Social Media and Journalism during Times of Crisis

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Introduction

Around lunchtime on 22 February 2011, the New Zealand city of Christchurch – the country's second largest city – was hit by a magnitude 6.3 earthquake. Built on a geological faultline, like Los Angeles and Tokyo, Christchurch is no stranger to tremors; indeed, it had experienced a magnitude 7.1 quake just months before, in September 2010, and technically, this new earthquake was no more than an aftershock of the earlier tremor. That earlier quake had caused significant structural damage, but no fatalities, but the February earthquake was different: with its epicentre located no more than ten kilometres from the Christchurch city centre, at a depth of only five kilometres, it proved considerably more destructive – and it affected buildings whose structural integrity had already been severely compromised by the September quake, in the middle of a weekday when schools and city offices would have been fully occupied. While the full death toll has yet to be determined, it is estimated at close to 200.

Both recent Christchurch quakes form part of a string of major natural disasters experienced during 2010 and 2011: from the earlier September quake to the widespread flooding of several Australian states during the first weeks of 2011, through to the February earthquake in Christchurch and the magnitude 9.0 earthquake off the northeast coast of Japan on 11 March, which triggered a massive tsunami and a meltdown at the Fukushima nuclear power plant. An aspect common to each of these crisis events is the role that current leading social media platforms – *Facebook* and *Twitter*, in particular – played in first spreading the word about these breaking news stories, and then in helping to organise the disaster response, and this is what we will examine in detail in this chapter. What our analysis will highlight is the role of social media as an adjunct to and an amplifier of journalistic reporting, but also as a substitute for conventional, professional journalism especially in the immediate aftermath of a disaster, when journalists themselves have yet to arrive on the scene; additionally, we will also see a marked shift in attention after the first few days, as the interest of the world media in the event begins to subside and longer-term, local issues come to take centre stage once again.

Our analysis here builds especially on a set of very recent, still emerging research methodologies: what the availability of social media content through well-defined application programming interfaces (APIs) also enables is a large-scale, data-driven analysis of user activities on social media platforms that begins with a quantitative exploration of the patterns that emerge from the data, followed by a further in-depth qualitative study of key moments or of the roles of central participants.

Overview

Such work is part of a broader turn towards data-driven analysis in media and communication studies, which Richard Rogers, the founder of the *IssueCrawler* project which provides an important early tool for the study of network structures on the World Wide Web, has described as using "natively digital methods", rather than relying only on existing research methods which have been adopted from previous use in offline contexts. Rogers proposes "a research practice which grounds claims about cultural change and societal conditions in online dynamics, introducing the term 'online groundedness'" (2009: 5). This is not to say that more conventional methods do not continue to have an important role to play, of course – however, the 'natively digital' methods which Rogers highlights build more directly on the technological affordances of the online medium and can provide important and very detailed new insights.

In our present context of examining the role of social media in the immediate aftermath of a major disaster, such work also addresses a number of long-standing other themes in media and journalism research. Since the emergence of what we now call user-generated content (UGC), and especially with the development of a special form of UGC, citizen journalism, during the late 1990s and early 2000s, the debate about user-generated reporting and commentary and its relationship to professionally, industrially produced news has continued; contributions to the discussion have ranged from a wholesale dismissal of citizen journalists as 'armchair experts' to utopian visions in which user-generated journalism would replace conventional news organisations altogether.

From a more balanced perspective, what is indisputable is that user-generated news and commentary – at first in the form of dedicated alternative news Websites like *IndyMedia* (Meikle, 2002) and news blogs (Bruns, 2006), but more recently also through more or less orchestrated group efforts in social media spaces – has now established itself within the overall media ecology of the news; some key sites (from the Korean *OhmyNews* to the US-based *Huffington Post* to the Australian *Crikey*) have even become important news organisations in their own right. This loose and by no means unified alliance of alternative news sites and spaces has been described by some scholars as forming a new fifth estate (Dutton, 2009) – or more modestly, Estate 4.5 (Singer, 2006) –, and inherent in this description is a realisation that for the most part, such alternative, largely amateur operators are unable to engage in a significant amount of first-hand reporting; they usually have neither time nor resources to be at the scene of major events or announcements. Rather, they form what Herbert Gans (1980) foresaw as a second tier of news organisations: a group of media watchdogs which critiques and comments on the content and performance of the more mainstream first tier of professional news agencies.

Their practice in doing so can be described as a form of gatewatching (Bruns, 2005), in distinction from conventional journalistic gatekeeping: where journalists, editors, and proprietors in the journalism industry have traditionally been seen as able to select from the sum total of the day's news events only those stories which they deemed suitable or important to report to their audiences – so that 'all the news that's fit to print' also meant 'all the news we think you need to know' –, their alternative counterparts have based the core of their practices on *watching* the information that passes through the gates of the first tier of news organisations (but also through those of first-hand sources like government departments, NGOs, research institutes, thinktanks, and others), and on collating and curating that information in a way that provides new insights for their readers. In doing so, of course, they benefit from the vastly greater access to primary and secondary information sources which the Internet has enabled – which is why alternative news media based on such gatewatching practices have blossomed only over the past decade.

But while gatewatching is a core practice of this second tier of individuals and groups who comment on the news in online spaces, first-hand reporting is also occasionally possible for them: at times when they find themselves – deliberately or by accident – at the centre of major unfolding events. This was one of the aims of the original *IndyMedia* project – set up to provide alternative reporting from the streets of Seattle during the World Trade Organisation meeting (and the associated counterculture protests) which took place there in 1999 (Meikle, 2002; Bruns, 2005) –, and remains important in many other protest situations, from the documentation of public opposition to the 2003 invasion of Iraq to the coverage of political unrest in Tunisia, Egypt, Yemen, Libya, and Syria during the early months of 2011; at other times, however, individuals simply find themselves, purely by chance, at the right (or wrong) place at the right time: in lower Manhattan during 11 September 2001, in downtown London during 7 July 2005, or indeed in the Christchurch city centre on 22 February 2011. In such moments, even simply to take a photo or post a brief status update from the scene can become a "random act of journalism" (Lasica, 2004): it documents the unfolding event and – in combination with similar activities from other bystanders – becomes an important source of information for authorities and the wider public alike.

Additionally, during the late 1990s and early 2000s such first-hand reporting may still have been somewhat difficult – individuals would have needed access to the appropriate technology for capturing their impressions from the event (including photos or videos), as well as to the tools and platforms for dissemination, *and* they

would have to have had the necessary technology literacy to use these tools to get the message out. Today, however, developments in hand-held technologies (most centrally, the mobile phone), the ubiquity of mobile and wireless networks, and the rapid adoption of social networking platforms have meant that reports, images, and videos from an event can now be shared widely and instantaneously (unless, of course, the very communications infrastructure itself has been severely affected by the disaster). With *Facebook* claiming a total userbase of some 600 million (Williams, 2011) worldwide, chances are that any significant natural or human-made event – and certainly any event affecting a developed nation – will affect at least a considerable number of social media users, too; each of these users, in turn, becomes a potential citizen journalist providing first-hand reports from the scene, even without necessarily being aware of that fact.

Alfred Hermida points to this fact when he describes *Twitter* as a platform for "ambient journalism" (2010):

> ambient journalism presents a multi-faceted and fragmented news experience, where citizens are producing small pieces of content that can be collectively considered as journalism. It acknowledges the audience as both a receiver and a sender. I suggest that micro-blogging social media services such as Twitter, that enable millions of people to communicate instantly, share and discuss events, are an expression of ambient journalism. (n.p.)

As Alex Burns (2010) points out in his response to Hermida, published in the same issue of *M/C Journal*, this form of journalism is also 'ambient' in the same way that the style of music initiated by Brian Eno is ambient: it remains in the background, almost at the edge of perception, for most of the time, but draws in its audience at particular key points, receiving their full attention. *Twitter* – and social media more broadly – as ambient journalism does so, too: for the most part, we may experience social media simply as a platform which is used to stay in touch with friends and acquaintances, near or far, and to exchange updates on any conceivable topic, at irregular intervals – but when a major story breaks, our (and most everybody's) attention becomes focussed on the reports shared about that event.

While both *Twitter* and other social media spaces can operate in this way, it is nonetheless important also to note a number of key differences between them – and in particular perhaps between *Twitter* and the major other international social media platform, *Facebook* (other major social media spaces, such as the Chinese *QQ*, are also of great importance, of course, but remain more regionally focussed). *Facebook* is built more strongly around established social networks (of family, friends, friends of friends, etc.), which affects how widely information posted to the site is visible and is able to travel: unless users have made their accounts publicly visible for all of *Facebook* and beyond, their posts will usually only be able to be seen by already established contacts. *Twitter*, on the other hand, has a simpler and more open structure: on the one hand, only one form of relationship exists ('following' the updates of another user), and on the other, only one privacy setting is available (updates are either visible *only* to one's approved followers, or they are *fully* public to all *Twitter* users as well as published to the Web beyond *Twitter* itself).

Further, *Facebook* has more sophisticated discussion functions – almost any post to *Facebook* can be 'liked' and commented upon by other users, and lengthy discussion threads, attached to the original post, can result from this. *Twitter* initially had no built-in discussion threading system at all; it was its *users* who initiated the @reply system by which (nonetheless public) updates can be brought to the attention of their intended target. Even this simply provides a means of addressing another user, however, and does not constitute a formal system for organising discussion threads in the full sense of the term. The simplicity of its underlying information architecture can also be seen as an important advantage of the *Twitter* platform, however, as it enables open and distributed group discussions to form *ad hoc* and quickly.

To further facilitate and coordinate such discussions, *Twitter* users have also introduced the #hashtag convention, which sees them include a brief topical keyword or abbreviation, preceded by the hash symbol '#', in each update. Such hashtags then enable *Twitter* users to search for and follow the entire hashtagged conversation, rather than subscribing to the updates (related or not) of all participating users; indeed, to follow the hashtag discussion it is not even necessary to be a *Twitter* user at all, since hashtags can be

searched for from the main *Twitter* Website as well. Additionally, tweet responses to the discussion which carry the correct hashtag will themselves be visible to all participating users, regardless of whether these users already follow the sender or not.

More so than *Facebook* conversations, then, where widespread visibility is uncertain and established social network connections are required for individual posts to be seen by others, hashtag groups on *Twitter* provide an open, flexible, and quickly established platform for the group discussion of shared themes; these advantages are especially important where conversations respond to and track breaking news and unfolding events. Unsurprisingly, substantial discussion in hashtag communities has been observable for virtually any major event in recent years – from major sporting tournaments such as the 2010 football World Cup to key cultural events like the Academy Awards, from political crises to natural disasters.

The same is true for the Christchurch earthquake, of course; during the September quake, the #eqnz hashtag (short for 'earthquake New Zealand') emerged as the central coordinating mechanism for tweets about the quake, and the same hashtag was used again when the major aftershock hit in February. In the analysis that follows, then, we will examine in detail how *Twitter* was used in the immediate and intermediate aftermath of the February tremor, and to what extent we can identify any evidence for the use of *Twitter* as a form of ambient journalism in the process.

Analysing #eqnz

Gathering hashtag data from *Twitter* is a comparatively simple process – not least of course because of the use of the #eqnz hashtag itself. A number of research tools are available which will simply capture any tweet made under a specific hashtag; in recent times, perhaps the best-known of these has been *Twapperkeeper.com*, a Website that enabled its users to submit specific hashtags (or even non-hashtagged keywords) for archiving, and which would make the archived data available to all users. While in late 2010 *Twitter* reacted against this open accessibility of tweet archives, and forced *Twapperkeeper* to severely curtail its functionality, an open source version of the tool, *yourTwapperkeeper* (*yTK*), is now available for internal use within research groups and organisations, and such internal use remains compatible with *Twitter*'s current interpretation of its terms and conditions. It should be noted in this context that *yourTwapperkeeper* archives only those tweets which are publicly available (excluding those from accounts set to private) – but even this does not exempt researchers from considering the ethical implications of their further research activities (such as the profiling of individual users, which may be possible when processing the data).

The datasets collected by *yTK* contain both the individual tweets themselves and a range of further metadata, including for example the username and internal *Twitter* numerical ID of the originating user, their geolocation (if available – though only a very small percentage of users provide such information with their tweets), and the exact timestamp of the tweet itself. Additional metadata can be extracted from the tweets themselves: for example, we may identify any hashtags contained in the tweet that are additional to the central hashtag around which the dataset was created, or extract the names of any users that a tweet is replying to. Indeed, *yTK* data may contain two specific forms of such replies: on the one hand, the conventional @reply, in the form of

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Hey @user, have you heard about the earthquake in Christchurch? #eqnz
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and on the other hand, a retweet of another user's message, to which the retweeting user may also have added further commentary:

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Can anyone confirm? RT @user Major earthquake in Christchurch... #eqnz
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The latter format simply constitutes a special form of @reply, in which the letters 'RT' (retweet) are prefixed to the name of the user whose original message is being shared; for most of *Twitter*'s existence to date, such retweets represented the main way of sharing other users' updates. More recently, *Twitter* introduced a new style of retweet, using a 'retweet button' which was implemented on its Website and in most major *Twitter*

software clients; these 'new-style' retweets share the original message verbatim, and do not enable retweeting users to add their own comments to the message. At present, *yourTwapperkeeper* does not capture such retweets, and they are therefore not included in the dataset we are examining here; many *Twitter* users continue to use old-style retweets, however (especially where they wish to add their own comments to the message, of course), and such 'manual' retweets *are* included. Indeed, with the introduction of verbatim 'button' retweets it is likely that remaining old-style retweets are *increasingly* used for this more discursive form of retweeting – since any messages which may be passed along verbatim might just as easily be retweeted using the button.

Fig. 1, then, presents an overview of general tweeting patterns within the #eqnz hashtag. There is an immediate spike following the earthquake, unsurprisingly, as *Twitter* users share the news and retweet one another's messages about the event; both directly affected locals as well as – most likely – a larger number of more remote *Twitter* users shocked by the early reports will be involved here. Activity peaks on this first day at nearly 7,500 tweets per hour (or more than two tweets per second), resulting in a considerable volume of tweets in total; this immediate interest declines markedly over the following days, however, reducing to levels of no more than several hundred tweets per hour after the first four days. This level of activity is also linked to the number of unique users participating in the hashtag discussion, of course: while during 22 Feb. 2011, more than 21,000 users tweeted to #eqnz, by 25 Feb. less than 4,300 participants remain. (This indicates the level of global attention or – less charitably – online rubbernecking that widely reported disaster events receive; similar patterns can also be observed for other natural and human-made disasters.)
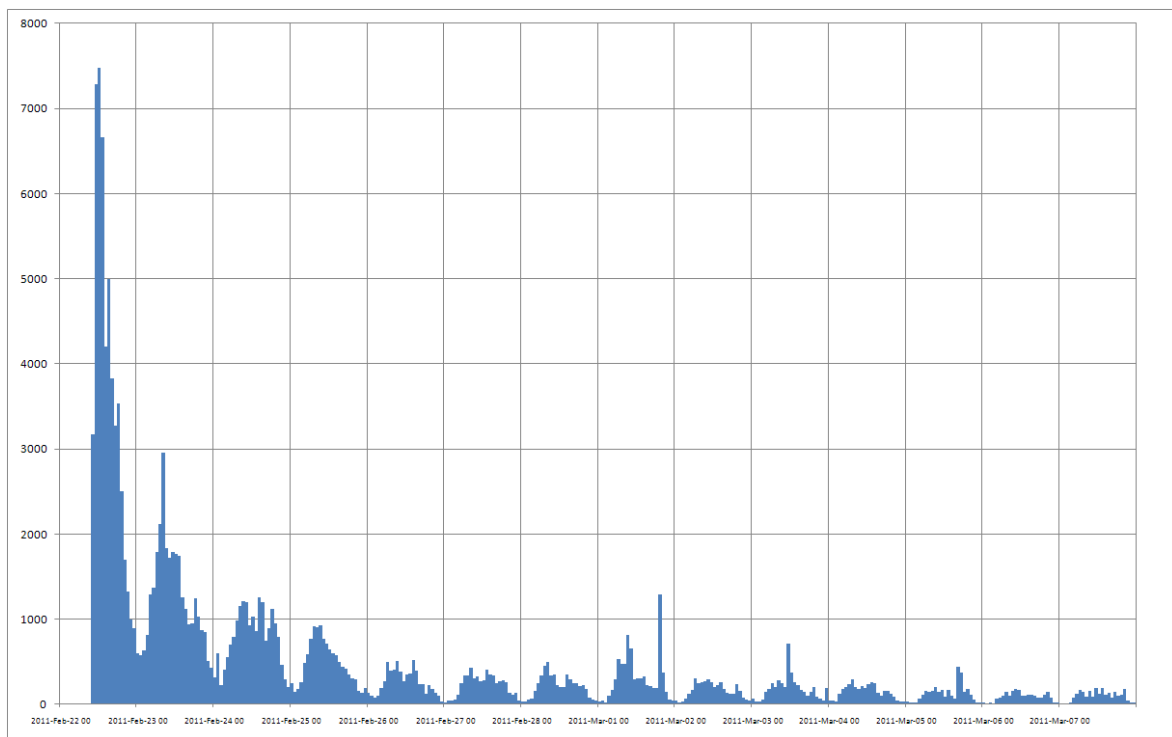

Fig. 1: number of #eqnz tweets per hour, 22 Feb. to 7 Mar. 2011

Additionally, there are also marked differences in what type of tweet is prevalent during these phases: during the early days of the disaster, retweets dominate #eqnz, as fig. 2 indicates: of the nearly 53,000 tweets made during the first day of the crisis (or more precisely, the first half-day, since the earthquake itself struck around lunchtime), over sixty per cent are (manual) retweets; this percentage declines to below fifty per cent for the first time six days later, on 28 February. This is a clear indication that the first days of the event are predominantly concerned with sharing information, and using *Twitter* as one element of overall information

management efforts; during later stages, it may be assumed that those users left within the #eqnz discussion constitute the central core of the community affected by or addressing the earthquake and its aftermath, and that they will already be well connected to most major sources of information, so that mere information dissemination becomes less important here.
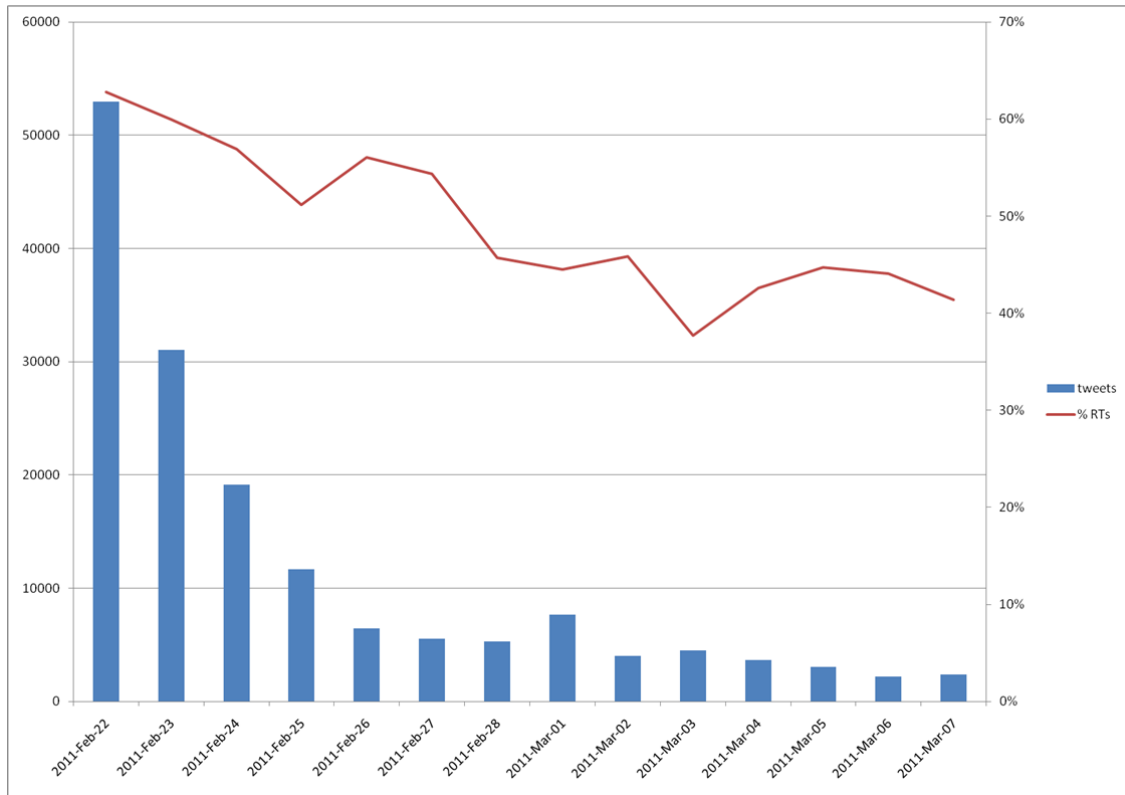

Fig. 2: number of #eqnz tweets per day and percentage of retweets, 22 Feb. to 7 Mar. 2011

Beyond the mere volume of *Twitter* activity which is evident for the #eqnz hashtag, however, it is valuable to examine how the attention of the #eqnz community is distributed across different sources and participants. In the first place, the distribution of @replies (including manual retweets) provides a very useful indicator of what *Twitter* users discussing the Christchurch earthquake paid attention to: @replies (a significant percentage of which were retweets, possibly with additional comments) represent a response to a previous tweet, thereby signifying not only that the replying user found the earlier message interesting, but even that it was interesting enough to reply to.

Fig. 3 indicates a familiar pattern of attention distribution across the *Twitter* accounts participating in #eqnz: a handful of key accounts are complemented by a greater number of more secondary information sources. The *Twitter* account of the newspaper *NZ Herald* emerges as the clear frontrunner over the entire period we are examining here, and a number of other media organisations (including the newsroom account of Australian Broadcasting Corporation, ABC, which also extensively covered this event in Australia's close neighbour) also appear in somewhat less central positions. Additionally, there is a well-developed system of *Twitter* accounts by emergency authorities, including @CEQgovtnz (the New Zealand government's Canterbury Earthquake authority; Canterbury is the region in which Christchurch is located) as the second most replied-to account, the Christchurch City Council account, New Zealand Civil Defence and the NZ Red Cross, and two utilities – mobile phone providers Telecom NZ and Vodafone NZ – are also featured. The latter appear especially because their warnings to use the mobile telephone network only sparingly (and with a preference for SMS messages rather than voice phonecalls) were widely retweeted in the immediate aftermath of the earthquake.
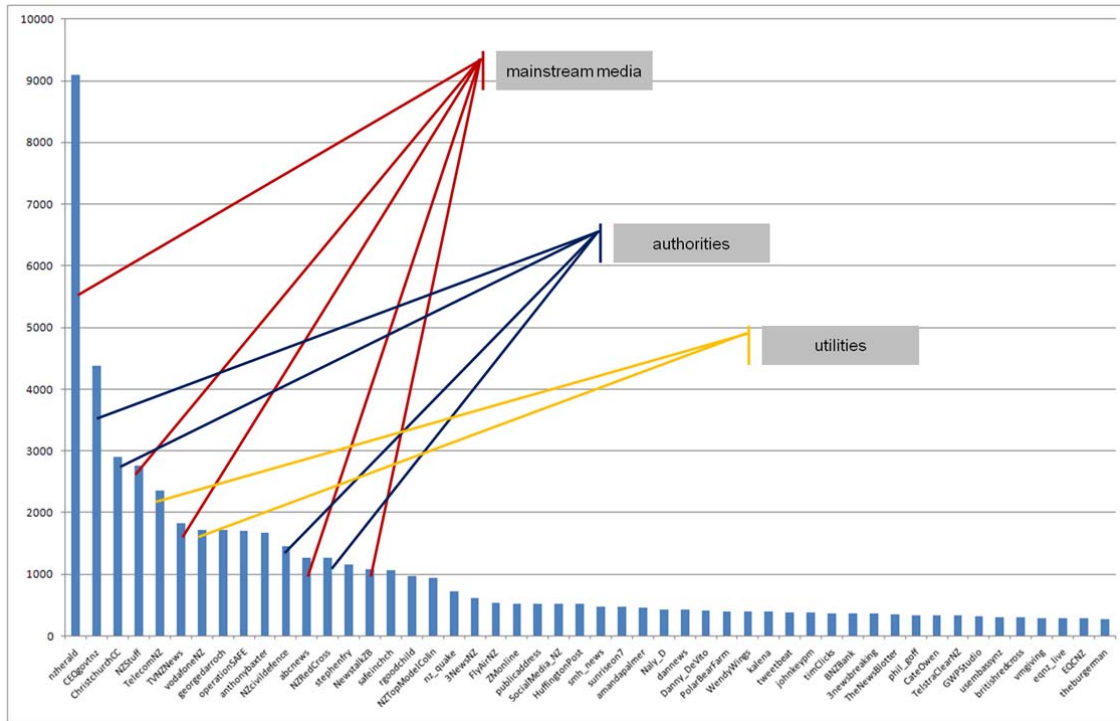
Fig. 3: #eqnz Twitter accounts receiving the most @replies (including retweets), 22 Feb. to 7 Mar. 2011

Given the marked changes in #eqnz activity over time which we have already identified from the overall volume of tweets and retweets in these first two weeks following the February earthquake, however, these overall trends may obscure a more diverse day-to-day picture. Fig. 4 breaks down this overall ranking of users according to the number of @replies they received, into two (admittedly somewhat arbitrarily selected) periods: tweets made *before* 25 February 2011, in the immediate aftermath of the disaster, and tweets made *after* that date. Naturally, given the higher total volume, @reply numbers for the first period are significant higher; more importantly, though, the focus of #eqnz's attention, as indicated by which accounts receive the most replies, has clearly shifted by the time the second period starts.

before 25 Feb.		after 25 Feb.	
nzherald	6239	CEQgovtnz	3439
NZStuff	2045	nzherald	2631
TelecomNZ	1882	ChristchurchCC	2070
anthonybaxter	1648	operationSAFE	918
vodafoneNZ	1576	NZStuff	711
georgedarroch	1514	nzcivildefence	545
TVNZNews	1386	NewstalkZB	475
abcnews	1240	TelecomNZ	459
stephenfry	1137	NZRedCross	451
safeinchch	967	NZTopModelColin	398
CEQgovtnz	927	nz_quake	375
NZcivildefence	802	vmgiving	286
operationSAFE	784	eqnz_live	281
ChristchurchCC	781	rgoodchild	260
NZRedCross	777	3NewsNZ	219

Fig. 4: #eqnz Twitter *accounts receiving the most @replies (including retweets), before and after 25 Feb. 2011*

Where during the first period, media organisations like *NZ Herald* and *NZ Stuff* dominated, along with retweeted messages from the utilities and a number of key individuals providing first-hand updates from the scene, after 25 February there is a substantial shift in attention to the emergency authorities. The Canterbury Earthquake authority (@CEQgovtnz) as well as the Christchurch City Council (@ChristchurchCC), @operationSAFE (which provided a series of widely retweeted tips for parents in helping their children cope with disaster, but might at times have engaged in activities bordering on spamming the hashtag), @NZcivildefence and @NZRedCoross are all ranked highly, while @NZherald and @NZStuff lose their leading positions.

This shift in the comparative importance of key accounts is illustrated further by fig. 5, which compares the number of @replies (including manual retweets) received by @NZherald, @CEQgovtnz, and @ChristchurchCC. While @NZherald is clearly leading during the first days (indeed, the about 3,900 and 1,700 @replies it received during 22 and 23 February, respectively, are not pictured in the chart, to aid readability), this changes during the following days, with @CEQgovtnz first matching and then well surpassing it in the level of attention received. Perhaps understandably given the local circumstances, neither of the government authorities tweeted to #eqnz at all on 22 February, and only the Christchurch City Council account tweeted briefly on the following day; this is clearly reflected in their comparative invisibility during these days. As they began to use their *Twitter* accounts again to provide news, information, and advice to affected residents, however, they soon became important elements of the overall disaster response on *Twitter*.
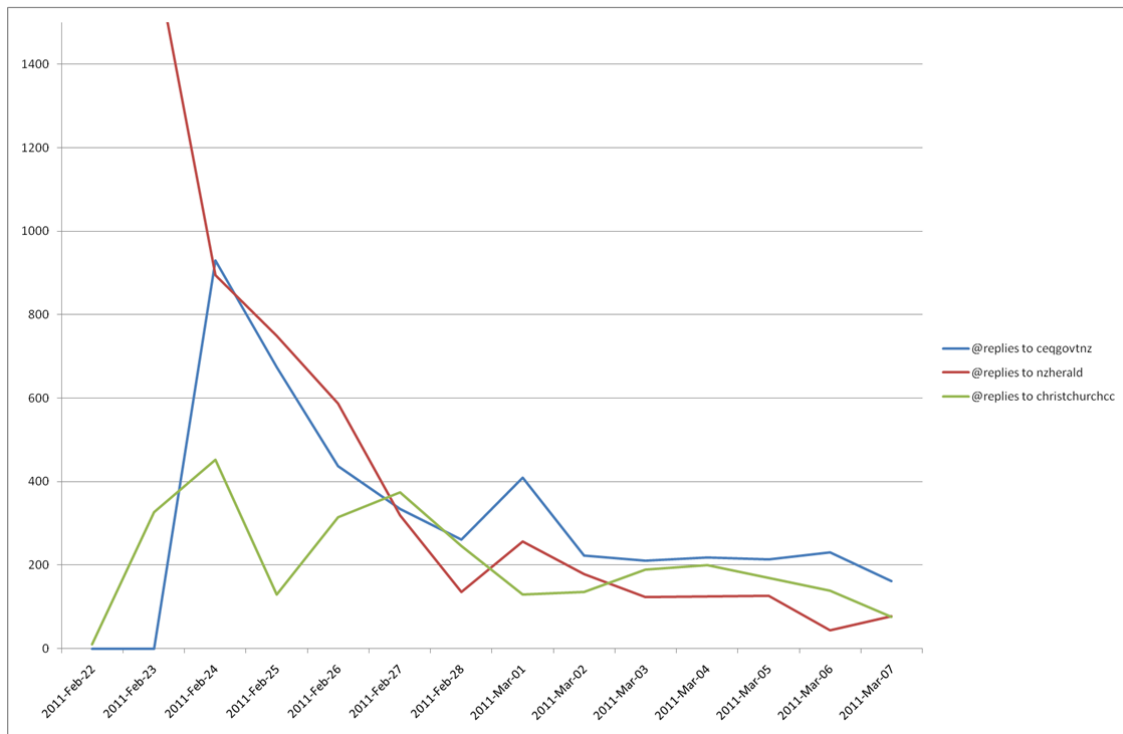

Fig. 5: @replies (including retweets) to key #eqnz Twitter *accounts, 22 Feb. to 7 Mar. 2011*

Overall, then, this supports Hermida's and Burns's views on *Twitter* as a form of ambient journalism, especially during the immediate aftermath of a disaster, while this period must be clearly distinguished from the longer-term discussion of relief and recovery which may follow it within the hashtag community. Indeed, recognising the substantially different make-up of the userbase of #eqnz during the first days after 22 February 2011, compared to the period that followed them, perhaps it would be more appropriate to speak of two different

communities: the much larger group of users which gathered around #eqnz to track news of the event and share links to the latest mainstream media stories as well as to first-hand reports, images and videos, and the smaller (and more likely far more geographically localised) community of residents and disaster relief organisations who continued beyond those first few days to share information and advice on how to cope with and address the damage and devastation which the earthquake caused.

It is likely that similar patterns can be discerned as we study the *Twitter* activities related to other natural disasters and similar acute events, such as the subsequent earthquake and tsunami in Japan (however, we must take into account the nature of the latter event as a continuing chain of disasters rather than one single crisis), and the approach we have taken to study #eqnz can be replicated in an examination of such other events.

It should also be pointed out that the comparatively rapid succession of major earthquakes in Christchurch, as well as New Zealand's overall familiarity with earthquakes and volcanic activity, may have prepared it (and its *Twitter* community) especially well for responding to the tremor. Especially following the already destructive (but far less fatal) earthquake in September 2010, the role of social media as a component of overall emergency media strategies had already been recognised, and the importance of specific *Twitter* accounts operated by media organisations and emergency authorities had been established. When the devastating February 2011 aftershock hit Christchurch, therefore, many interested *Twitter* users in the city and beyond already knew where to turn for information; similarly, they simply re-used the #eqnz hashtag which had been established during the earlier event. It is very likely, too, that any future earthquakes in the country will build further on these lessons; much as most New Zealanders will know what to do, physically, in the event of an earthquake, so will most NZ *Twitter* users now know how to respond to it using social media.

An analysis of the #eqnz dataset reveals important activity patterns as far as key users are concerned, then; in addition to this, however, we may also extract useful information from a further examination of tweet contents. In the first place, it is possible to extract the key themes in the entire dataset through a simple keyword analysis; after a further manual processing of this list, we can determine a number of thematic keyword bundles which we may then also track over time to identify when such specific themes become important to #eqnz participants. The process here is somewhat similar to the 'trending topics' which *Twitter* identifies on a global level, across the entire volume of tweets being made by its users; here, however, we examine what themes are trending only *within* the hashtag under investigation, and are therefore able to observe what issues exercise this specific, self-selected community.

By way of example, Fig. 6 presents an overview of the relative presence of a number of key issues in the tweets made to #eqnz. Power and water clearly are the first major concerns (but further spot checking would need to ensure that there are no false positives – such as uses of the term 'power' in phrases like 'powerful earthquake' – included in our count; for the purpose of demonstration, we may skip this phase. Petrol supplies, by contrast, are a clearly secondary concern, and arise only on the day following the earthquake itself, as longer-term supply issues are beginning to be considered; they also appear to have been addressed quickly, as petrol is rarely mentioned at all after the end of February. Similarly, a low-level discussion of the availability of portable toilets, or 'portaloos', gradually emerges during the first week after the disaster, as it becomes apparent that full water and sewage services across the city will remain disrupted for some time and longer-term alternative arrangements will need to be found. A longer-term study of #eqnz discussions beyond the period examined here may point to further community issues arising during the recovery phase.
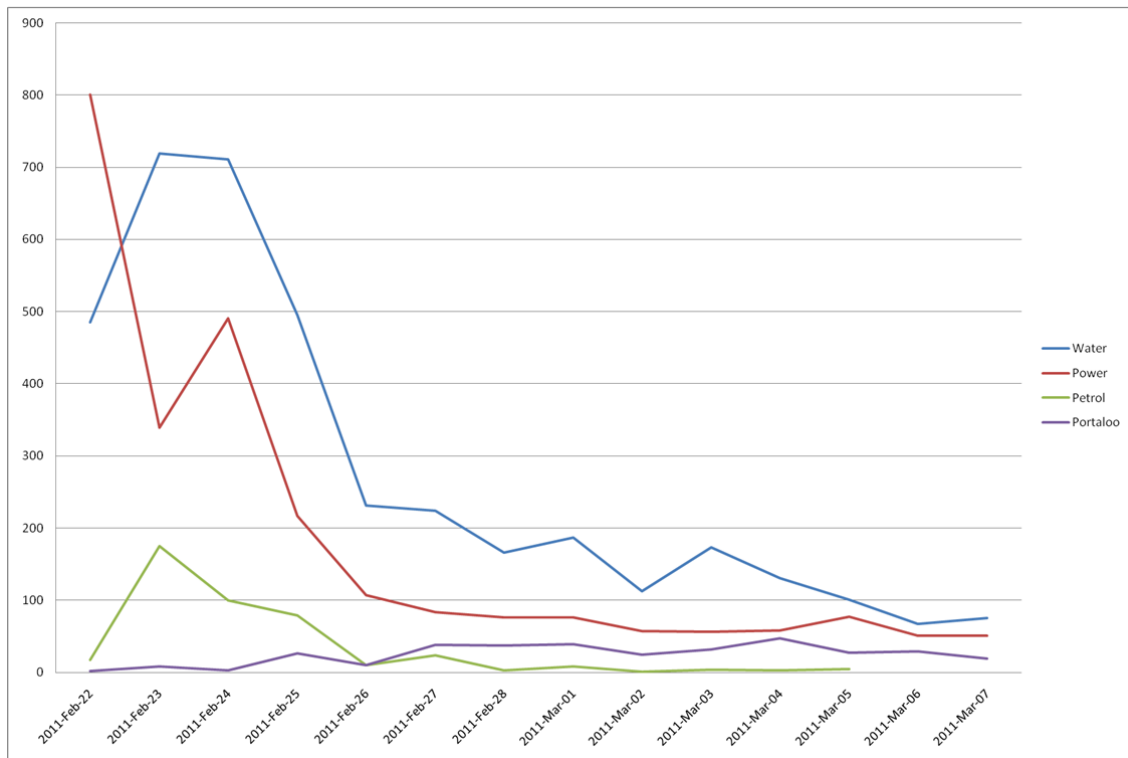
Fig. 6: key themes in the #eqnz discussion, 22 Feb. to 7 Mar. 2011

A final striking indication of a shift in the focus of the #eqnz discussion is evident also in the incidence of a number of more general keywords: 'rescue', 'relief', and 'recovery' (fig. 7). It is unsurprising that the term 'rescue' occurs frequently during the first few days after the quake, especially as the focus during these days is on sharing information from the mainstream media, whose stories would themselves have been strongly centred on the continuing rescue operations. 'Relief', by contrast, gains prominence slightly later, as a greater amount of support agencies begin to send their staff to the stricken city. From 3 March 2011 onwards, however, there is a marked shift in the content of tweets: 'recovery' now clearly becomes the more prominent term, as the immediate emergency response operations are concluded and the lengthy rebuilding process begins. While it would be dangerous – at least without further qualitative examination – to read too much into the mere quantitative presence of these key terms in the data, this shift nonetheless makes sense in the overall context of a community emerging from the crisis event to enter a long-term phase of recovery.
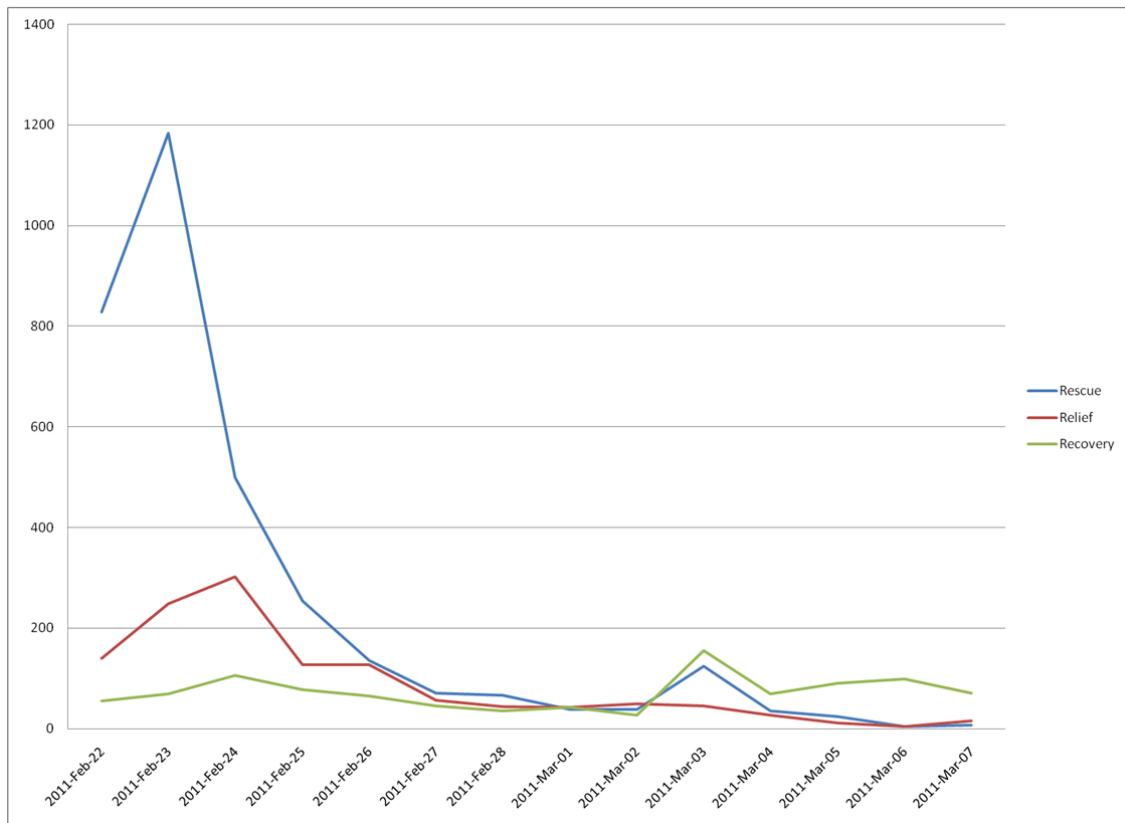
Fig. 7: changing focus in #eqnz, 22 Feb. to 7 Mar. 2011

Conclusion

Our brief analysis of the #eqnz hashtag in the aftermath of the New Zealand earthquake has been able to document a number of key patterns in the data; a more detailed study, which may also involve further qualitative investigation of selected subsets of the entire dataset, a closer examination of the most frequently shared links during these days, a focussed analysis of the performance of specific official *Twitter* accounts, or interviews with the people behind these accounts or residents of Christchurch who participated in #eqnz, would generate considerably more insight. The research approach outlined here provides an important basis for such additional work.

Another avenue for further exploration is provided by the potential for network visualisation which is inherent in our data. Beyond mere measures of which user accounts received or sent the most @replies and retweets, such networks of communication can also be graphically represented using a variety of approaches and algorithms, not only providing an insight into the overall ranking of attention but also pinpointing clusters of participants who were most frequently interacting amongst themselves rather than engaging with the wider hashtag community. Further, such visualisations may also track changes in the network over time, showing perhaps the gradual structuration and cluster formation processes in a community which initially emerged *ad hoc* around an acute event. In the case of natural disasters and other unforeseen events, such processes might be imagined to occur once the immediate rescue phase, where petty squabbles may have been put aside, concludes, and as plans for recovery and rebuilding become increasingly politicised.

Additionally, what must also be remembered in any study of hashtag communities is that significant further *Twitter* activity of relevance to the topic under investigation will have taken place outside of the hashtag, involving users who either were unaware of the hashtag altogether, deliberately chose to eschew this wider visibility for the tweets, or preferred an alternative hashtag option. For example, evidence from the Japanese tsunami shows that on average, during the five days following the initial earthquake, the word 'tsunami' itself appeared in over three times more tweets than were posted to the #tsunami hashtag. While a focus on the

'official' hashtag of an event can be expected to capture the most engaged and committed participants in a conversation, then (as well as those who most want to be seen by others), it does not cover the entire *Twitter* audience for that event.

Twitter's current restrictions on access to larger tweet datasets, even for publicly funded research which addresses issues of significant public interest, also make it very difficult to put the findings from hashtag studies into a broader context. While we know, for example, that some 21,000 users posted to #eqnz during the day of the earthquake, and while a further examination of their *Twitter* user profile information could reveal with some degree of accuracy what percentage of these users were based in New Zealand, what is missing to date is reliable information about the total size of the New Zealand *Twitter* population – a measure which would enable us to determine what percentage of the local userbase became directly engaged in discussing the disaster on *Twitter*. What estimates are publicly available for any one nation (or for the total *Twitter* userbase) tend to vary wildly, and derive from a variety of research methodologies – or more often, mere guesswork –, and reliable scholarly work on such questions has been largely blocked by *Twitter*'s policies. That said, the situation here still remains more manageable than in many other social media platforms, and not least on *Facebook*, where the far more complex system of content types and applicable privacy restrictions means that even comprehensive access to basic public content is both technologically and ethically problematic.

What will be more easily possible for most researchers is to compare the coverage of an event by the hashtag community with the contemporaneous coverage of the same event by the mainstream media. Conventional content coding approaches as well as computer-aided content analysis methods may be brought to bear on a corpus of mainstream media reports covering the period under investigation, to compare the presence of key themes and key actors as well as the overall level of coverage on both sides. Such comparative approaches return us to some more fundamental questions about the relationship between user-driven new and social media on the one hand, and more traditional, industrially produced media forms on the other: do they pursue the same themes with the same level of attention, or are there marked differences between the two? Is their framing of events and stories comparable, or are they differently biased? Can we detect any signs of the mainstream media agenda influencing that of the online discussion, or vice versa?

Whatever the answers to these questions, both for individual case studies or more generally, what is already apparent is that social media of various forms clearly do have a role to play in covering and responding to crisis events – much as conventional mainstream media continue to do; indeed, both frequently act in conjunction with one another and at times serve as mutual amplifiers: social media by disseminating key breaking news stories, mainstream media by picking up on first-hand information reported by immediately affected locals. The research approach outlined here can contribute significantly to a better understanding of this complex interaction between the two, as well as providing greater detail and documentation of the specific use of social media during disasters; in doing so, it may also contribute to further improvements in the disaster response mechanisms by emergency authorities, media organisations, and individual citizens.

Acknowledgements

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Topic List

Twitter, social media, journalism, citizen journalism, disasters, crisis communication, quantitative research, 2011 Christchurch earthquake

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