

‘Thank goodness for our little radio’: Researching post-quake radio audiences

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Summary:

This article discusses the use of radio after major earthquakes in Christchurch, New Zealand, in 2010 and 2011. It draws on archival sources to retrospectively research post-quake audiences in the terms people used during and soon after the earthquakes through personal narratives and Twitter. Retrospective narratives of earthquake experiences affirm the value of radio for communicating the scale of disaster and comforting listeners during dislocation from safe home spaces. In the narratives radio is often compared with television, which signifies electricity supply and associated comfort but also visually confirms the city’s destruction. Twitter provides insights into radio use from within the disaster period, but its more global reach facilitates reflection on online and international radio from outside the disaster-affected area. This research demonstrates the value of archival audience research, and finds that the combination of online radio and Twitter enables a new form of participatory disaster spectatorship from afar.

Keywords: Radio, disaster, earthquake, Twitter, television, witnessing, archival audience research

Introduction

This research explores audience use of media after two major earthquakes in New Zealand, in 2010 and 2011. It traces the ways people describe their use of radio and television in personal narratives, and how radio was discussed on Twitter after the quakes. Radio is closely associated with communication for those suffering through a disaster, while analysis of television emphasises its tendency to dramatic disaster marathon coverage. Twitter shares some aspects of those media, with a broadcast-like style, and the ability to carry live updates of disaster in words and images, but it also interconnects a participatory global network of users that expands through retweets and replies. This research focuses on radio

as the medium that was most reliable after the loss of electricity in the earthquakes, but also finds that television confirmed in images the extent of disaster described by radio. Responses to New Zealand radio's mediation of the quakes flowed across the English-speaking world through Twitter, and the expanded reach of online radio streams.

New Zealand lies on a tectonic plate boundary where earthquakes are common, but the quakes addressed here occurred on previously unknown fault-lines running through Christchurch, the country's second biggest city. The earthquake of Saturday 4 September 2010 was centred in countryside 40km west of the city, with a moment magnitude of 7.1. It was a substantial shock, but it occurred at 4:35am, when most people were asleep in bed. While damage to buildings and land was considerable, there were no fatalities, and the common story told about the quake was that the Canterbury region had proved resilient in building and infrastructure (for example, Revkin, 2010). However, the aftershocks were continuous and unsettling (McColl & Burckle, 2012). The most significant shock occurred on Tuesday 22 February 2011. As expected this was a magnitude lower than the initial quake, with a magnitude of 6.3, but it was centred in the Port Hills, between the city and its port town of Lyttelton, and it released a significant amount of energy directly towards the central city at lunchtime – 12:51pm. Many buildings were destroyed, 185 people lost their lives, and there was extensive damage to land, roading, infrastructure, and homes across the city, particularly in the more low-lying eastern areas (Potter et al., 2015). Recovery from a seismic event of this size is a slow and complex process, which is often referred to as the real disaster (for example Farrell, 2015). This disaster period has been shaped and conditioned by the flows of media coverage and communications (Cottle, 2014), and the beginnings of mediated themes are evident in responses to post-quake media, including the devastation of the central city, the resilience of the people, and the disparate impact of the quakes across the area.

This article uses two archival sources to explore audience responses to the immediate mediation of the earthquakes. One is a collection of personal narratives about earthquake experiences written by members of the public, and provided by the Ministry for Culture and Heritage to UC CEISMIC (Canterbury Earthquake Images, Stories and Media Integrated Collection), a collaborative, open access digital archive hosted by the University of Canterbury. The other is a collection of Tweets sent immediately after each of the two major earthquakes. These document experiences from the earthquakes, from a moment by moment perspective, a fragmentary account of events as they unfold. The personal narratives are specifically elicited from people who experienced an earthquake, so those used here focus on the use of radio by people within the disaster area itself. Twitter, by contrast, has a global user base, so the Tweets analysed here also refer to streamed New Zealand and international radio broadcasts listened to around the world. As may be expected, the role of radio differs in the accounts held in the two archives. As demonstrated in other disaster research, the personal narratives of people caught up in the earthquake represent broadcast media as an ongoing source of immediate information and comfort (Hindman and Coyle, 1999; Perez-Lugo, Maria 2005; Spence et al., 2009; Moody 2009; Ewart

and Dekker, 2013). In the Twitter archive radio is often represented by critical reflections on moments of broadcast from far outside the disaster. These are often quoted out of the longer flow of coverage, and retweeted so that small moments of broadcast flow may have a far longer presence on Twitter. However Twitter also provides insight into reception of earthquake news via international radio broadcasts and New Zealand radio stations' webstreams. This research demonstrates the value of archival audience research, and finds that the combination of online radio and Twitter enables a new form of participatory disaster spectatorship from afar.

Radio and the witnessing of disaster

Radio and Twitter are both now well understood as primary sources of information in disaster (Spence et. al., 2009; Guan and Chen, 2014). However Perez-Lugo argues that research on media and disaster tends to focus on the role of media in preparation for a disaster event and recovery from it, rather than the 'impact phase' of the disaster (2005). Her research traces the information, emotional support and sense of community communicated by radio during Hurricane Georges' 24-hour traverse of Puerto Rico on 21 and 22 September 1998. A hurricane has a very clearly defined long impact, while the two earthquakes on which this research focuses lasted only 40 and 20 seconds respectively. However they can be viewed as moments in an impact phase that lasted much longer. McColl and Burkly, for example, refer to the year following 4 September 2010 as 'an example of a major, sustained and unrelenting geophysical event that has produced a catastrophic public health emergency', as aftershocks caused a 'sustained and repeated high level of geophysical destruction to the backbone of a large urban and suburban community' (2012: 33). Through this long period of disaster-impact, responses to the two major quake events demonstrate the continuing value of radio for informing and supporting local communities in disaster.

Radio's role in informing and connecting people during disasters is echoed in social media, and particularly the short messages and hashtags supported by Twitter. Radio is valued for its informative communication, but also the sense of companionship and emotional support it can facilitate for the imagined audience of people who are directly experiencing disaster (Hindman and Coyle, 1999; Perez-Lugo, 2005; Spence, et. al., 2009; Moody, 2009; Nelson, et. al., 2010; Ewert and Dekker, 2013). Twitter has more recently become a focus of research into disaster and media (Murthy & Longwell, 2013, Guan & Chen, 2014), including in relation to the Canterbury earthquakes (Bruns and Burgess, 2013; Lewis, 2013; Potts et al. 2011). Twitter played an important role in crisis communication in Christchurch (Yin et al., 2012), but has also been valued for building community resilience (Dabner et.al, 2012; Taylor et.al, 2012), and enabling sense-making practices (Wengenmeir, 2016). The 11 March 2011 Tohoku earthquake and tsunami in Japan produced a range of Twitter practices and research (Acar and Muraki, 2011; Sato et.al, 2012; Murakami & Nasukawa, 2012; Umihara & Nishikitani, 2013). Jung studied university students' use of

social media and compared it with 'mass' media after the 11 March 2011 earthquake, because 'few studies have examined use of social media after a disaster in relation to use of other forms of media' (2012: 'Research Questions 4 and 5'). She found that Twitter use in particular was driven by the desire to communicate with others and to access information, but radio was used significantly less by Twitter users in Japan than by non-Twitter users (Jung, 2012). The motivations that Jung identifies for Twitter use reflect those associated with radio use after disaster: to seek information and connect with others. This may demonstrate simply that the most effective media in a disaster are those that are most available at the time (Cottle, 2014).

Research on broadcast media after the Christchurch earthquakes has focused more on radio production and content than on television or audiences. Some research addresses the challenges faced by broadcasters after the disaster (Joyce, 2015; Pauling and Reece, 2014), or on how radio sounded after the September 2010 earthquake (Zanker, 2014). However it is harder to know what people heard and what that meant for their experience of the disaster. Vavasour's work (2014), based on surveys administered six months after the February earthquake, reveals some patterns of longer term use of different media, including radio, television, and social media, as it related to the availability of electricity in different areas of Christchurch. In the aftermath of the earthquakes, and particularly the February quake, the few radio stations physically based in Christchurch struggled to stay on air, being non-commercial independent stations limited in broadcast capacity by an inability to access studios or remote broadcast technology (Joyce, 2015). New Zealand's highly deregulated radio environment is dominated by commercial networks based in Auckland, and the national public broadcaster RNZ (Radio New Zealand) National, in Wellington (Shanahan and Duignan, 2005). Unlike in other post-disaster radio environments (for example Hindman and Coyle, 1999; Moody, 2009), the small scale of truly local radio stations in the city, and their inability to broadcast in the days after the February quake meant the radio coverage of the Christchurch earthquakes was almost entirely provided by national broadcasters for a national audience.

This article, about how people in Christchurch and internationally used radio after the Christchurch earthquakes, draws on Twitter for insight into radio rather than for disaster reportage in itself. The other primary source here is personal narratives, which along with oral history interviews are a more established site for researching both media audiences and disaster experiences than social media. Narratives have become a rich source material in disaster research, providing insights into the facts and experiences of disaster, and how survivors articulate their disruptive experience in an overall life story (Niemeyer, 2004; Dickie, 2006; Tuohy & Stephens, 2012; Stewart et al., 2012). Narratives fulfil an important role for the tellers, in creating some sense of order in the events:

Personal narratives are [...] the primary means at an individual's disposal to regain order out of chaos. While fire trucks, bulldozers, construction crews and money allow for the removal of rubble and rebuilding of physical structures,

personal narratives accomplish the same work in our heads and hearts (Bendix, 1990: 333)

As Dhoest (2015) observes, a narrative is not an objective account, but a process of meaning-making, in which the importance and value of mediated moments are constructed as much as they are remembered, most often being co-created with a researcher (Stewart, et al. 201). Peter Lewis (2013) has taken a personal approach to radio oral history, developing his own 'self-ethnography', to recount his early memories of radio listening, which are verified and contextualised against other family and archival documentation. The possibility of self-narratives for revealing moments of media audiencing in disaster is illustrated well by Bendix, in reflecting on earthquake narratives prompted by the 1989 Loma Prieta earthquake (1990). In her own narrative of the disaster, she describes turning to television and radio after the shaking stopped:

There was only static on the TV. We turned it off and stood around the patio Ten minutes after the quake we found an operating radio station. 'The speakers were flying through the room,' said a badly shocked D.J ... They gave out their number, and as we went around the house to check for gas smells and broken pipes, and through the noise of sirens winding their way up the Berkeley hills, we heard the first earthquake stories being called in to the station (Bendix, 1990: 337).

Radio fulfils a clear purpose here in validating the shared experience of an earthquake, and enabling access to other people's experiences of that moment, pieced together into stories that soon develop patterns.

Research on witnessing of disaster often focuses on the ways in which 'disaster marathons' are constructed on television (Blondheim and Liebes, 2002; Marriott 2007), although that is not a framework applied to radio. Audiences' experiences of proximal mediated disaster on radio, television, or social media are often overlooked, and Joye identifies 'empirical studies of audiences' reactions to and interpretations of mediated suffering' as a particular gap in the research into media and disaster (2014: 999). Radio research demonstrates that long periods of radio coverage and listenership are characteristic of disaster media (for example in Perez Logo, 2015; Ewert and Dekker, 2013), enabling audiences embedded in disaster to better understand what is happening outside their homes, although as noted above the examples in previous research tend to be of media located within the disaster area itself. At the same time, online streamed radio means that people far away can utilise local media to witness the disaster as though from the inside, in real time, as a more participatory form of spectatorship than the globalised disaster marathon. This is a form of the 'ordinary witnessing' Chouliaraki describes as the 'first-hand witnessing and personal opinion' of citizens (2013: 147). However the distance lends this

witnessing via Twitter a sense of performance, as users demonstrate to their own followers their understanding of distant events via on-the-ground sources.

When the voices of people outside a disaster dominate through its remediations, the experiences of those inside the disaster area can be overwhelmed. In a BBC 'live stream' of reports on the 13 January 2010 Haiti earthquake, Chouliaraki identifies that, out of 115 entries, only seven included the voices of people directly affected by the earthquake. The rest were from International Non-Governmental Organisations, 'Westerners indirectly affected by the earthquake or by Haitians who live in the West [or] in neighbouring countries' (2013: 163). In that journalistically mediated sequence of updates, the voice of the disaster is overwhelmingly that of spectators outside the 'zone of suffering' (2013: 165). Directly reading tweets, outside the structures even of the new 'participatory realism' of live blogging, renders the distant performance of 'ordinary witnessing' more striking, as a sequential series of reports in which an authoritative stance of ordinary witnessing may be taken by spectators from afar via local radio, as well as by people directly affected. This may be an outcome of the "'fetishizing" of liveness' that characterises contemporary television news (Marriott, 2007: 119), expressed through tools that enable distant spectators to bypass their own television news and access liveness at the source. How to unpick the role of radio in mediating the disaster between people in Christchurch, and those vicariously experiencing it from elsewhere in the world, is one of the tasks of this article.

Methodology

This research is grounded in a methodological problem: how to research audiences of the past with existing resources. It is located in an emerging field of audience research that seeks to understand historical responses to media from audiences who may not have been specifically researched in their own time. Sources for this kind of research include oral history and other retrospective interviews or surveys, and archives. However archives pose particular problems for researchers, as:

Everyday practices of readers, viewers and listeners are typically beyond the remit of sources found in institutional archival collections, and the researcher is often left with a plethora of sources that only marginally address the object of study and rarely amount to a clear-cut, homogeneous understanding of audiences and their historical practices (Mihelj and Bourdon, 2015: 3).

In this vein, Massey's (1995) analysis of student media diaries that incidentally covered the 1989 Loma Prieta Earthquake demonstrates some uses of radio after that disaster, but that is secondary to students' reflections on their media experiences. This research began in 2015, when it seemed that interviewing people affected by the earthquakes about their media use during traumatic events of four years earlier would be impractical and unhelpful. Instead, the research uses two forms of archives to find insights into the use of radio after the

earthquakes, among much broader accounts of experience. One archive is the collection of personal narratives of earthquake experiences aggregated by UC CEISMIC. The other is a collection of close to one million Tweets sent in the first two years after the initial earthquake.

The personal narratives and Tweets reflect very different aspects of the earthquake experience. The narratives are first hand and retrospective, in some cases written up to two years post-quake. They tell stories that have been carefully considered and placed into a coherent structure. They have a similar shape, often beginning before the particular earthquake, moving through the experiences of the day, and ending with some form of restoration of order (Tuohy and Stephens, 2012). Twitter, by contrast, captures moment by moment accounts that were salient enough for a user to tweet about at the time. Constrained by the 140 character limit, the tweets offer brief insights into the earthquake experiences as they unfold. Twitter's global user base also creates international exchange of tweets about the earthquakes and media, and many tweets were sent by people who were not directly experiencing the earthquakes themselves. Combining the Twitter data with the narratives archived by CEISMIC enables comparison of retrospective first person narratives of disaster experience from within Christchurch with brief messages sent at the time of the unfolding disasters from all over the world.

The long form narratives were contributed to the CEISMIC archive from three discrete sources. The majority of narratives, one hundred and six, used in this research were collected by the New Zealand Ministry for Culture and Heritage, through an interactive website called 'Quake Stories'. A button on the site invites the user to 'tell your story', and this leads to a simple text box with the instruction 'Start writing your earthquake story here. Please write as much or as little as you like'. Further text fields include location and email address and the optional entry of name, date of birth, and current location. On clicking the 'Share my story' button, the text is immediately uploaded to the CEISMIC archive and available for public access. Twenty of these entries were interviews gathered by community organisation Project Lyttelton after 4 September 2010. Thirty-four of the narratives came from the 'whenmyhomeshook' website, which was still active in November 2015, but no longer accessible by March 2016, which invited parents to submit a child's earthquake story or poem by email.

Apart from the interviews, these stories were self-written accounts contributed by their authors, so they are not narratives aided purposefully by an interviewer as is the case with much narrative discourse analysis (Fraser, 2004; Neimeyer, 2004; Stewart, et al., 2012; Tuohy & Stephens, 2012). These do however construct idiosyncratic stories of people's own earthquake experiences, framed with a range of contextual and other information, as people use storytelling to make sense of their experiences (Bendix, 1990; Carlin & Park-Fuller, 2011; Kargillis, et al., 2014). Some are long, detailed, and imbued with emotional language, while others are more matter of fact descriptions, told in a way that maintains biographical coherence (Tuohy and Stephens, 2012). For this research, particular stories have been selected because they reference radio or television. Although the focus of this research is

radio, it became apparent that many narratives included both media, and comparing them provided further insights into the role of radio after the quakes. These were sourced using the textual search function of the CEISMIC archive's web interface, with searches within each of the specific collections (Quake Stories and Whenmyhomeshook) for the terms 'radio', 'television', and 'TV'. Of 962 accounts held by the archive in total, 117 referred to radio, and 132 to television, although these are not discrete – some included both radio and television. Fifty two of the narratives referring to television were about sets being broken in the quakes rather than about watching television, although this often explained not watching.

In these accounts radio and television are sometimes marginal to the story, and sometimes central. However the location of the media moment in the overall narrative is revealing of the value of radio and television in the remembered and told experience. This may be different from the actual experience, and this article cannot reach strong conclusions about how radio and television were definitively used, but it can make some claims about how people integrate media into their disaster stories: the role of radio and television in reconfiguring 'a sense of order, meaningfulness, and coherent identity' (Crossley in Tuohy and Stephens, 2012: 28). The selected narratives were copied into NVivo, and each specific reference to radio or television within the narratives was coded with an emergent set of codes that identified the applicable earthquake and medium, along with details of location, time, media content, and reaction. Word trees and matrices run in NVivo helped to identify the context of radio and television use within narratives, and to compare media, locations, and timings between the two major earthquakes.

The Twitter material was collected by a University of Canterbury research team, using a research grant to purchase tweets relating to the earthquakes and aftermath from Texifter, a reseller of twitter data. The 962,728 tweets collected were sent during specific periods of time following major quakes, anniversaries, and significant quake-related events between September 2010 and 2014. They included references to variations on the words Christchurch and earthquake, and the most common hashtags, such as #eqnz. Including content references in the search query meant that the Tweets were not limited by hashtags. This particular research focuses only on those Tweets sent in the time immediately after the earthquakes of 4 September 2010, and 22 February 2011 (4-14 Sept 2010, 22 Feb – 22 March 2011), as the archived narratives focus on those earthquakes and the immediate period after them. Tweets that included the word 'radio,' a total of 2,542, were identified using the search function in Texifter's Discovertext tool, and these were coded to establish the context of each tweet, including aspects of location, source, and content. The coding was carried out by a research assistant, cross-coded by another research assistant, and also by the author. The tweets were then transferred into Open Refine for analysis, using faceting and clustering to group coded tweets according to discern patterns. The tweets discussed here mention only radio, because the emergent point of comparison in these was not television, but broadcast listening in Christchurch compared with online listening in other parts of the world.

There are ethical concerns associated with the archival sources used in this research. All of the material included here is publicly accessible, searchable, and has been compiled for the purposes of research. As far as Twitter goes, however, access to this substantial dataset was only made possible with research funding, and could only be gained through a third party vendor of Twitter data. This illustrates substantial concern about inequities of access to social media data for research, the transparency of research and the difficulty of replicating and verifying data that is covered by strict Terms of Use agreements (Bruns, 2013). The research team was particularly concerned about the ethical impact of research on this scale, in which Twitter users were frequently describing emotional trauma and grief during the post-quake period. It is not possible to fully anonymise Tweets because their text can be located in search engines, and full anonymisation would require stripping away too much information about location and personal bios that was pertinent to the analysis. However the full collection of Tweets from which this research draws has been stored in a purpose-made database, in which user-names were replaced with individual numbers for analysis and multiple levels of access for different research purposes have been defined. Material analysed with Open Refine has been deleted and is only now stored in the database. The narratives held by the CEISMIC archive are explicitly for research purposes, but for this article quotes are included without names, identified only by the earthquake to which they refer, as September, or February, in the shorthand that has become common usage. The quoted tweets are also identified only by the relevant earthquake, or location of the tweeter. Quotes are presented as found in the material, including errors of spelling and grammar, in order to preserve their voice.

Personal narratives: witnessing proximal disaster

The personal narratives held by the CEISMIC archive vary in their detailing of earthquake experiences. Some are short reflections on particular moments of an earthquake and its aftermath, while others are long and informative accounts covering several days. Because the narratives were contributed using an open text box on a website they do not respond to a specific set of parameters and cannot be read as comparable transparent accounts of widespread earthquake experience. However they reflect the perspectives of their authors, and how earthquake experiences are represented. These are accounts not only of personal experiences of disaster, but of how that disaster was mediated, in which broadcast coverage of the disaster becomes a means of understanding what is happening outside the narrator's immediate environment. Radio and television provide a means of witnessing the local, proximal, disaster, as well as emotional support and validation for those within the disaster area.

Media use in the narratives of the September 2010 and the February 2011 earthquakes differed in ways that reflect the timing of the earthquakes, the extent of electrical supply failure across the city, and the relative damage and loss of life. The September earthquake narratives are fairly straightforward, usually beginning with a

narrator who is in bed, though not necessarily asleep, is surprised by the earthquake, seeks reassurance from other household members, seeks information from the radio, frequently returns to bed listening to the radio, and perhaps watches television when power is restored or on reawakening later in the morning. By contrast, the February narratives tend to begin with the normality of the day before the earthquake hits, establishing that many narrators and / or family members were away from home when it happened, leading to lengthy journeys to return home or to a place of safety and be reunited with loved ones. A number of narratives after each earthquake reflect on their lack of access to radio, or to batteries, and many situations of radio listening take place in cars, in which the car is often also framed as a place of safety when a house has become unsettling.

Radio tends to be available, in homes, cars, or via cellphones, soon after both events, while television is usually only accessible later in the day or days following the quake, when electricity supply is restored, or the narrator arrives at another location. The most salient use of radio after both the September and February earthquakes was as an immediate source of verified information about the size, location, and effects:

I tuned into the radio and it seemed forever before reports came through, buildings down in the city. Power out everywhere, water out too. After cleaning up a little we returned to bed [...] what else could we do till morning. Shakes and rumbles carried on. (September)

The nationally networked structure of New Zealand radio became very apparent in the wait for news of the quake in September, as reflected in this comment about RNZ:

We turned on the radio to see if there was any news, but the announcer (in Wellington) was just commenting that she'd felt an earthquake, and wondering where it was. We were trying to re-tune to a local station when the first aftershock hit. It was quite a big one (though felt tiny compared to what we'd just been through!) and knocked the power out. (September)

Many accounts of radio listening on 22 February 2011 take place when the narrator is trying to get home, or to collect their children from school, while walking or in a car. Radio is the companion to the frequently long and distressing journey, and is associated with shared, collective emotion:

Bumper-to-bumper traffic both ways on Birmingham drive. Moved maybe 5 car lengths in the first 15 minutes. Listening to the radio, trying my cell, exchanging nods and grimaces with people crawling past me going the other way. (February)

We meet people on the walk home: stressed people, helpful people, scared people. We talk, we share radios, we hear of deaths. We live through a surreal moment when the people on the radio discuss an earthquake and it reaches us several seconds later. Through it all we worry. (February)

These accounts illustrate the role of radio in providing information about the event beyond personal experience, but also the partial nature of that information. The February narratives above are clipped in tone, expressing the stress of the moment, in a present tense that relives the experience. Radio at that moment cannot provide enough information, or personal enough information, to reassure someone in the middle of the disaster.

Despite the value of radio, there are expressions of frustration by those who remained without electricity at the impossibility of seeing what is going on. In some stories the narrator is embedded within a very personal experience of disaster in which radio is the only source of connection to the rest of the city:

We did not seem to exist to emergency services and had to very much rely on our own resilience and resources to get through, thank goodness for our little radio. (February)

Our evening was again spent listening to the radio, hearing reports of water tank deliveries, portaloos drop-offs, requests and offers for help, rising body counts, closed roads, etc. (February)

There is a strong desire in many of the narratives to witness the disaster visually, exacerbated by the fact that people in the rest of New Zealand, or outside the immediate disaster area, had access to images and visual knowledge of the event that were inaccessible to those within it. Many narratives refer to receiving text messages from friends and family about the images on television while being unable to witness the footage themselves for hours or days:

All we had to rely on was the AM radio – it was hard to listen to the reports coming through, the rising death toll, the buildings that no longer stood, the damage to residential areas.... I had friends from out of town texting me about what they were seeing on TV – and while part of me wished I could be watching, another part of me knew that seeing the footage would be over-the-top upsetting. (February)

The radio gave us good information but we felt very disconnected [from] our city not knowing what had [happened]. We later found from our children, who all live in other centres, that people outside of Christchurch had a far better understanding of our situation than we did. (February)

Those who were in the midst of the disaster were the least able to witness it in a televisual sense, while actively witnessing it in their own life. The role of television in the narratives reflects the extent of electricity failure across the city, as many areas of Christchurch were without power on 4 September 2010, and even more after 22 February 2011 (Vavasour, 2014). Massie and Watson show that while it took one day to restore power supply to 90% of Christchurch after the September earthquake, the same process took ten days after the February earthquake (2011: 425), with the majority of power loss being from the central city eastwards (426). Television therefore remained inaccessible across the most damaged parts of the city for a considerable period of time.

In accounts that included television the moment of seeing the coverage often comes at or towards the end of the story. Being able to watch television frequently signifies arriving at a place of safety that also has electricity, or having the power restored to the narrator's own home. As indicated above, this also signifies a return to the broader national community of viewers witnessing this disaster. In these narratives turning on the television and seeing the earthquake damage is often framed the moment where it all 'became more real'. In some accounts this occurred in the narrator's own home:

We got home to find the power back on. We spent the rest of that day watching the continuous TV coverage – not believing the damage to roads, buildings and houses, but comforted by the news there had been no deaths ... (September)

In others, particularly after 22 February, the reality of television witnessing came after a longer journey.

It was three days till my mum and her partner sourced a generator from a friend in Dunedin that we were able to turn on the TV and see the devastation that had happened to our beautiful city. I wasn't ready mentally or practically to experience a disaster of this scale. (February)

Television images in these stories are intertwined with the journey to safety and relative normality, but they also carry an emotional burden as narrators are able to relax a little and process the implications of the event:

Later that evening, when the rain started, our saviours arrived and invited us to stay the night where they had everything we did not. We charged our cells, had more hot food and for the first time, saw the chaos as everyone else did on TV. What a frightening experience. Just seeing what had occurred 10 minutes from our house almost brought us to our knees. I know that we were lucky, lucky that we were not in the CBD or East of the City. So many were not lucky. (February)

The television images illustrate what radio had been explaining in words, but there is a strong need for the survivors to 'see for themselves'.

Many narrators remember specific details of the things they heard on radio and saw on television, and these accounts are often emotionally charged. People remark that they were shocked, or in shock, or that the images on television were shocking. Many references are made to disbelief and an inability to believe what they are seeing or hearing, or that it seems unreal. The unreality often refers to the experience of witnessing disaster taking place in their own city. This is particularly marked in narratives by people who lived on the western side of the city, where electricity remained on, and there was less evidence of physical damage.

When we got back the power was back on, so we just sat in the lounge glued to the TV while the scale of the disaster was revealed. It was a very surreal experience to have actually experienced the event, and be in the middle of it all. Normally the news happens somewhere else. It still doesn't seem quite real now. (February)

The structural similarities with a previous quote ('We got home to find the power back on...') illustrate some of the recurring references to television, with the primary differences between them defined by the effects of the two different quakes.

Everything seemed so normal out here..., but on TV we were seeing pictures of the destruction in the central city, just a few km away. It was hard to believe we were in the same city as the one on TV where a state of emergency had just been declared, and search and rescue teams were digging through rubble searching for victims I keep thinking that the pictures on TV are from some foreign city, but then I recognise the buildings, and can work out exactly where the camera person must be standing to shoot the film – it's all so familiar and yet so unreal. (February)

The strength of responses is also reflected in references to being 'glued' to the television, or occasionally the radio, of being unable to tear themselves away from the coverage, which is often referred to as showing 'devastation'. The images on television are regarded in many of these accounts as salient confirmation of what had happened, while viewed through the understanding that 'most people' only experience disasters through media (Joye, 2014: 994), so that the recognisable mode of the disaster marathon television coverage conflicts with recognition of the local setting. Television carries more emotional weight in these stories than radio does, operating in a visual frame that has 'the power to create stronger emotional and immediate cues' (Rodriguez and Dimitrova, 2011: 50). Television's role in confirming the reality of the disaster perhaps also reflects the success with which television journalism has adopted 'discourses of authenticity and presence, which proffer the 'real', the

'genuine' and the immediate' (121). Indeed, in the first hours and days after the 22 February earthquake the coverage was dominated by the kind of amateur video and raw journalistic coverage (Brown, 2011; McCosker, 2013: 390) that reinforces discourses of authenticity and presence (Marriott, 2013: 113).

Radio and television bear witness to disaster unfolding beyond an audience member's immediate location. Both provide news and detail about what has happened, but they fulfil different purposes in the narratives above. Radio tends to accompany people on their journeys to a place of safety, while television signifies that safety, inherently tied to the presence of electricity. Radio traces the unfolding facts of the disaster, the rising realisation of death and damage, while television solidifies that knowledge, makes it real in its images. In many of the earthquake narratives, there is a complex sense of navigating roles as both participant and audience member (Marriott, 2007: 112), embedded in a disaster but reliant on media for information, confirmation, and connection. The way radio is represented in the tweets replicates these points, but also extends the participant-audience member relationship beyond the disaster zone itself.

Twitter: global circulation

Twitter offers documentation of 'live' radio use in the aftermath of the earthquakes, and potential insights into the listening experiences described in the personal narratives, from within the moment itself. In practice some of the collected tweets reflect this, but the majority were sent from outside Christchurch, and overwhelmingly the Twitter references to radio after the earthquakes were from outside New Zealand. The radio listening referenced by the Twitter archive, therefore, is largely by people who were not personally involved in the disaster. This distribution of users may reflect the relatively low population and level of Twitter usage in the Canterbury region in 2010 and 2011 (Vavasour, 2014), and it is not necessarily representative of the overall distribution of all tweets in this time, as the 'radio' tweets examined for this research were a small number of all earthquake-related tweets. However the active engagement with New Zealand radio by international Twitter users is revealing of the global reach of online radio and suggests a desire to actively participate in distant disaster.

In the ten days following the earthquake of 4 September 2010, 679 Tweets were sent that referred to radio in the earthquake context. Of these 82 were sent from users who appear to have been in Canterbury, so experienced the earthquake, while 199 were sent by users in the rest of New Zealand, and 395 by users in the rest of the world. As expected the local tweets referred to radio content and the experience of listening during a disaster, but tweeters also critiqued the content and presentation of radio stations. Twitter users overseas were either remarking on the news heard on their own local radio stations, or seeking out New Zealand radio web streams for news on the quake. A subset of tweets was from overseas radio stations eliciting responses from people in Canterbury for eye witness reports.

The overall pattern was repeated after the Earthquake of 22 February 2011, although the patterns and content of Twitter use reflected the timing and more extensive damage. In the month following that earthquake, 1863 tweets were sent with the word 'radio' in them, of which only 54 identifiably came from people in Canterbury, 445 from the rest of New Zealand, and 1362 from the rest of the world. It is not possible through the content or biographical information in this dataset to know whether any of these were sent by New Zealanders living abroad. International tweets played a much bigger role in this earthquake, and in a pattern that follows global time-zones. The initial activity on Twitter originated in California, where 12:51pm New Zealand time was 3:51pm on 21 February, while it was closer to midnight in the UK and Europe, and responses tended to flow through the following morning. Content followed similar patterns to the September tweets, with people in Canterbury remarking on their reliance on radio's informational and connective value, while people from around New Zealand and the world commented on radio content and shared information.

Where many of the personal narratives identified radio as the first broadcast medium to which the narrators turned for information, the Twitter references to radio from people in Christchurch tend to emphasise the comfort provided by radio. This possibly reflects the longer time period across which Twitter users mention radio, compared with moments described in the narratives, and a social media form that facilitates descriptions of the user's activity at a specific point in time. On 4 September 2010, this is most apparent in a Tweet sent from Christchurch in the evening following the quake:

#quake have made a pot of thick, yummy soup, have warm clothes on, ph, radio, and torch handy .. settled in for the nite! #nz (chch)

On 22 February 2011, some references to radio comfort emerge from the post-quake journey period identified in the narratives, from one Twitter user gathering with others outside the home, and another reflecting on radio in the car:

Standing with neighbours listening to radio. #eqnz

Trying to get home roads are gridlocked National radio I love you #eqnz

The Tweets also provide some evidence of the role of radio in the period after the February quake, and communicate some of the disaster humour of that period:

Thank you Radio New Zealand. Keeping my wind-up radio close by. Also a comfort to know where my gumboots are. #eqnz (Christchurch, February)

Found some hiphop beats on my trusty AM Radio. Cranking* this candle lit club right now *Actual definition of cranking may vary #eqnz (Christchurch, February)

References to content in the tweets include some information directly translated from radio, but users in Christchurch and the rest of New Zealand tend to reflect on the kind of content carried by radio more than the information itself.

Praise to National Radio over #EQNZ coverage. If you ever needed to realise the value of good state broadcaster this is (September)

Well said! RT [user]: Kim Hill and Mary Wilson doing a superb job on RadioNZ. Our state radio outshines the state broadcaster #eqnz (September)

Yet again, radio is the place to listen to #eqnz coverage. No doubt this quake is much, much bigger than previous ones (February)

However Radio New Zealand was subject of many critical comments following the September quake, for the pre-programmed broadcasting of the Beach Boys' song 'Good Vibrations':

Most of the private radio music stations giving earthquake updates. RadioNZ, not so much. They're playing 'Good vibrations' #nzeq (Christchurch)

Oh. So Radio NZ is playing 'Good Vibrations' by the Beach Boys. ummm. huh. #eqnz (RoNZ, widely retweeted internationally)

Further criticism focused on the broadcast of the scheduled 'Storytime' programme for children at 6:30am:

Unimpressed at having to listen to storytime on radio NZ – perhaps a nice distraction to the listening folks in chch? #earthquake (RoNZ)

um, an earthquake just hit New Zealand and their national radio station is playing a fictional audio story? Not cool. #eqnz (RoW, retweeted twenty times)

Radio New Zealand responded to these criticisms in a special report on the station's quake coverage, observing that the stories were broadcast 'while newsroom resources and presenters were gathered for a three hour special programme to follow at 7.00 am', although 'Some listeners who tuned in during that brief period missed the earlier and later coverage and expressed concerns about Radio New Zealand's performance.' (Barr, 2010: 7).

The report also acknowledges responses to 'Good Vibrations', based on text message communication from listeners: 'While the choice of this track did receive positive feedback from some Cantabrians who appreciated the irony as they listened huddled under dining room tables, the rotate music was subject to some animated criticism on the social network Twitter.' (Barr, 2010: 7). RNZ's framing of these responses suggests that those who were listening over the longer term - by implication those within the disaster area - were more accepting of moments of radio that appeared irrelevant to those just tuning in briefly.

Twitter users in September 2010 also compared the coverage of different radio stations, and compared radio with television and Twitter itself:

Agreed! And the #eqnz twitter stream. RT @Zurtle: Of all the media coverage I've seen/heard, I reckon Radio Live has been the best by far! (Christchurch,)

One interesting side note – we have been relying on Twitter for ALL info since it happened. Much faster than radio etc #eqnz' (Christchurch, retweeted 17 times)

Twitter photos and reports the best, second is Radio NZ, TVNZ woeful #eqnz' (Christchurch)

At last, ta RadioNZ for news on what you're now describing as a 'clearly significant' earthquake in Christchurch. TVNZ, turn on the radio. (RoNZ)

This range of tweets suggests that radio and Twitter are comparable as sources of information, and that both were considered more effective than television in the immediate aftermath of the earthquakes.

As identified above, the most active Twitter users referencing radio after both earthquakes were located overseas, away from the disaster area, and few of these identified any particular connection to New Zealand, or Christchurch in their tweets or bio and location data. This suggests a high level of engagement with the web streams of New Zealand radio stations, to which people appear to have tuned in to find more detailed local information. After the September earthquake these tended to focus on more light-hearted aspects:

OK.. listening to NZ radio. People keep texting and emailing the station to report who's fallen out of bed. LOL #newzealand #quake (RoW)

However, after the more serious February earthquake, people seem to be using New Zealand radio more actively as a form of witnessing, and using Twitter to share their information and observations, demonstrating the technical ability to participate in a distant disaster in a form of performative spectatorship:

Listening to a radio talk show out of New Zealand...a 6.3 quake hit very close to Christchurch, damage said to be extensive. (Florida)

live audio stream of eyewitnesses calling into Auckland radio station from Christchurch earthquake zone <http://bit.ly/bTxHMS> thx @u62 (Washington)

However, here again the form of New Zealand radio is critiqued even while the disaster is being witnessed, in a manner that may suggest that the public broadcaster is technologically backward, or emphasises the urgency of the broadcast:

wow, listening to New Zealand radio nationals news update on the quake. The presenter is actually reading from printed off papers. #rare (Texas)

Other tweeters refer to coverage of the earthquakes, particularly the February quake, on their own local stations around the world, and here the form of witnessing becomes more immediate. These tweets tend to refer to the value of radio as a medium, emphasising its liveness and intimacy.

Just found out one of hubby's rellies is in Christchurch for work. I hope everyone's OK. It sounded bad on the radio on the way home! #eqnz (Brisbane)

Woke up to Radio telling me about new earthquake in #Christchurch! Certainly hope they can recover from it. Great place and great people! (Seems to be UK)

Radio is such a powerful medium. @CBCStephenQuinn chats w/girl in NZ re: earthquake as aftershocks hit. She reacts. I felt like I was there. (Canada)

A substantial body of international tweets are from radio stations overseas looking for people to share experiences of the earthquake live on air. There were a handful of these after the September earthquake, and many more after February, from stations including RTE in Ireland, and CBC in Canada. People also shared their experiences of being interviewed on international radio, and television, stations, creating a close interrelationship between radio, Twitter, and a global media environment. The Australian public broadcaster ABC dedicated a digital channel to rebroadcasting Radio New Zealand for nearly a month following February 22, with regular Twitter updates about the content.

Twitter was used substantially by people in Christchurch to share the experiences of the earthquakes, and by those in the rest of New Zealand and the world to share information and empathise. In this small subset of the overall tweets however there are insights into the role radio played for people within the disaster, especially when without electricity. Radio offers companionship and a sense of preparedness, as well as the kind of

connective work indicated in the narratives, and there is a strong sense of gratitude for the radio coverage expressed in the 'moment' through tweets, that is not communicated in the same way by more reflective narratives. However Twitter is most insightful as a source of commentary on the quake coverage of radio, television, and twitter itself, for acknowledging the coverage provided by radio stations overseas, and revealing international use of New Zealand radio web streams.

Conclusion

This research sought to examine how radio was used after the Christchurch earthquakes, drawing on personal narratives and tweets as archival records of experiences. Comparison of those sources reflected more than anticipated uses of radio for comfort and information, with contrasting accounts of listening to radio from within a disaster and using radio from a distance to witness the disaster. In the period after the earthquakes, radio surfaces in the narratives as the obvious medium for understanding what is happening as quickly as possible. Its ability to witness events beyond the listener's immediate environment is central to radio's role. In many radio-focused narratives it provides long-form companionship, particularly through periods without electricity. Television, in contrast, is framed as more emotionally resonant, seeming to confirm the reality of the disaster for people who were embedded in it. In the narratives, television also signifies an end point to the immediate dislocation of the disaster, when people regain access to electricity. In many of the narratives the time period between the beginning of the earthquake and a sense of safety, or televisual confirmation of what has happened, takes hours or days, which is just one indication of the long impact phase of the earthquakes, experienced through constant aftershocks. In the Twitter archive it is apparent that international Tweeters used New Zealand radio web streams to witness the local disaster, and then performed knowledge of it through Twitter, as a way of participating in the petit narratives of disaster (Chouliaraki, 2013: 168), implicitly expressing a desire to be not just an audience, but a, safely distant, participant in it. In the Twitter archive moments of media may be quoted out of the longer flow of coverage, and retweeted so that small moments of broadcast flow are given a far longer presence and reach. The audiences who used radio and Twitter in the immediate aftermath of the Christchurch earthquakes were embedded in the disaster or distributed around the world. They accessed radio in the midst of a local emergency or online from a distance. The archived Tweets and personal narratives demonstrate both the emotional connection to radio by audiences within the disaster, and the power of radio witnessing for listeners overseas.

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