#rescatemineros: global media events in the microblogging age

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Abstract

Contemporary media events are experienced within the complex scenario of convergence media. Broadcasting channels and traditional mass media coexist with online digital news channels and with countless social media services. This paper describes how a global media event (the rescue operation of the 33 Chilean miners trapped underground for 69 days between August and October 2010) can be observed through the communication occurred inside *Twitter*, the largest microblogging platform. The article proposes a data-driven methodology that, starting from a large data acquisition procedure, is used to investigate: a) what communication patterns emerged within the microblogging sites; and b) how relevant information is propagated through the microblogging network of users.

Keywords

microblogging; social network analysis; Twitter; information propagation; media events

Introduction: Monitoring global Media events in Microblogging sites

Our contemporary media experience is based on a continuous flow of information coming to our attention from all over the world. Despite the fact that we usually give a higher attention to those events happening closer to our everyday life (Luhmann 2000) we can be emotionally involved also with events happening very far away from us and having no practical impact on our lives. Usually we know these events through the media and our participation to the ongoing facts is mostly media based. Since the early work by Dayan and Katz (1994) media studies have thoroughly analyzed how media events are constructed and managed worldwide by media companies and their relationship with the concept of Public Sphere as defined by Habermas (1987). However, today for the first time we are facing a radical transformation of these concepts because social media raise individuals to a higher level of communicational power. What we are facing today has been described in terms of a networked public culture by Russell and Echchaibi (2009), showing how individual and interpersonal cultural production could come out of their isolation to become a new public language once again able to mix and stimulate mass media products and audience practices. Within this novel context media events are no longer a place for more or less passive audiences but constitute opportunities for connected publics to join this new form of mediated participation (Wohn, D. Y., Na, E.-K. 2011).

The 2010 Copiapò mining accident offered a great opportunity to observe how global media events appear when observed through the lens of social media, specifically through the lens of microblogging sites. This event can be briefly summarized as follows: on August 5, 2010 a cave-in occurred at the San José copper-gold mine in the Atacama Desert near Copiapò, Chile, leaving thirty-three men trapped 700 metres (2,300 ft) below ground. The miners survived underground for a record 69 days, until when all of them were rescued and brought to the surface (October 14, 2010). The rescue process (named *Operation San Lorenzo*) raised a huge global interest and emotional participation. While the whole history is surely dramatic and poses many questions about the safety of workers all around the world, what really caught the international attention was the Chilean national effort to save the miners' lives. As it is possible to see in Figure 1, which shows the average worldwide traffic related to the *mineros* keyword as reported by Google trends, during the first days the news of the incident had a small impact producing a very low amount of researches. The highest level of interest is not just after the collapse of the mine, nor when the miners were discovered to be still alive (August 22nd) but it happened to be in October when the rescue mission was first announced and then accomplished.

The final phase of the San Lorenzo operation was carefully prepared both from the technical and the media point of view and as such many international broadcasters showed it live and many users produced a live coverage of it through the social media. What we witnessed was a large active participation into the media coverage of the event itself. This participation involved several thousands of users worldwide in many different ways: some users decided to spread the news they were seeing on television to their online contacts while others wanted to comment about the occurring events or share their feelings and emotions.
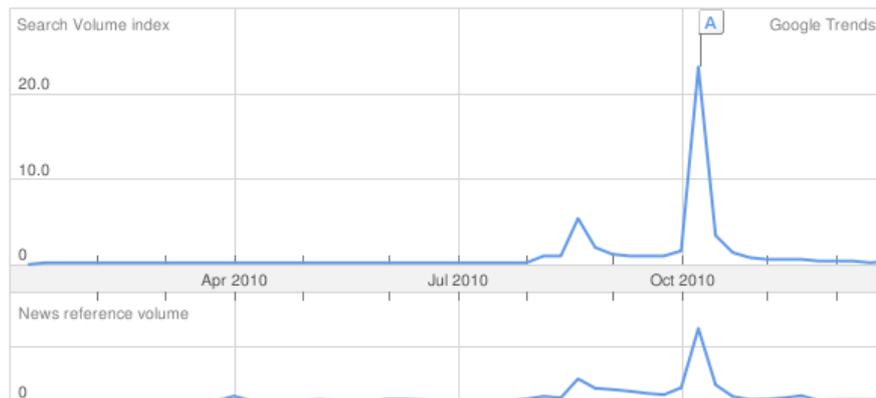

Figure 1: Web searches for "mineros" (source: Google trends)

The digital nature of these online communications gave us the opportunity to investigate several aspects of contemporary online media events. In order to investigate what happened in online communications about the #mineros rescue - as it was labelled on *Twitter* - we studied the *Twitter* messages produced during the event and we focused on two main research questions: (RQ1) what kind of *Twitter* communications take place among the users during a global media event? And (RQ2) how does information and specific messages (in our case related to the final phase of the rescue operations) spread within the *Twitter* network?

Microblogging data: collection and methodology

Since the whole event spans more than two months (69 days) and it is internally made of many overlapping sub-events (the collapse itself, the finding of the alive miners, the planning of the rescue operation etc.) we decided to focus our observation only on the rescue phase that corresponds to the higher level of interest and volume of communication. Therefore the data we deal with from now on concerns the time between October 12, 2010 (12:00 Chilean time), the day when the rescue operation started, and October 14, 2010 (12:00 Chilean time), the day when all the miners had been rescued at the end of a long and complex operation. In addition to

the huge amount of data available focusing only on the rescue operation allows the research to observe how social media communication interacts with a carefully prepared traditional media event since the rescue operations were broadcasted world-wide by TV channels from all over the world.

The data have been extracted from *Twitter* using an on line tweet archiver (twapperkeeper.com) (Kelly, B. et al., 2010) filtering messages containing the hashtag #mineros. The hastag emerged globally during the first phase of the crisis as a general tag to identify tweets related to this event. In addition we added to the dataset also an archive with tweets containing the hashtag #rescatemineros that was more specific to the rescue phase. This double query produced a cleaned archive of 30.169 *Twitter* messages. The (unavoidable) problem in filtering tweets about some news concerns the fact that hashtags are user-generated, and thus there can be relevant messages using rare tags or even without any tags. Obviously these messages may be lost, even if during global events even when an *official* hashtag is not provided consensus about the hashtag(s) to be used is usually reached in short time.

From these data we have extracted two networks: a first network where nodes represent users and edges represent direct communications between them – such as replies or messages addressed to a specific user - and a second network of users where edges represent information flows, i.e., a message ReTweeted by several users. In the remaining of the paper we analyze these networks to highlight the behavior of users with regard to the event under examination.

These two networks have different functions: on one side the direct communication network can be used to detect how the *Twitter* platform is used as a conversational place in order to support the sharing of messages and opinions among users, on the other side the propagation network can be used to study how and to what extent *Twitter* works as a social tool to spread information. In the microblogging context, in fact, concepts like final audience and visibility of a specific message are the result of a complex series of interactions between users. The final choice about what to share is up to every user. Users decide the *relevance* of the stories that end up into their feeds and decide how to behave according to different kinds of messages. As noticed by previous researches on microblogging sites by Honeycutt and Herring (2009), boyd et al. (2010) and Magnani et al. (2010) different communicative practices may coexist: while some users share information of general interest others are more concerned about what their specific audience might find interesting.

Within this user-centric selection of information when users share some news there is a known number of other users (their followers) receiving the message on their news feed. If some of them find it interesting the message will be probably re-shared and it will be thus kept alive and made visible to a larger audience. This *user-generated propagation* is the baseline of information propagation within the microblogging sites and within the specific context of *Twitter* is achieved through the ReTweet practice. In *Twitter* it is also possible to reply to specific messages, without making their content visible to the replier's followers, and it is also worth mentioning that ReTweets and replies are often specified by manually editing the messages and thus present a lot of variations sometimes difficult to identify (e.g., RT, RT:, via, using quotations, and with or without the @ symbol to reference the author of the ReTweeted message, etc.). As a consequence, which news is shared and how long it stays visible is induced autonomously by users' behaviors and decisions. Within this perspective the final audience of specific news posted by a user is not determined only by his/her first level of followers but is more specifically a matter of how many times that news will be re-shared moving away from the original audience toward a larger one.

Direct communication network: chatting alone together

We define as direct communication network the set of messages explicitly addressed to other users. This set has been extracted from the data by collecting all messages with an explicit reply mark @ within the body of the message. In order to avoid misleading data messages had to be cleaned from ReTweeted messages that usually include the @ sign (ReTweets have been analyzed with regard to the process of information propagation).

The goal of extracting the direct communication network is to highlight the messages exchanged among the users and to identify major hubs or highly intercommunicating users. The direct communication network has been extracted as described above and has been visualized (Figure 2) through the graph analysis software Gephi with a Force layout algorithm (Bastian & Heymann, 2009). It is worth noticing that the large majority of users exchange a very small number of messages with a small number of other users. The large group of nodes with only one connection visualized at the centre of Figure 2 represents users with just a single interaction with another user. Those are surrounded by users with more than one single direct interaction. The most interacting users are at the border of the visualization and have been colored to highlight the clusters.
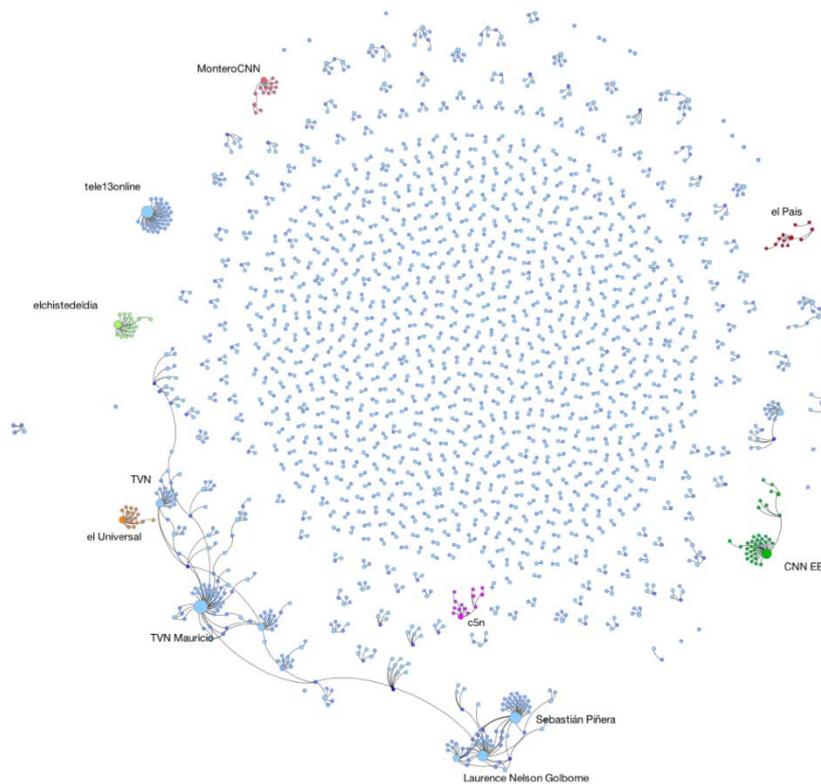
Figure 2 Direct Communication Network - different communicating clusters of users have been manually coloured and the name of the most addressed node has been added.

Now we can focus our attention on the most commented *Twitter* users (those who received the largest number of messages). Among them it is possible to find the major newspapers and television channels from southern America: *TVN* (the state-owned Chilean television station), *El Universal* (a major Colombian newspaper), *Tele13* (a Chilean news program) *C5N* (the Argentinian Canal 5 Noticias). These TV channels are followed by some international news actors like *El Pais* or the *CNN* (Spanish Edition).

Beside the official news actors it is possible to see how also the personal account of some journalists (who were live covering the news) generated a high level of communication from *Twitter* users. MonteroCNN (the *Twitter* channel of Carlos Montero news anchor for CNN en Español or those from Mauricio Bustamante (TVN Mauricio) have a large number of incoming messages showing how users seem to appreciate the opportunity of interacting directly with the news anchors during a crisis communication time.

In addition to those addressed to journalists or tv channels a large number of messages have been addressed both to the Chilean Prime Minister (Mr. Sebastian Pinera) and to the

Chilean Mines Minister (Mr. Laurence Nelson Golborne). What is worth noticing is that – similarly to what happens with the News channels accounts – this kind of communication is not necessarily bidirectional. Most of the journalists and politicians that receive *Twitter* messages do not reply to them but it seems to be a way for the audience to show its presence and to publicly address complains or emotions:

> LOS 33 #MINEROS EN LA SUPERFICIE !!!! GRACIAS @sebastianpinera @lgolborne A TODOS LOS RESCATISTAS Y A DIOS ** #VIVACHILEMIERDA #MINERS.

This message was clearly a joy expression broadcasted through *Twitter* but, at the same time, it addresses directly two user accounts. Within this context every distinction between personal and public communication collapses (boyd, 2008): the message is at the very same time broadcasted directly to the user's followers, aggregated through the #mineros hashtag for a larger and public visibility and notified to the mentioned users @sebastianpinera and @lgolborne.

The analysis of the communication network represented in Figure 2 shows also how local national communities seem to connect around a local influent node (typically a mass media actor). In Figure 2 we use different colours to highlight different groups of interconnected users representing different geographical areas. While the largest interconnected group (in the bottom right part of the picture) is easily identifiable with a Chilean cluster of users (all the hubs are belonging to the Chilean public sphere) it is possible to identify also clusters of interconnected users belonging to different countries: Argentina, coloured in green and connected to the *C5N* TV channel, Colombia, coloured in orange and connected to the newspaper *El Universal*, Spain, coloured in red and connected to the *El Pais* newspaper and other clusters harder to identify from a specific geographic perspective, like those connected to the Spanish edition of the *CNN* (coloured in green). The emergence of these geographical clusters is rather interesting since even if all the messages appeared into the global *Twitter* conversation (through the #mineros hashtag) the communication between the users seems to reproduce some already existing pattern of geographical or cultural proximity.

Propagation Network

In addition to the analysis of conversations it is also important to understand how information spreads within the network. To study this phenomenon we need to define when a communication act implies an information flow.

In many cases the identification of an information flow is an easy task. When a *Twitter* user ReTweets a message he/she is explicitly exposing this message to a new set of followers. This kind of propagation can be easily identified and visualized. Beside this kind of explicit propagation information can also be spread following alternative dynamics. For instance, a user might read some news posted by a *Twitter* contact of him/her and he/she might decide to autonomously post a new tweet on the same topic. Even in this case of implicit propagation we can nevertheless verify that that specific user had been previously exposed to that news by looking at the chronological sequence of messages and the following/follower relationship between the users.
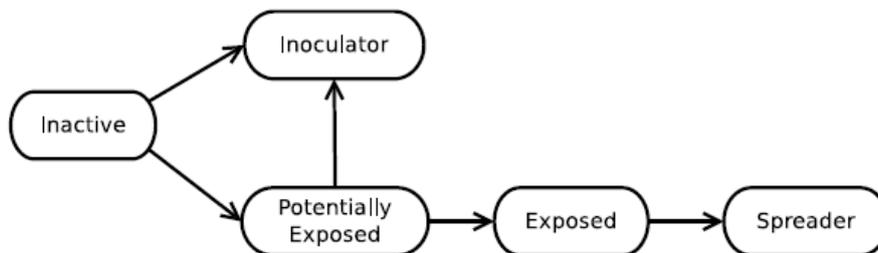

Figure 3 Possible states of *Twitter* users during the propagation process

From a formal point of view, any microblogging site can be described as an open system consisting of users communicating both inside the system and with the outside world. Users introduce new information into the site from the outside and propagate that information inside it. Before an event happens, all users are inactive with respect to that event. At some point after the event has happened users may learn about it from outside the site and introduce (inoculate) the news. These users become inoculators, and as a consequence other users following them remain exposed to the news. If some of the exposed users retweet the news, they propagate it, potentially exposing new users. The state diagram in Figure 3 illustrates this dynamic. To decide when potentially exposed users become exposed we applied the following assumptions:

1) If a user is exposed to some news from one of his/her contacts and ReTweets it we are sure that he/she read the message inside the microblogging site, therefore we can define a propagation path between this user and the poster of the message.

2) If a user is exposed to some news and writes a new independent message on the site, we cannot be sure he/she read the original message but we know he/she was active on the website. Therefore, we may assume there has been propagation.

With regard to the second point, we could add some time-related constraints, for example that if a user posts something on a topic months after a related message of one of his/her connections we cannot consider this a propagation. However, in the context under analysis where discussions usually last a few minutes and rarely more than a few days these constraints seem to represent an unnecessary complexity.

In summary, the ReTweet interaction is explicitly available in the data and indicates with certainty a propagation path if the user was not already active, although ReTweets are made in different ways according to alternative social practices and may be hard to identify. On the other hand, the last assumption may be used to identify additional propagation paths not explicitly represented in the data that would otherwise be lost. This model allows us to mark explicit and implicit propagation paths, and the result of its application to our data is represented in Figure 4.

The visualization in Figure 4 – obtained with *Gephi* and the use of a *Force Atlas* algorithm (Bastian & Heymann, 2009) – shows that information propagates through the network starting from several sources, constituting independent flows of propagation. Even if *Twitter* can be described as a social media tool with a broadcasting attitude, due to the non reciprocity of the following/follower system that often leads toward a one to many broadcasting of messages, it is interesting to notice than from a larger perspective, when it comes to propagation of specific information through the network, the system appears to have several sources where information are inserted into it. Online social environments are not a homogeneous continuum of interconnected people but, on the opposite, are made of several loosely connected communities. In substance, global knowledge is built upon a multiplicity of local knowledge spreading processes.
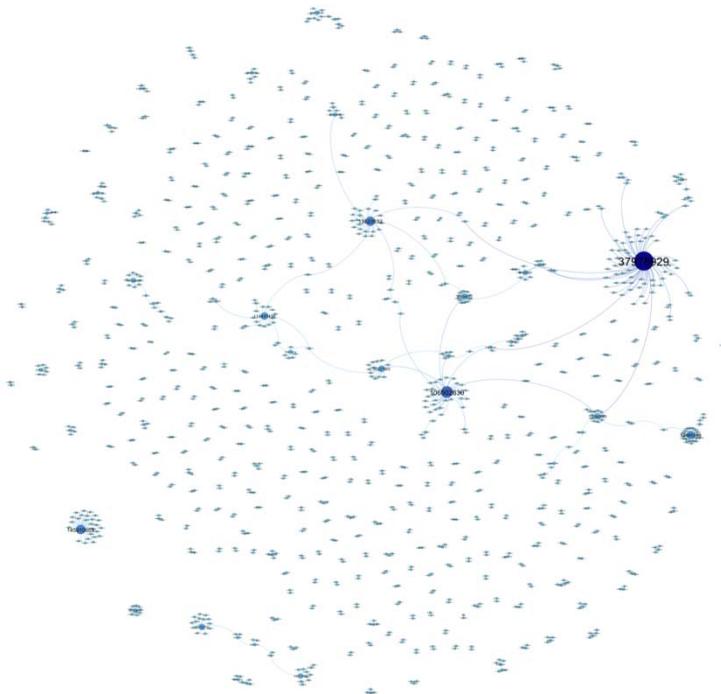
Figure 4 Propagation of #mineros messages through the *Twitter* network (only nodes with degree higher than 3 are displayed).

In a way similar to what we did with the direct communication network in order to identify the most prominent users we focused on the users that had a higher level of propagation of their messages. In Figure 4, due to the structure of *TwapperKeeper* data, nodes are identified by their *Twitter* ID instead of their *Twitter* username. Nevertheless converting *Twitter* IDs to *Twitter* usernames is a simple procedure then we can retrieve the username of most propagated users. These are id 37978920 (user: TVN_Mauricio), id 106502630 (user: TVN) and id 13623532 (user: sebastianpinera). It is interesting to notice that, as it happened in the direct communication network, the Chilean public television and the Chilean Prime Minister official accounts appear to be the most influent users. Messages from these sources are the most propagated and retweeted. While we are analyzing the consequences of these data in the following section it seems important to notice that users chose to broadcast official and reliable information sources. A final element that should be stressed is that several users seem to be active as ReTweeters or propagators of multiple users. As an example user ID 58386168 (user: An_dreM) ReTweeted messages both from TVN_Mauricio and from sebastianpinera acting as a collector and retweeter of several #mineros-related messages.

Discussion

In this article we focused our research on the rescue of the 33 Chilean Miners trapped into the Copiapò Mine from the 5th of August 2010 to the 14th of October 2010. The main goals of the analysis were on one side (RQ1) to describe what kind of direct communication emerges between *Twitter* users in terms of which users where involved and on the other side (RQ2) to describe how specific messages spread through the network of *Twitter*.

We have found that, as shown also by previous researches (Marwick & boyd, 2010), most of the users had none or very small communication activities while a very small number of users generate the larger part of the interactions. Similarly to what has been observed before (Wu et al., 2011) the most addressed users are famous persons in the offline world. Nevertheless within this specific context of crisis communication these users are not celebrities, actors or musicians but journalists (or official account of TV channels) and politicians. The centrality of this kind of users can be observed both into the direct communication network and in the propagation network. This suggests that not only their messages are judged as worthy to be spread (and trustable) by several *Twitter* users but that, at the same time, *Twitter* users use the microblogging site as a platform that gives them the opportunity to address messages directly to VIPs. This happens even if – at least according to our data – it seems to be mostly a single way communication with normal users addressing messages and referring to VIP users with no feedback.

The analysis of the direct communication network showed also some unexpected results. Users communication seems to stay within sub-networks geographically defined. As it can be seen from Figure 2 the large clusters of users exchanging direct communications are often based on a central user that is a mainstream media actor (a journalist or a TV channel). These media players appear to speak to specific geographical communities of users. In fact many major news actors from Latin America are present in the visualization: *TVN, Cn5, el Universal, CNN Spanish Edition, El Pais*, etc. Users, when it comes to the news on a dramatic event, still prefer to follow and interact with local players instead of an international news channels, or a local TV channel closer to the centre of the events. While this behaviour can be easily understood when there are cultural or linguistic differences between the users, in the Copiapò rescue operations this is not the case because the largest part of the interacting users and almost all the media actors were from Latin America or from a Spanish speaking countries. Nevertheless users seem to communicate according to a regional or geographical identity. Local

communities are clearly visible as clusters of connected users. Understanding why this happens even when every user is potentially connected with every other user no matter where they are based and especially being able to understand what will be the relationship between global events and local communities within the networked media surely requires more detailed research.

By moving on the analysis of the propagation patterns of specific messages within the network we have pointed out two different issues. On a first level of analysis it is possible to say that information propagates through the network starting almost simultaneously from several sources. These users propagate first the information to their closer community then information moves gradually toward a larger audience. Nevertheless the global knowledge is built upon the sum of local knowledge instead of being the result of an unstoppable viral propagation. Even within the networked context communities – often based on local identities as we saw before – still exist. Within these propagation processes VIP users (journalists, TV) have a strategic role. Their messages are those with a higher chance of being propagated and therefore they seem to be the primary source for the largest part of the stories propagating through the network. Nevertheless at the same time users that actively ReTweet messages play a central role into the propagation process by allowing to the message to move out of the first followers circle. Even if the ReTweet practice can be perceived as a practice with a low level of engagement it has to be said clearly that no propagation would be possible without it.

So far we have described the communication patterns that have occurred on *Twitter* during the rescue operations of the 33 Chilean miners and at the same we have identified some of the actors and processes involved into the propagation of a specific messages through the network. While these elements answer the research questions we have presented at the beginning of the article the data that we have collected allow us also to briefly touch a more general topic about the evolution and the future of contemporary audience experience. The data we have presented clearly show that users want to be part of contemporary global media events. Nevertheless this participation seems to be less interactive that it was thought to be. The largest part of the messages produced by the users does not generate any response and only a minor part of users – usually VIPs users – get a large number of replies and messages. At the same time low engagement practices such as ReTweeting have a central role in information propagation processes allowing messages to reach a larger number of users and therefore bringing news form something known within specific circles to something widely known within the society at large. While traditionally media events – as they have been described by Dayan

and Katz (1994) – left the audience alone, when it comes to contemporary media events supported by social media the audience is made visible and it plays and active role within the propagation processes. Even if this is undoubtedly a larger level of engagement than the one possible with mass media, today large real time conversations on the occurring events seem still far to come.

Acknowledgments

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