly with readers, and tap into the wisdom of the crowd to enhance their reporting. Survey and interview respondents overwhelmingly identified misinformation as one of the greatest risks of Twitter during a breaking news event, and suggested the most important role for journalists to play would be to confirm or disconfirm rumors and help bring expert voices to bear on the situation.

This study confirmed earlier research (Messner et. al. 2011; Greer & Ferguson, 2011) suggesting that most journalists use Twitter primarily for broadcasting instead of engaging and/or crowdsourcing. However, interviews with journalists showed that this may be beginning to change; for example, one local meteorologist now actively responds to viewers on Twitter, often answering their specific questions. The independent local meteorologist has also made engagement with others on Twitter a top priority and credits this with enhancing both credibility and web traffic.

The primary limitation of this study is a relatively low number of responses for the survey and the lack of a randomized sample; those willing to take the time to take this survey may be more motivated or dedicated hashtag users. Despite a wide distribution network and several attempts to solicit participants using the hashtag as well as the cooperation of local media in sharing the study, just 33 surveys were returned. However, because several of the survey questions asked respondents for open-ended responses, the data gathered were still remarkably rich in nuance, and when combined with interviews, detailed, long-form responses were received from over 40 people. Further research with funding for incentives for participants is needed.

References

- Albarran, A.B. Dyer, C, Hutton, B, Valentine, A. (2010). Social media and young latinos: A cross-cultural examination. Presented at the Association in Journalism and Mass Communication conference, Denver, CO.
- Ahmad, A. (2010). Is Twitter a useful tool for journalists?. *Journal Of Media Practice*, 11(2), 145-155. doi:10.1386/jmpr.11.2.145_1
- boyd, d. Golder, S., and Lotan, G. (2010). Tweet Tweet Retweet: Conversational Aspects of Retweeting on Twitter. *Proceedings of HICSS-43*. Kauai, HI January 5-8. <http://www.danah.org/papers/TweetTweetRetweet.pdf>
- Chen, G.M. (2011). Tweet this: A uses and gratifications perspective on how active Twitter use gratifies a need to connect with others. *Computers in Human Behavior*, 27(2), 755-762.
- Crawford, K. (2009). Following you: Disciplines of listening in social media. *Continuum: Journal of Media & Cultural Studies*, 23(4), 525-535.
- Farhi, P. (2009). The Twitter Explosion. *American Journalism Review*. Retrieved on February 19, 2012 from <http://www.ajr.org/Article.asp?id=4756>.
- Ferguson, D. A., & Greer, C. F. (2011). Local radio and microblogging: How radio stations in the U.S. are using Twitter. *Journal Of Radio & Audio Media*, 18(1), 33-46. doi:10.1080/19376529.2011.558867
- Greer, C. F., & Ferguson, D. A. (2011). Using Twitter for promotion and branding: A content analysis of local television Twitter sites. *Journal Of Broadcasting & Electronic Media*, 55(2), 198-214. doi:10.1080/08838151.2011.570824
- Hermida, A. (2010). Twittering the news. *Journalism Practice*, 4(3), 297-308. doi:10.1080/17512781003640703
- Hermida, Alfred. (2010). From TV to Twitter: How Ambient News Became Ambient Journalism. *M/C Journal*, 13 (2).
- Heverin, Thomas, and Zach, Lisl. (2010). Microblogging for Crisis Communication: Examination of Twitter Use in Response to a 2009 Violent Crisis in Seattle-Tacoma, Washington Area. *Proceedings of the 2010 ISCRAM Conference*. Seattle, Washington.
- Howell, A. (2011, April 27). "Community-driven hashtag tells the Memstorm story." Retrieved December 14, 2011 from <http://howell-marketing.posterous.com/community-driven-hashtag-tells-the-memstorm-s>

- Hughes, A.L., and Palen, L. (2009). Twitter Adoption and Use in Mass Convergence and Emergency Events. Proceedings of the 2009 ISCRAM Conference.
- Johnson and Yang. (2009) Uses and Gratifications of Twitter: An Examination of User Motives and Satisfaction of Twitter Use. Presented at the Association for Journalism in Education and Mass Communication in Boston, MA.
- Kulicke, H. (2011). Seeking Success for Newspapers in the Social Media Marketplace. *Editor & Publisher*, Retrieved March 11, 2012 from <http://www.editorandpublisher.com/Features/Article/Seeking-Success-for-Newspapers-in-the-Social-Media-Marketplace>
- Lariscy, R. W., Avery, E. J., Sweetser, K. D., & Howes, P. (2009). An examination of the role of online social media in journalists' source mix. *Public Relations Review*, 35(3), 314-316.
- Mathison, S. (1988). Why triangulate? *Educational Researcher*, 17(2), 13-17.
- Messner, M., Linke, M., & Eford, A. (2011). Shoveling tweets: An analysis of the microblogging engagement of traditional news organizations. Paper presented at the International Symposium on Online Journalism, Austin, TX.
- Morris, M.R., Counts, S., Roseway, A, Hoff, A. and Schwarz, J. (2012). Tweeting is Believing? Understanding Microblog Credibility Perceptions. CSCW.Seattle, WA February.
- Naaman, M., Becker, H, and Gravano, L. (2011). Hip and Trendy: Characterizing Emerging Trends on Twitter. *Journal of the American Society for Information Science and Technology*, 62
- O'Dell, J. (2010). Twitter celebrates 100 million new accounts in 2010. *Mashable*. Retrieved March 4, 2011 from <http://mashable.com/2010/12/09/twitter-vips-2010/>
- Pepitone, J. (2010). Twitter users not so social after all. *CNN Money*, retrieved March 23, 2012 from http://money.cnn.com/2010/03/10/technology/twitter_users_active/index.htm?section=money_latest
- Pew Project for Excellence in Journalism. (2011). State of the media report. Retrieved March 4, 2011 from <http://www.stateofthemediamedia.org/2011/>
- Ruby, D. (2010) "Twitter and Facebook are for news, MySpace is for leisure," *Chitika Research* <http://chitika.com/research/2010/twitter-and-facebook-are-for-news-myspace-is-for-leisure/>
- Singer, J.B., Hermida, A., Domingo, D, Heinonen, A., Paulussen, S., Quandt, T, Reich, Z, & Vujnovic, M. (2011). *Participatory Journalism: Guarding the Open Gates at Online Newspapers*. Malden, MA: Wiley-Blackwell.
- Smith, A. (2011). Twitter Update. Pew Research Center. Retrieved March 23, 2012 from <http://pewinternet.org/Reports/2011/Twitter-Update-2011.aspx>
- Smith, A, and Rainie, L. (2010). "Who Tweets?" *Pew Research Center*. Retrieved March 4, 2011 from <http://pewresearch.org/pubs/1821/twitter-users-profile-exclusive-examination>
- Smith, B. (2010). Socially distributing public relations: Twitter, Haiti, and interactivity in social media. *Public Relations Review*, 36(4), 329-335.

- Steinfeld, N. & Lampe, C. (2007). The benefits of Facebook “friends:” Social capital and college students use of online social network sites. *Journal of Computer-Mediated Communication*, 12 (4), 1143-1168.
- Sysomos, Inc. (2010). Twitter statistics for 2010. Retrieved March 4, 2011 from <http://www.sysomos.com/insidetwitter/twitter-stats-2010/>
- Thorson, E., & Duffy, M. (2006). A needs-based theory of the revolution in news use and its implications for the newspaper business (Technical report). Columbia: University of Missouri –Columbia, Reynolds Journalism Institute at the School of Journalism.
- Urista, M., Dong, Q., Day, K. (2009). Explaining why young adults use MySpace and Facebook through uses and gratifications. *Human Communication*, 12 (2), 215-229.
- Webster, T. (2010). Twitter usage in America: 2010. Edison Research/Arbitron Internet and Multimedia Study. Retrieved March 4, 2011 from http://images.publicaster.com/ImageLibrary/account2782/documents/Twitter_Usage_In_America_2010.pdf
- Yin, R.K. (2003). *Case Study Research: Design and Methods*. Sage.

Appendix A: Twitter code book

Non-journalist

Is the Tweet...

Witnessing – direct observations of what is going on around them

Passing on news or information

- Includes link
- From television
- From newspaper
- Undetermined source
- From National Weather Service or independent weather source

Making a joke

Expressing fear or emotion/commiserating with others

Asking a question/crowdsourcing

Other

Is the Retweet...

Witnessing – direct observations of what is going on around them

Passing on news or information

- Includes link
- From television
- From newspaper
- Undetermined source
- From National Weather Service or independent weather source

Making a joke

Expressing fear or emotion/commiserating with others

Asking a question/crowdsourcing

Other

Is it a response to another person

Response to a journalist

Witnessing – direct observations of what is going on around them

Passing on news or information heard from another source, e.g. the television

Making a joke

Expressing fear or emotion/commiserating with others

Asking a question/crowdsourcing

Journalist

Is the Tweet...

News and information

Making a joke

Expressing fear or emotion/commiserating with others

Asking a question/crowdsourcing

Is the Retweet...

Witnessing – direct observations of what is going on around them

Passing on news or information heard from another source, e.g. the television

Making a joke

Expressing fear or emotion/commiserating with others

Asking a question/crowdsourcing

Is it a response to another person

Response to another journalist

Passing on news and information

Making a joke

Expressing fear or emotion/commiserating with others

Asking a question/crowdsourcing

Appendix B: Interview Questions

To get started, tell me a little bit about how you used Twitter during the storm.

- What kinds of information did you share with others using the hashtag?
- What kinds of information did you get from others using the hashtag?
- How much did you interact with others in the community using @replies or Direct Messages during the storm? What tends to prompt you to interact with somebody?

How did you initially find out about the #memstorm hashtag?

What do you find to be useful or valuable about Twitter during an event like a major storm?

What kinds of drawbacks or challenges do you see from using Twitter during an event like a major storm?

Do you think Twitter has any advantages/disadvantages over more traditional sources of news and information?

Did you also follow/interact with any journalists working for local media organizations on Twitter who were also using the hashtag during the storm? If so, was their use of Twitter helpful to you? What do you think is the role of journalists in situations like this? What could journalists do that might add value to the community in situations like this?

Do you think Twitter has changed in any way how citizens of Memphis interact or how they think about their community?

Any other thoughts you would like to share?

Appendix C: Survey Questions

Please see:

<https://docs.google.com/spreadsheet/viewform?formkey=dDEzb0gyd0hvc3RaV19iSHp3Rmt6RIE6MQ>