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Foreword: Debanalising Twitter: The Transformation of an Object of Study

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Published in:
Twitter and Society

Link to publication

Citation for published version (APA):
Rogers, R. (2014). Foreword: Debanalising Twitter: The Transformation of an Object of Study. In K. Weller, A. Bruns, J. Burgess, M. Mahrt, & C. Puschmann (Eds.), Twitter and Society. (pp. ix-xxvi). (Digital Formations; No. 89). New York: Peter Lang.

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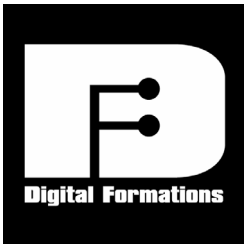
TWITTER AND SOCIETY



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Vol. 89

The Digital Formations series is part of the Peter Lang Media and Communication list.
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TWITTER AND SOCIETY

Edited by Katrin Weller, Axel Bruns,
Jean Burgess, Merja Mahrt, & Cornelius Puschmann

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Library of Congress Cataloging-in-Publication Data

Twitter and society / edited by Katrin Weller, Axel Bruns,
Jean Burgess, Merja Mahrt, Cornelius Puschmann.
pages cm. — (Digital formations; vol. 89)
Includes bibliographical references and index.
1. Twitter. 2. Online social networks. 3. Internet—Social aspects.
4. Information society. I. Weller, Katrin, editor of compilation.
HM743.T95T85 2 006.7'54—dc23 2013018788
ISBN 978-1-4331-2170-8 (hardcover)
ISBN 978-1-4331-2169-2 (paperback)
ISBN 978-1-4539-1170-9 (e-book)
ISSN 1526-3169

Bibliographic information published by **Die Deutsche Nationalbibliothek**.
Die Deutsche Nationalbibliothek lists this publication in the "Deutsche
Nationalbibliografie"; detailed bibliographic data is available
on the Internet at http://dnb.d-nb.de/.

Cover art:
Klee, Paul (1879–1940): *Twittering Machine* (*Zwitscher-Maschine*), 1922.
New York, Museum of Modern Art (MoMA).
Watercolor, and pen and ink on oil transfer drawing on paper, mounted on cardboard.
DIGITAL IMAGE ©2012, The Museum of Modern Art/Scala, Florence.

The paper in this book meets the guidelines for permanence and durability
of the Committee on Production Guidelines for Book Longevity
of the Council of Library Resources.

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29 Broadway, 18th floor, New York, NY 10006
www.peterlang.com

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Debanalising Twitter

The Transformation of an Object of Study

FOREWORD Richard Rogers

three major phases of Twitter development, from stat.us to Twitter, Inc. #socmedhistory

This is an enquiry into how Twitter has been studied since it was launched in 2006 as an ambient friend-following and messaging utility, modelled after dispatch communications. As Jack Dorsey, the Twitter co-founder, phrased it, Twitter also did rather well during disasters and elections, and subsequently became an event-following tool, at once shedding, at least in part, its image as a what-I-had-for-lunch medium. Most recently, Twitter has settled into a data set, one that is of value for Twitter, Inc. and is also archived by the Library of Congress. Each of these objects, described here as Twitter I, Twitter II, and Twitter III, has elicited particular approaches to its study, surveyed below. In the following I take each object in turn, describing the debates and scholarship around them, and provide a framework to situate past, current, and future Twitter research.

INTRODUCTION: TWITTER STUDIES

Founded by Jack Dorsey and associates in San Francisco in 2006, Twitter brought together two subcultures, new media coding culture as well as radio scanner and dispatch enthusiasm. Together they informed what could be called first-generation Twitter (or 'Twitter I'), an urban lifestyle tool for friends to provide each other with updates of their whereabouts and activities (Akcora & Demirbas, 2010). In an early sketch, maintained on Dorsey's dormant Flickr account, the service is called stat.us (see Figure 1). The sketch has two in-built options, "in bed" and "going to park", and the current status is "reading" One is able to watch a user change states, in a sense 'tracking' or following the user's updates like tracking a courier package.

Dorsey's description of the sketch on Flickr also contains the compact name of the service, Twttr, which is in keeping with dispatch and courier messaging protocol. It is a five-digit short code that would comply with the cellular administration of an SMS messaging service, which Twitter is designed to work with. The delivery constraints of text messages provided the rationale for the length of a Twitter message, or tweet, as it has come to be known. With SMS, the message breaks in two after 160 characters, and two messages are sent. It was decided to work within the limits of the one message of 160 characters; 20 were reserved for the name space, and the other 140 characters for the message. The required brevity has spawned growth in URL shortening services, which themselves have grown shorter, from *tinyurl.com* to *bit.ly* and Twitter's own *t.co*.

Twitter's historical roots rely often on Dorsey's own telling. It was conceived as part of a long line of squawk media, dispatch, short messaging, as well as citizen communications services. Dorsey's genealogy of Twitter refers to communications systems for bicycle messengers, truck couriers, emergency services, ambulances, firetrucks, and police. He also mentions GPS, citizen band (CB) radio, as well as Research In Motion's proto-BlackBerry (the RIM 850 interactive pager), for which he wrote a script to batch post to a friend list. Dorsey also recalls a visualisation he made before stat.us that captures the output of radio scanners, and shows on a city map the flows of emergency communication in the city. It demonstrates interest in scanner culture, and has affinity with early locative media art projects. In a two-part interview for the *Los Angeles Times* published in 2009, and in other interviews and public appearances, Dorsey touched on the lineage of the project, at once trying to define Twitter as a new medium in itself, a public instant messaging system. The system was meant to be device and (proprietary) platform independent, thus eschewing the walled

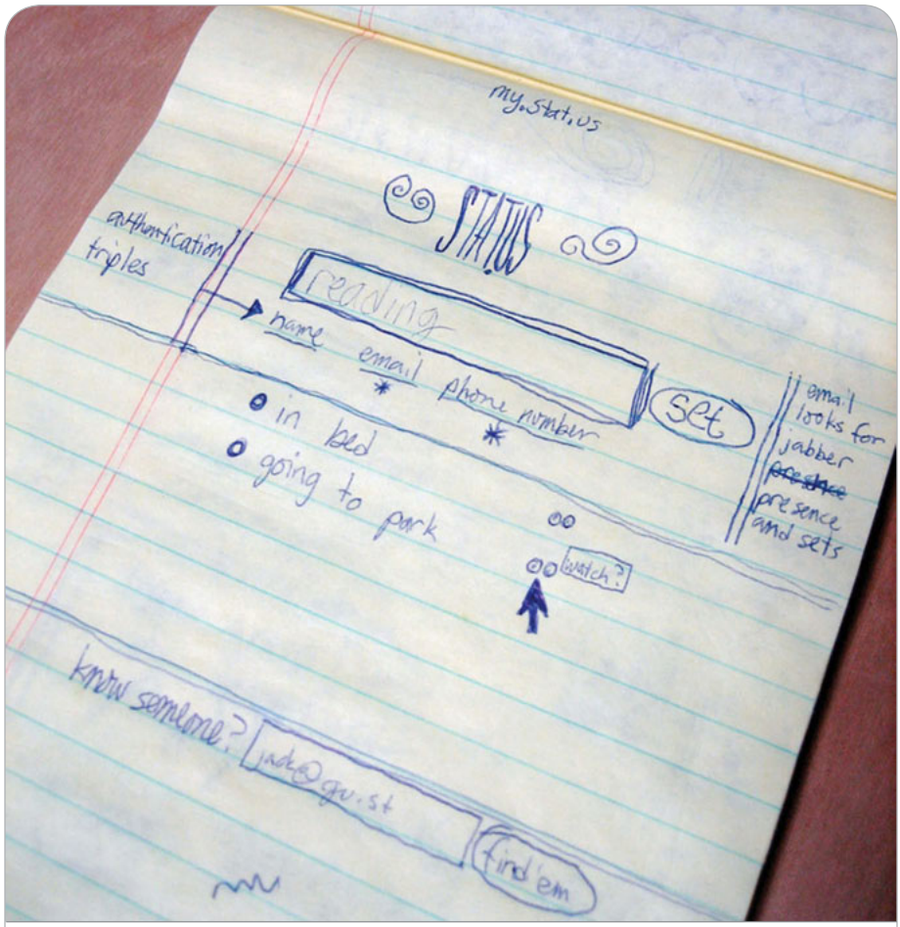

Figure 1: "twttr sketch" by Jack Dorsey, 2000. Source: http://www.flickr.com/photos/jackdorsey/182613360/ (Dorsey, 2006)

garden model and desiring to be a public information utility. It also is a "new take on the address book", as Dorsey put it. "When I'm visiting New York, I turn on my New York friends just because I'm more interested in their particular interruptions" (Sarno, 2009b). While a universal messaging system, Twitter in that sense was conceived and used also as an ambient, friend-following tool.

One other aspect of the origins story of Twitter is of special interest. The name of the service would try to capture "the physical sensation that you're buzzing your friend's pocket", and after a "name-storming" session resulted in 'twitch' and 'jitter', a dictionary search around *tw* ended with 'twitter' (Sarno, 2009a; Truong, 2011). Twitter means both *bird calls*, as well as "a short burst

of inconsequential information" (Sarno, 2009a). The bird which serves as the image for the brand points to the idea of tweets as inconsequential chirpings: a typical early perspective on Twitter I. But from here we move to Twitter II, which is less about ambient friend-following and inconsequential tweets than about event-following and tweets that matter. Dorsey:

> The whole bird thing: bird chirps sound meaningless to us, but meaning is applied by other birds. The same is true of Twitter: a lot of messages can be seen as completely useless and meaningless, but it's entirely dependent on the recipient. (Sarno, 2009a)

The transformation of dispatch and scanner culture into friend status updates could inform Twitter origins stories (Fincham, 2007; Kidder, 2009). The sketches, founder interviews, as well as early Twitter taglines demonstrate imagined uses that are mundane and everyday, yet also intimate. Up until November 2009, the question Twitter posed to its users was, "What are you doing?" In a sense, the question and answers inform the discourse and early study of Twitter as mundane or banal, on the one hand, and highly personal on the other. Twitter studies and reflections by bloggers have come to describe these functions in terms such as 'ambient intimacy' and 'connected presence'.

There are also stories to be told about unintended uses, or how Twitter was adopted differently from how Dorsey envisaged it. Because friends were to follow status updates of friends, there was no organisation of topics built in; users furnished symbols that caught on, such as the hashtag. The @mention marker is a second example of user innovation. Both have been attributed to having roots in Internet Relay Chat culture (Akcora & Demirbas, 2010). From 2006 to early 2009, Twitter remained virtually the same, though it is difficult to study the evolution of its interface, for it has excluded itself from the Internet archive.

TWITTER I: TOWARDS AN AMBIENT, FRIEND-FOLLOWING MEDIUM

In much Twitter research, the software's origins as an urban, mobile lifestyle tool for friends were largely lost, in a sense, to the etymology of the service name, and the inconsequentiality more generally of tweets. Marketing firm Pear Analytic were among those to study the meaning of tweets, finding them of scant interest (Kelly, 2009). The focus turned to their banality. The BBC news headline about the study read: "Twitter tweets are 40% 'babble'" (BBC News, 2009). The firm manually categorised some 2,000 tweets over a two-week period. As became the norm in Twitter research, they conceived of a series of tweet types, begin-

ning with the senseless: Tweets that were 'pointless babble', that is, of the "I'm eating a sandwich" type. The other categories of tweets were 'conversational', of 'pass-along value', 'self-promotional', and 'spam', where those of pass-along value (and thus of particular informational interest) were estimated at under 9 per cent of the total.

Indeed, characterising tweet types, determining how many of them are of value, and evaluating Twitter as more or less interesting content became the focus of the early studies. Java, Song, Finin, & Tseng (2007) characterised most tweets as "daily chatter", and in a sense, also showed that the other types of tweets were not built into the design and relied on subsequent innovations. "Conversations" on Twitter were beginning to take place, owing to the use by early adopters of the @ symbol for replies to a particular user (Honeycutt & Herring, 2009). "Sharing information" concerned commenting on URLs, which required shortening. The fourth category, "reporting news", also prompted user innovation; the # symbol caught on in Twitter when users reported about the San Diego fires in 2007, with #sandiegofire (Sutton et al., 2008).

How to consider Twitter as substantive (and thus worthy of serious use and study)? Or does it only offer the banal? The daily chatter discussed by Java et al. (2007) was illustrated with a tweet: "Off to get some dinner before everything shuts down" (p. 1). Dorsey himself, in the *Los Angeles Times* interview, joined the conversation about what has become known euphemistically as 'food tweets': "Why would I want to join this stupid useless thing and know what my brother's eating for lunch?" (Sarno, 2009b). Two years later he would come to defend that particular usage: a tweet about breakfast is "extremely meaningful to my mother", he said (Truong, 2011). The preponderance of "food tweets" and the more general "mindless stream" emanating from Twitter were the source of multiple news reports, in an analysis of the coverage of Twitter's first three years (Arceneaux & Schmitz Weiss, 2010). It noted how one of the more significant contributions, from trade magazine *Advertising Age*, questioned the value of tweets:

> The amazing thing is that enough people out there think this mindless stream of ephemera ('I'm eating a tangerine', 'I'm waiting for a plane', 'I want a Big Mac') is interesting enough to serve as the basis for a viable advertising platform. (Arceneaux & Schmitz Weiss, 2010, p. 1271)

What value lies in breakfast and lunch tweets? Twitter may not be about imparting great meaning and serious information, beyond breakfast and lunch eating habits. (One reads rather less about dinner tweets.) But geo-located food tweets may be of interest to those studying the geography of taste and other

questions of cultural preference. For example, Edwin Chen (2012), a Twitter data scientist, studied geo-tagged tweets for regional variation in language use in the USA, comparing where people employ the words *soda*, *pop*, and *coke*. The work contributes to a series of similar studies about regional language use, yet substitutes methods of survey and interview with so-called unobtrusive data capture (McConchie, n.d.). Here Twitter becomes de-banalised, and serves as a means to study cultural conditions.

The focus on Twitter as small talk has reoriented the study of new media away from the informational. How to study the social Web, or Web 2.0, now that it has come to dominate over the info-Web, or Web 1.0? People connect socially through small talk, without passing along meaningful information, as Bronislaw Malinowski (1923) described in what he called phatic communion. People communicate in order to relate to one another, to connect, and to establish or maintain a bond. After quoting from Malinowski's classic study, Vincent Miller (2008), in his piece on the phatic culture of social media, referred to this short message: "eating a peanut butter-filled corny dog dipped in queso. mmmmmmm breakfast" (p. 387). To Miller, Twitter (along with other social media) should be studied as a space where neither the dialogue nor the information exchange is the primary object of scrutiny.

Twitter is also not the space for the study of debate and the deliberative process, as new comment and conversational spaces online have been treated. Information that is worth passing along is in the minority on Twitter, as was found. Twitter and other social media should be analysed as spaces or platforms (the newer term) of so-called 'networked sociality' (Gillespie, 2010; Wittel, 2001). Defending a literary tradition of media, or reintroducing the old and new media divide, Miller (2008) is critical of the ascendency of Twitter and other social media, where "content is not king" (p. 395). The main purpose is keeping in touch. Doing so has its online specificity, somewhat different from the exchanges Malinowski (1923) described: "How do you do?" "Nice day today." "Ah, here you are." Rather, the connection is made both with and without words. "The point of Twitter is the maintenance of connected presence, and to sustain this presence, it is necessarily almost completely devoid of substantive content" (Miller, 2008, p. 396). Apart from small talk, one has connected presence when showing an available state, such as being visibly online in the chat feature of Facebook or on Skype. With social media, people are able to maintain what is referred to as ambient or digital intimacy (Reichelt, 2007).

Twitter is studied not only as banal and phatic. It also could be viewed as shallow media, in the sense that it favours the present, the popular, and the

ephemeral. Tweets appear in reverse chronological order, so Twitter has genre characteristics of a blog (albeit with character limits: hence the term *microblog*). It is also part of the real-time Web (or Internet), in the sense that the updates continue to be refreshed. The display of messages has been described as a "stream" (Naaman, Boase, & Lai, 2010). Its privileging of the latest has only grown over time, and it has become more ephemeral. The number of days that old tweets were available was once 20, and subsequently 15 and then 7. In a sense, ephemerality was built in. For its first few years, Twitter contained no search, so stepping back in time meant manual scrolling.

Tweeting banally has its consequences, for one may be unfollowed. Indeed, how to tweet well, authentically, and attractively have become objects of study. Kwak, Chun, & Moon (2011) studied why people unfollow others on Twitter, using a South Korean data set. Those who outpoured (many tweets in a short period), or were dull and tweeted about life's trivial details tended to be unfollowed. Similar findings have been made about unfriending on Facebook, although there are other reasons to be unfriended. Those who post frequently about "unimportant", "polarising", and "inappropriate" subject matters are more likely to leave a Facebook friend than for so-called offline reasons, such as an altercation (Sibona & Walczak, 2011).

Friends on Facebook and followers on Twitter are distinctive, however. Here is how Dorsey put it in an interview, employing the old term 'watching', which was later replaced by 'following':

> The important consideration [is] that on Twitter, you're not watching the person, you're watching what they produce. It's not a social network, so there's no real social pressure inherent in having to call them a "friend" or having to call them a relative, because you're not dealing with them personally, you're dealing with what they've put out there. (Sarno, 2009a)

Indeed, in another study of what they described as the entire Twittersphere of some 41 million user profiles and 106 million tweets in 2009, Kwak, Lee, Park, & Moon (2010) found that Twitter is not particularly 'social'. That is, it does not have the characteristics of a social network, for among other reasons there is low reciprocity in following. This lack of sociality on Twitter prompted the researchers to characterise it as news media, where users broadcast or narrowcast to followers.

Perhaps rather than social circles, Twitter users have audiences. Marwick and boyd (2011) complicated the idea of Twitter as only banal, phatic, or shallow media by introducing the notion of the audience of a user's tweets, and referring to the phenomenon of micro-celebrity. Follower numbers are dis-

played prominently on one's profile page. Large numbers are status symbols, and one's influence or "klout" (as a popular, third-party metric is called) is measurable. Like A-list bloggers, there are A-list Twitter users, but also influencers on smaller scales. Marwick and boyd (2011) discussed the notion of the networked audience, which has elements of the writer's audience (readers, in the minds of the writers) and the broadcast audience (quantities of viewers, for advertising), but new traits, too. For example, Twitter users may ask their followers questions. They may read their audience's inter-exchanges in the web of followers around theirs.

TWITTER II: TOWARDS A NEWS MEDIUM FOR EVENT-FOLLOWING

In November 2009, Twitter's tagline changed. The question Twitter users were asked had been "What are you doing?" It became "What's happening?" To David Crystal, the linguist and author of *Txting: The gr8 db8*, the change signified a move from an ego to a reporting machine (Tate, 2009). Twitter studies were still focussed on the ego machine. Indeed, it has been found that "80% of Twitter Users Are All About Me", as the *Mashable* headline read just prior to the tagline change (Van Grove, 2009). In studying 350 users, Naaman et al. (2010) made more fine-grained the scholarly characterisations of tweets, and many of the nine types they derived concentrate on what one could call 'me-tweets'. In their tweet type classification, note that the banal has been subdivided into many kinds, and that there is really only one tweet type—"information sharing"—that could be considered 'news'.

Twitter's tagline change could be interpreted as an internal shift, as well as a nudge for both users and researchers to consider information sharing tweets. Another co-founder of Twitter, Biz Stone, discussed Twitter's new purpose when the trending topics feature was introduced in April 2009. It is a state-of-affairs machine, or "discovery engine for finding out what is happening right now" (Stone, 2009). Dorsey, whose vision for Twitter usage always appeared to be more in the area of ambient intimacy, did aver that the service did "well at: natural disasters, man-made disasters, events, conferences, presidential elections", or what he calls "massively shared experiences" (Sarno, 2009b). For it to be a machine for media events (as massively shared experiences are sometimes called), and for it to take that role from television, an argument should be made about its significance in a specific event.

The South by Southwest conferences in 2007 and 2008 in Austin, Texas, established Twitter as an event backchannel, a kind of gossip machine for commenting on what one thinks of speakers' talks (McCarthy & Calore, 2008). Twitter use at conferences would be standardised with a conference hashtag, which attendees would use and watch; speakers would be ranked according to mention frequency, showing how each trends (Ebner & Reinhardt, 2009; Ebner et al., 2010). Early Twitter studies often listed the events when Twitter was considered impactful: the San Diego fires (as mentioned); the Sichuan earthquake in May 2008; the Mumbai terrorist attacks in November 2008; James Karl Buck's arrest in Egypt in 2008; and the Hudson River landing of a US Airways jet in January 2009, a story which broke on Twitter (Arceneaux & Schmitz Weiss, 2010).

Andrew Sullivan, the American A-list political blogger, made an allusion to Twitter as a revolutionary machine, when he wrote in reference to the street demonstrations in Iran after the presidential elections of June 2009 that "The Revolution Will Be Twittered", as opposed to televised (Sullivan, 2009). That headline appeared on 13 June, a day after the elections, and on 15 June, Ari Berman (2009), blogging at the revered, left-of-centre publication *The Nation*, entitled his posting, "Iran's Twitter Revolution". Evgeny Morozov, at the time working on his book *The Net Delusion: The Dark Side of Internet Freedom*, strove to debunk the idea of Twitter as revolutionary machine (Morozov, 2009, 2010). His were arguments informed by the scholarly study of the history of technology, and in particular the critique of viewing machines as driving history. Leo Marx and Merrit Roe Smith (1994) summed up such a line of thought with examples: "'the automobile created suburbia.'. . . 'The mechanical cotton-picker set off the migration of southern black farm workers to northern cities.' 'The Pill produced the sexual revolution'" (p. xi).

Discursively, Twitter was being fit into a lineage of revolutionary technologies, like the Xerox photocopier and the fax machine from Soviet times, or the mobile phone and text messaging in the colour revolutions. Morozov critiqued Clay Shirky, whose *Here Comes Everybody* engenders optimism about social media as a democratising force, in a sense being a version of machines driving history. Morozov: "'Tehran's "collective action cascade" of 2009 feels like Leipzig 1989,' tweeted Clay Shirky, new media's favorite cheerleader" (2009, pp. 10–11). Shirky and Morozov would come to debate one another, and in the exchange, Morozov (2010) introduced a phenomenon accounting for why Twitter cannot drive the revolution: "authoritarian governments—those in Belarus, China and Moldova are good examples—are increasingly relying on what is known as 'event-based internet filtering,' whereby they turn off mobile coverage". Jack

Dorsey described Twitter as a service doing well with events, where "a lot of [the] people are not sitting in front of a laptop screen—they're typing from their phone" (Sarno, 2009b). But that is when it is not shut down. Morozov's arguments are also informed by new media user studies, and especially the myth of user-generated content, where very few are responsible for the great majority of content (van Dijck, 2009). In Iran, those very few responsible for Twitter content Morozov finds nearly irrelevant:

> Pro-Western, technology-friendly and iPod-carrying young people . . . are the . . . most frequent users of Twitter. They are a tiny and, most important, extremely untypical segment of the Iranian population (the number of Twitter users in Iran—a country of more than seventy million people—was estimated at less than twenty thousand before the protests). Whatever they do with Twitter may have little relevance to the rest of the country, including the masses marching in the streets". (Morozov, 2009, p. 12)

Morozov also did not appreciate what Sullivan and Berman saw (or digitally witnessed) in Twitter (Morozov, 2009). In a variation on Andrew Keen's argumentation about the decline of quality in journalism and in letters more generally because of the Web, Morozov reported that the traditional media are not in Iran, and can no longer afford to report there. Instead, we must rely on nameless bloggers and other online reporters. So, "what Andrew Sullivan is 'seeing' might be radically different from what is actually happening" (Morozov, 2009, p. 11). No longer only the ambient intimacy machine, Twitter was becoming a news source, replacing old media (however regrettably) when information was shared from the ground. Berman (2009) wrote: "some absolutely riveting and thrilling reporting has been done over Twitter".

Refashioning Twitter as new object of study (what I refer to as 'Twitter II'), researchers took up the project of de-banalising Twitter by identifying new tweet types, and a new purpose, similar to Dorsey's discussion of where and when Twitter has done well (events, disasters, and elections). Tweet characterisation would become rather different from making distinctions about the multiple forms of banality (plus information sharing). Researchers also used the markers in the tweets to create significant collections (hashtags), and to order them (retweets) so as to tell the story of the events on the ground and online. Tweet collections by researchers also caught the attention of Twitter, Inc., which at once banned their sharing, and announced that all tweets would be made available in an archive at the Library of Congress. I return to studying Twitter as archived object in the conclusion.

In Twitter Studies II, the research framework would move away from the implications of ambient intimacy to the value of accounts from the ground

and from online for event-following. In the critical study of Twitter as quality source, there are the questions of accuracy and professionalism in reporting of which Evgeny Morozov wrote. The larger question, more in the realm of political science, is also the issue of the significance of Twitter for the so-called revolution. The call for revolution, or at least for shouting from the rooftops, was reported by Andrew Sullivan in his 13 June 2009 blog posting: "ALL internet & mobile networks are cut. We ask everyone in Tehran to go onto their rooftops and shout ALAHO AKBAR in protest #IranElection" (Sullivan, 2009). The revolutionary tweet, as it might be called, was posted by @MirHossein Mousavi; Mousavi lost the election to the standing president, Mahmoud Ahmadinejad, a day earlier. Street protests erupted. Mousavi's Twitter account posted the news that the Internet and mobile coverage were down, and that people should take to the rooftops. Here we note Morozov's admonition about relying on Twitter, social media, and the Internet for uprisings. Note, too, the hashtag contained in the tweet, #IranElection. It became a means to follow the action, and also one to demarcate a set of tweets in order to study the events, and the content of the 'Twitter revolution', or at least the Iran election crisis both online and on the ground. The first study of Iran election-related tweets appeared some two weeks after the election, on 26 June 2009, subtitled "The First Eighteen Days" (Hwang, 2009). It criticised the use of the term 'Twitter revolution', joining many others whom the authors list, including Evgeny Morozov and Clay Shirky. It also outlined a technique to make a tweet collection, using multiple hashtags related to #iranelection, or those other hashtags that appear in tweets containing #iranelection. Further, it adds to the data the results of key word queries in Twitter search (then a new feature). Relying on a single hashtag, #iranelection, misses much of the discourse:

> The number of tweets using hashtags other than #iranelection amount to 1,166,765 messages, or 57.6% of the total set accumulated in our study (a significant portion of the discourse that other studies ignore when focusing solely on #iranelection). (Hwang, 2009, p. 3)

Generally, the researchers concentrated on the characteristics not of the revolution but of the conversation, as they call it, with a description of the users and their relative contributions, including activity measures. They also discuss influential users and contents retweeted most frequently, pointing to a method to order tweets for the purposes of evaluating Twitter users' contributions to event-following.

How to employ retweets in order to debanalise Twitter? Indeed, two research projects, at Rensselaer Polytechnic Institute (RPI) and the Digital Methods

Initiative (DMI) at the University of Amsterdam (where I contributed), examined in some detail the tweets which used the hashtag #iranelection (Gaffney, 2010; Rogers, Jansen, Stevenson, & Weltevrede, 2009). Both examined how to make use of "retweets of interest" (Gaffney, 2010, p. 6). As Berman (2009) pointed out in his "Twitter Revolution" blog posting on 15 June 2009, the accounts of events from Twitter, however sourced, were compelling, and prompted the DMI project to consider how to transform the 'retweets of interest' into a story of the events of June 2009 (Rogers et al., 2009). Can Twitter be made into a storytelling machine that recounts the events on the ground and on Twitter? The result of our efforts, "For the ppl of Iran—#iranelection RT" is a collection of some 650,000 tweets containing the hashtag #iranelection, from 10 to 30 June 2009. The top three retweets per day were captured and ordered by retweet count (see Figure 2). All sets of retweets were placed in chronological order, as opposed to the reverse chronological order of Twitter and blogs more generally. The story of the events unfolds through retweets over the course of the twenty days: Mir-Hossein Mousavi holds an emergency press conference; the voter turn-out is 80%; Mousavi's website and Facebook page are blocked; police are using pepper spray; Mousavi is under house arrest, and declares he is prepared for martyrdom; Neda is dead; there is a riot in Baharestan Square; Bon Jovi sings "Stand by Me" (in Farsi) in support; Ahmadinejad is confirmed the winner, and a last tweet in the collection reads "light a candle for those who have died". In the retweets, one takes note of many of the main storylines discussed above that mitigate Twitter's role in the 'revolution', and detail is offered about how the users reacted. There is the suspicion of infiltration and the call for an act of solidarity to change one's user location to Iran. The Internet is filtered,

Figure 2: Segment of 'For the ppl of Iran—#iranelection RT.' Top 3 retweets per day, of tweets with #iranelection hashtag, 10–30 June 2009, in chronological order. Source: Rettiwt.net, Digital Methods Initiative, Amsterdam, 2009

and subsequently proxies and anonymisers are offered. There is violence in the streets, and first aid as well as digital witnessing pointers are given. In a sense, it is a space which aids events—as other researchers have found in their studies of natural disasters (Bruns & Liang, 2012).

CONCLUSION—TWITTER III: TOWARDS (ARCHIVED) DATA SET AND ANTICIPATORY MEDIUM

Once considered a source of "pointless babble" about one's lunch and a backchannel for interacting at an event (while speakers held presentations and listeners remarked), Twitter increasingly has come to be studied as an emergency communication channel in times of disasters and other major events, as well as an event-following and aid machine for revolution and uprising in the Middle East and beyond. More recently it has settled into a data set, from which researchers have made collections, and one to be archived and made available by the U.S. Library of Congress. Twitter III is thus being studied as data, which requires both contractual access as well as technical infrastructure to take in the tweets, store them, and analyse them. Twitter has an array of access points (so-called firehoses and sprinklers from its own API), intermediary commercial collection vessels (Gnip and DataSift), and analytical tools which are often used for Web data analysis more generally (such as the network visualisation software, Gephi). Twitter is particularly attractive for research, owing to the relative ease with which tweets are gathered and collections are made, as well as the inbuilt means of analysis, including retweets for significant tweets, hashtags for subject matter categorisation, @replies as well as followers-followees for network analysis, and shortened URLs for reference analysis. Given its character limit and the fact that each tweet in a collection is relatively the same length, it also lends itself well to textual analysis, including co-word analysis (Marres & Weltevrede, 2013). Additional avenues of Twitter analysis have recently opened that take up the invitation made by Biz Stone (and Twitter more generally) to follow meaningfully what is happening, for example by making a list of subject matter or domain knowledge experts (or concatenating and/or triangulating those of others) so as to capture their tweets, and study the evolution of an issue area according to "professional communities of practice" (Turoff & Hiltz, 2009).

There are issues with Twitter as a data provision machine. Twitter was conceived (by Dorsey and associates) as ephemeral, whose users, if we take Dorsey as an avant-garde case, are not thought to be "obsessive about going all the way

back in time and catching every single message that people have updated about" (Sarno, 2009b). Owing to issues of scale as well as resources, there are limited quantities of tweets available per user, per hashtag, etc., without special access privileges. As with other Internet or new media data sets, one is often required to be employed by or within the walls of the corporate research lab in order to have access to larger data sets, including longitudinal ones. For example, it was the Twitter data scientist Edwin Chen who conducted the study on regional variation in the use of words such as *soda*, *pop*, and *coke*. As boyd and Crawford (2011) pointed out in their influential paper concerned with big data science,

> During his keynote talk at the International Conference on Weblogs and Social Media (ICWSM) in Barcelona on 19 July 2011, Jimmy Lin—a researcher at Twitter—discouraged researchers from pursuing lines of inquiry that internal Twitter researchers could do better given their preferential access to Twitter data. (p. 13)

Moreover, Twitter, Inc. trades in the so-called data market, and its evolving terms of service and dealings with third parties are increasingly distinguishing between 'good' Twitter data and the black market for data, which could be construed as the research collections made by other means and shared (Puschmann & Burgess, 2013).

Twitter, however, is to be archived by the Library of Congress, and made available for research purposes. As is now customary in Twitter studies, someone brought up the value of sandwich tweets: the first comment posted on the FAQ page of the Library of Congress's Twitter project reads, sarcastically, "it's critical the future generations know what flavor burrito I had for lunch" (Raymond, 2010). Of interest here are the implications of studying Twitter, once it becomes an archived object. The archived tweets under study will be at least six months old, which creates a gap in longitudinal work between the number of days' worth of tweets available currently via Twitter, and those aged six months or more. Of greater interest, perhaps, will be the difference in query and storage environments between an online Twitter (and its hoses and sprinklers), and the archived Twitter. The Library of Congress has already indicated that Twitter the archived object will no longer be Twitter the online service. As the Library's 2013 White Paper on the Twitter Archive put it, "currently, executing a single search of just the fixed 2006–2010 archive on the Library's systems could take 24 hours" (Library of Congress, 2013, p. 4). Gnip, the social media data supplier and partner with Twitter and the Library of Congress in creating the tweet delivery software for the archive, is separately selling historical tweets, from the very first (by Jack Dorsey) on 21 March 2006 onwards. The Historical PowerTrack API documentation provides insights into Twitter as

archived object, and the types of research which are precluded, given certain characteristics of the data. For example, geo-location is not available for tweets prior to 2011, and all tweets older than those have the user's profile information from September 2011 (Gnip, 2013). One avenue of inquiry for Twitter studies is thus the difference between the Library of Congress's services for academic researchers and those of Gnip and others.

Sifting through the enquiries made by researchers to the Library of Congress also provides an opportunity to reflect further on the purpose of studying Twitter. Many include studying what Dorsey described as when Twitter does well: natural and man-made disasters as well as elections. Other proposals highlighted by the Library of Congress are the tracking of flu epidemics on Twitter (recalling Google Flu Trends) and stock market prediction, testing Twitter's capacity as anticipatory medium—which is perhaps a new calling for the platform (Meier, 2013).

ACKNOWLEDGMENTS

Thanks to Anne Helmond and Natalia Sanchez for comments on an earlier version of this piece, presented at the Digital Methods Winter School, Media Studies, University of Amsterdam, January 2013. A longer version is published in the *Proceedings of the WebSci'13 Conference*, 2–4 May, Paris. New York, NY: ACM.

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