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Cover: A woman shovels mud from her driveway in the aftermath of the October 2010 debris flow that affected the Province of Vibo Valentia (Calabria, southern Italy).

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12. Re-assessing the role of communication in the aftermath of a disaster: case studies and lesson learned

Andrea Cerase[1]

Abstract

The scope of the chapter is to provide an interpretive hypothesis on the different functions of different media in the aftermath of a disaster, drawing upon theoretical and empirical literature and case-studies in the light of Uses and Gratification perspective. Moving from the way people engage with media and interpersonal source, the chapter addresses disaster communication in the light of both collective needs and its related social functions, considering how people actually interact with communication to cope with disasters.

A better understanding of the ways situational constraint, individual motivations, consumption patterns and communication cycles are arranged may improve our understanding of the whole disaster communication process, thus being very helpful to ground effective communication strategies, and to better understand the possible consequences of poor message shaping or use of wrong choices of channels.

The paper will also discuss complementary roles of broadcast media, interactive digital environments and interpersonal channels to inform public discourse on disaster, improving preparedness measures, giving voice to exposed communities and informing both individual and collective decision, as well as mobilizing human and collective resources to foster return to normalcy.

Keywords: Disaster communication, Media functions in disaster, Uses and gratification, Communication theory.

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1. Social functions of communication: a theoretical foundation

1.1. From structural functionalism to use and gratifications

A large body of studies on emergency / disaster communication is based on a source-oriented perspective, that looks at the whole disaster communication process in terms of actions, duties and responsibilities of who is charged on handling communication (sources), basically aimed at improving message circulation and its effectiveness on people's behaviours and attitudes, thus privileging a clear-cut fix-the-problem orientation (among others: Seeger, 2008; Heath and O'Hair, 2010; Lundgren and McMakin, 2011; Sellnow and Seeger, 2013; Lindell, 2018).

This chapter is intended to overturn the perspective, by considering the way both people and communities turn to communication (and media) to cope with disasters, to better understand what happens downstream messages, with a closer look to uses, functions and gratifications that motivate people to get and release information and to be engaged in disaster communication.

The key assumption about media role and functions in disasters derives from the assumption that "societies are more than the sum of their constituent individuals" (Durkheim, 1984). He was the first to realize that social disrupt is a fundamental feature of modern industrial societies, stemming from a chronic state of widespread lack of socially valued goals (anomie). Moving from the idea that social system has a paramount importance with respect to the individual, and tends to a state of equilibrium, resulting from an effective interaction between sub-systems (e.g. political institutions, law administration, economy, political parties and trade unions, social movements and so on), structural-functionalist theory was developed by eminent scholars such as Parsons (1951) Merton (1949a), Luhmann (1995) and, more recently, Alexander (1988).

Communication is seen as a relevant channel to convey, establish or reassert shared norms and goals, and media are held as a relevant part of the social system itself. According to Lasswell (1948), media are essential for system maintenance as they fulfil functions such as surveillance and control on the environment; linkage of the parts of society and transmission of values and social norms. Furthermore, such functions are likely to go far beyond the source's intentions, as to perform latent functions which consequences, although unintended or unrecognized, are relevant for the social system (Merton, 1949b).

Mass media are charged with complex and differentiated functions, being not confined to simply distributive maintenance of social system, that also include more complex forms of feedback control and knowledge distribution within different segments of population, thus widening gaps in knowledge and power (Donohue, Tichenor, and Olien, 1973).

Such a theory is one of the most complex and articulated theories in social science, also constituting a milestone in communication research (Bentivegna, 2005). "The general assumption is that communication works towards the integration, continuity and order of society, although mass communication also has potentially dysfunctional (disruptive or harmful) consequences." (McQuail, 2003: 68). Moving from these premises Uses and Gratifications approach (hereinafter U&G) was first theorized in early 40's, re-established and strengthened in 70's and later revamped as a promising theoretical tool to investigate emerging uses of information and communication technologies (ICTs) (Ruggiero, 2000).

U&G overturned the perspective of structuralism – functionalism and marked a pivotal turning point in communication research, thus replacing the paradigmatic question "what the media do to people" with "what people do with the media". U&G first introduced the idea of active audience, emphasizing the interaction between media and public as a voluntary and selective behaviour, thus challenging the idea of audience as a mass of passive individual receivers. Furthermore, media uses are deemed to satisfy other relevant latent functions, as keeping company or to mark the time of everyday activities (Klapper, 1960; Katz and Foulkes, 1962; Katz *et al.*, 1974).

Differently from functionalism-structuralism, U&G approach is focused on audience ability to use the media to achieve their goals and satisfy various personal and social needs as gathering information, discharge stress, share experience, and so on (Levy and Windahl, 1984). This kind of needs can be also fulfilled by family, peer groups, co-workers, through a variety of channels, and since people's attention is a scarce resource, media compete with each other to get public's attention (Katz *et al.*, 1973; Moores, 1994; McQuail, 2003). U&G is focused on the ongoing interplay between different sources, channels and subjective motivations, being therefore applied in researches about people's approach to media and communication in serious crisis (Peled and Katz, 1974).

Given the prominent attention to individuals' subjective motivations, U&G also provide a strong integration of both quantitative and qualitative methods (Ruggiero, 2000).

1.2. Media functions and gratification in disasters' context

These basic theoretical and methodological assumptions are helpful to address the multifaceted functions and roles played by communication in disasters' scenarios, according to the general hypothesis that communication is as a crucial resource both for social system and individuals because of its "regulatory" capacity, that may foster (or even hinder) disaster response capacity and, in turn, return to normalcy (Wenger and Parr, 1969; Quarantelli and Dynes, 1977; Austin et al., 2012). Audiences are deemed capable to interact both with media and other channels in different ways, thus feeding a broader, multi-layered communication process, in which media uses, institutional communication and individual gratifications are intertwined with other socially and psychologically relevant activities (Rubin, 2009).

When a disaster occurs, communication is charged with fulfilling a plurality of individual and collective needs: to get information about the event, to provide a coherent account of available information, to reassure people and to improve their self-confidence in coping with the situation, as well as to relieve stress, help people to overcome grim, sense of powerlessness and frustration, to make sense of the event and to re(connect) disrupted community ties (Peled and Katz, 1974; Houston, 2012; Lev-On, 2012).

From a psychosocial perspective one of the main functions of communication concerns the need of reducing the inherent ambiguity of situation, that represents a distinctive sign of disasters and crisis (Turner, 1978). When physical and social environment can not provide neither clues nor expert knowledge that may support in interpreting the situation, communication becomes a relevant resource to cope with disasters, as it integrates available information, helping people to face ambiguity and indeterminacy of the event. This process leans both on looking for information and on asking for consensual acceptance of the proposed definitions (Ball-Rokeach, 1973).

Such a mechanism is very relevant for disaster studies. When a disaster strikes people shall confront with novel emergent problems and the ability of providing adequate definitions of the situation is to be definitely intended as a primary goal of emergency communication, along with orienting mitigation behaviours and delivering self-efficacy messages (Lombardi, 2005: 80). People can make sense of the disaster by gathering information (about the event, support resources, actions, etc.) that will be interpreted in the light of emerging demands, including the primary need to restore sense of community (Paton and Irons, 2016).

The traditional view of disaster communication as a top-down delivery of information from an authoritative source (as agencies' officers or media) to a mass of passive individuals appears to be out-dated and inappropriate, as it provides oversimplified schemata of the process, deemed to result into an ineffective approach.

Taken by themselves, media and institutional sources alone are not enough to fulfil complex social needs, and people play an active role along all the communication process, being continuously involved in an information exchange through different channels, as to check validity, prioritize emerging issues and arrange information into a comprehensive and coherent structure. Information is not simply transmitted, as it is shared, interpreted, evaluated, decoded and loaded with different feelings, as to build both shared meanings and empathy. Disaster communication must consider that "(media) consumption represents only one of many media activities in which people engage" (Massey, 1995: 338).

The spectrum of these activities has been obviously enlarged as a consequence of the appearance and domestication of the Internet, that has ended to become as an essential part of our everyday lives. The social change triggered by ICTs, namely social media and mobile devices, has now ballooned to massive proportions, till to result in a radical and sometimes contradictory change of late modernity societies' themselves, being more globalized, more commodified, and more connected than ever (Haddon, 2011; Kaplan and Haenlein, 2012; Humphreys *et al.*, 2013; Couldry, 2014; Livingstone, 2015). Such radical changes also includes the way people approach to disasters, and ICTs are increasingly used to convey information spread early warnings and improve situational awareness also supporting dialog and organized action of citizens, volunteer, public authorities and other stakeholders (Wendling *et al.*, 2013).

The U&G approach has been successfully adopted to investigate the ways people were using the media during major crisis and disaster, as the 1973 Yom Kippur War (Peled and Katz, 1974), 1989 Loma Prieta Earthquake (Massey, 1995), the 1997 Red River Valley floods (Hindman and Coyle, 1999), the most stressful phases of the Hurricane Katrina (Macias *et al.*, 2009) and the 9/11 terrorist attacks in NY (Pew Internet and American Life Project, 2001; Morcellini, 2002; Dutta-Bergman, 2006). It basically assumes that during a disaster people would differently approach media usage within wider patterns of communication, and the ways they do it has a fundamental relevance to shape collective response, also resulting in different needs and patterns of media / interpersonal communication use.

Fraustino and his colleagues (2012) analysed social media uses during a disaster. They identified convenience, social norms, personal recommendation, need to relief stress through humour, to check in with family and friends, to self-mobilize, and fostering sense of community and emotional support as factors that motivate online communication. Anyway, major relevant uses revolve around cognitive needs such as information seeking, the will to get timely and unfiltered information and to estimate disaster magnitude. Other studies highlight the psychological benefits provided by social media, and their role in making people feeling as a part of a like-minded community, improving their ability to feel relieved (Neubaum *et al.*, 2014).

2. Communication and disasters: between continuity and disrupt

As a result from both increasing mediatisation of society, and the process of growing integration of communication and related technologies in any social activity, disasters acquired a two-fold nature: they are not only about physical events per se, as they may be dramatically amplified or attenuated by social interactions between individuals, social groups, institutions, media, government agencies and other policy-makers (Kaspersons *et al.*, 1988). By definition socio-natural disasters, together with other critical events, are caused or magnified by "wrong" human interventions on environment that enhanced the vulnerability of human beings and communities in the affected areas (Guha-Sapir *et al.*, 2014; Mela *et al.*, 2017). Disasters namely arise from the combination of a hazardous event (earthquakes, volcanic eruptions, tsunamis, hurricanes and tornadoes) and a vulnerable "built" environment. (Turner *et al.*, 2003; Birkmann, 2006).

Although disasters can be triggered by a natural event, their consequences are due to social factors such as unauthorised buildings, intensive mining, poor land use plans and building codes, which in turn result from inequality, unfair deployment of resources and distribution of power, lack of democracy in environmental policy (CRED/UNIDSR, 2015). These factors are at the basis of the increasing vulnerability of socialized environment: their consequences are everything but an "act of god" and could be therefore predicted and prevented by means of human knowledge and rational decisions (Chmutina *et al.*, 2017).

Disasters can trigger sudden and long lasting perturbations of social structure, able to pose serious threats against the physical environment and social structure, also jeopardizing the validity of social norms. Such vulnerability also depends on the way knowledge circulates and it is shared,

inasmuch risk awareness and mitigation measures are always made possible and mediated through (risk) communication, regardless the direction of flows, their purposes, and channels used to convey messages (Plough and Krimsky, 1987; Renn, 1991).

Within the proposed approach, disaster communication fulfils two main manifest and latent social functions: 1) *restoring the symbolic unity* of the physical and social environment and 2) *strengthening community networks* to enable people's capacity to self-organize and respond to disruption. Information must be seen a symbolic resource, continuously exchanged within and between communities, enabling social action and feeding feedbacks within social system (e.g. media coverage of recovery phase). This process does not only involve broadcast media, as messages flows are mediated through interpersonal networks, having a primary role in situation-setting and also fostering the creation of socially shared images of the "new" reality of the disaster.

These representations and narratives provide a general picture of the situation allowing people to understand how to act, making possible a more effective mobilization of both available material and symbolic resources, also strengthening the social ties between members of the community, thus improving the effectiveness of recovery process and facilitate the return to normalcy. In a long-term perspective, they also contribute to the creation of a social memory of disaster, deemed to be a crucial factor to explain people's attitudes toward future risks (Adger *et al.*, 2005).

Such communication function "emerges in the manner in which media frame a disaster, thereby contributing to a complex combination of public risk consciousness and disaster-related issue amplification or attenuation" (Rausch, 2014: 275). Furthermore, people interact with media and engage in communication within the framework of everyday activities. As disaster trigger a radical change in daily interactions with the media, people are likely to return from "unusual" media activity to "usual" media activity within few days (Massey, 1995).

Communication provides relevant resources to bring order into a disrupted / discontinued reality, creating sensemaking structures both of "normal" and "risky" events. Borrowing a basic assumption of cognitive and social psychology, information and meaning are not self-evident neither neutral, as they are first organized and understood within shared cognitive structures (frames) being used to make sense of experience and to provide a base for setting social situations and to inform behaviours. In view of this, the idea of sensemaking structure (Sellnow *et al.*, 2002) has a close kinship with other similar concepts from social sciences being applied in risk and disaster studies, such as mental models (Morgan *et al.*, 2002; Zaksek and

Arvai, 2004) or social representation theory (Moscovici, 1981, 1988; Breakwell, 2001; Joffe, 2003: Joffe *et al.*, 2013). These approaches have characteristics in common, as they recognize communication centrality in creating / shaping disasters' reality.

Disasters may trigger the collapse of pre-existing sensemaking structures, relationships and understandings of the event, also fostering the emergence of new ones. Hence, a prominent function of communication consists in rearranging scattered fragments from a chaotic reality within new coherent cognitive structures. Such a process is often conceptualized as "framing" and it is basically intended as "a way of giving some overall interpretation to isolated items of fact" (McQuail, 2003: 379).

Framing involves a selection of some aspects of a perceived reality and their salience / prominence, as to promote causal interpretation, moral evaluation, and/or treatment recommendation or remedy for the item described (Entman, 1993). Framing issues related to disasters are both relevant for common people, legislators and policy makers, as frames connect various sources of knowledge to inform decisions, practices and policies (Wisner *et al.*, 2012). This process involves different channels and sources at different stages and times: media, interpersonal channels and governmental / institutional sources. On the other hand, disaster communication must be seen as a mean to restore community ties. Since audience should be considered as active, individuals are deemed to play in turn a pro-active role in the whole emergency communication process, by selecting, gathering and relaying information through their interpersonal communication networks. When a disaster strike, a relevant part of the audience feels to be urged to alert relatives, friends, neighbours and significant others, in order to be ensured about others' safety and to seek for confirmation and further information about the ongoing event.

A number of studies have shown that, on the occasion of disasters or high-impact events, the importance of the media turns out to be relatively secondary with respect to interpersonal sources, in particular for warning dissemination (Drabek, 1969; Drabek and Stephenson, 1971; Perry, 2007). Research data also stress word of mouth and other interpersonal channel as first sources, also speeding-up the diffusion of the news (Greenberg, 1964; Mayer *et al.*, 1990; Greenberg, Hofschire and Lachan, 2002; Morcellini, 2002; Roger and Seidel, 2002; Kanihan and Gale, 2003). Interpersonal networks are a primary channel to spread information on hazards characteristics and evolution, and a better understanding of their functioning is needed to improve warning dissemination strategies about imminent risk (Lindell, 2018).

Both direct and technological mediated channels (Twitter, Facebook, Whatsapp) may support the diffusion of news across such networks, thus improving diffusion rates of messages, the effectiveness of operating early warning systems and the ability to collect relevant data from disaster area (Earle *et al.*, 2010; Chatfield *et al.*, 2013; Kryvasheyeu *et al.*, 2016). Furthermore, as the diffusion of portable technologies grows, direct witnesses or first information responders play a pivotal role in disseminating information about an ongoing crisis to the members of their interpersonal networks, who are also more likely to accept these messages as reliable information (Omilion-Hodges and McClain, 2016).

3. Three cases studies

To better assess the uses and functions of media in a disaster we will consider three well – known case studies: the 9/11 terrorist attacks in NY (2001), the Katrina Hurricane in Louisiana (2005) and then the Great East Japan earthquake and tsunami (2011). These three major disasters have relevant characteristics in common, fitting the scopes of this paper. All these event have clear-cut boundaries around place and time, had a relevant impact even at a global scale, triggered both relevant media coverage and on-line communication flows and were subjected to extensive research efforts from both communication and disaster scholars, including papers referable to U&G theoretical framework.

Following Simons' analysis of current definitions, a case study is aimed at addressing the complexity and uniqueness of particular project, policy, institution, program or system in "real life" through an in-depth exploration from multiple perspectives of the context, in which a single case is aimed at resuming and generalizing a larger set of similar events (Simons, 2009: 21).

The first descriptive observation is concerned on the way changes in mediascapes affected scientific methods, themes and subject matters. This concept is referred both to technological means to produce and disseminate information and to the consequences deriving from the diffusion of means themselves (Appadurai, 1996). In the described scenario, also disaster communication has been affected by such a profound socio-technological change, and researchers' attention appears to be having gradually shifted from the analysis of how traditional broadcast media are used (e.g. Massey, 1995) to the more advanced forms of digital volunteerism enabled by digital media (e.g. Starbird and Palen, 2011).

Along the last decades, as a consequences of the growing penetration of ICTs in modern societies, as well as their increasing domestication within

users' daily lives, the main focus of the U&G studies in disasters situations has slowly shifted from broadcast and printed media to social media uses, even though they still continue to be complementary information resources in the aftermath of a disaster. One of the main reasons appears to be the surprising ability of user to personalize technologies, even "re-inventing" them to fulfil new needs emerging from disaster itself. Zemp (2010) noticed that tremendous structural change occurred in media systems, thus modifying their own logic and goals. This radical change created an opportunity to better address media shortcomings and explore advanced uses of ICTs in disaster field. A study of the Pew foundation about American public on a typical day, not related to any specific event nor disasters showed that although local and national cable TV were the most important news source for over 70% of the interviewees, more than 60% were used to get news from somewhat on line source and 37% of Internet users were experienced with sharing new stories through their personal social media (Purcell *et al.*, 2010).

3.1. 9/11: a broadcast media disaster

9/11 may provide a number of insight on the way people approach breaking news about an ongoing disaster. For some aspects, 9/11 may be considered as the last broadcasted disaster, since traditional media and TV networks have been the main channel in disseminating the news and providing information, with a relatively minor impact of ICTs. Since late '60 disaster research has focused on the role of the mass media in mass emergencies. Broadcast media are still nowadays relevant, but their value as first source is often related to the particular social situation in which they are used. Albeit the role of radio in providing first information is well-recognized since first researches on flash floods in late '60s (Drabek, 1969), the 9/11 event provides a number of evidences about its prominent role in the diffusion of the news. Similar percentages of people who heard first news from the radio (roughly between 20 to 30 %) have been found in different researches respectively conducted in Southern California, Arizona, Italy and Germany (Cohen *et al.*, 2003; Roger and Seidel, 2002; Morcellini, 2002; Reuband, 2010).

Unfortunately, the 9/11 disaster also proves that a generalizable explanation about media ability to provide the first information appears to be a quite remote possibility rather than an empirical reality. Same events can, in fact, result in a very different usage of the available channel according contingent factors such as time zones and related media

consumption patterns, that may be influenced from being asleep, driving on the way to work, being at home in front of the TV set rather than staying at work (Cohen *et al.,* 2003; Roger and Seidel, 2002; Reuband, 2010). Anyway, radio is still nowadays a primary and supplemental source (Steelman *et al.,* 2015), as it is one of the more prominent channel through which at-risk populations receives vital information regarding the disaster (Andersen and Spitzberg, 2009: 217) even in the case of malfunction of other media (Perez-Lugo, 2004).

The usage of different sources may differ substantially according to the contextual situation of the receiver, thus making impossible to individuate a clear pattern of channels usage. Saying it with an old and always valid adage, a mix of channels incorporating news media is still nowadays the best strategy (Perry and Lindell, 1989). Redundancy and differentiation of channels are at once effective and indispensable to effectively spread information both in organizations and general public, also fostering extensive retransmission of messages to quickly reach a broader audience (Sutton *et al.,* 2015; Perreault *et al.,* 2014; Stephens *et al.,* 2013; Nicholls, 2012).

Evidence from other research suggests that a high exposure to media is very likely to result in negative sentiments such as anger, depression, confusion and fear. Nevertheless, the need to get a relief from the distress triggered by the initial alert along the lack of alternative viable sources push individuals to search compulsively information through the media, as to restore their images of the world and get timely information to follow the return to normalcy (Lachlan *et al.,* 2009).

In the wake of 9/11, others demonstrated that gender is likely to significantly affect source choices and perceived usefulness, displaying different pattern of media consumption on behalf of male and females. More precisely, women were found more likely to perceive television and radio usefulness with respect to males; printed media usefulness was not significantly influenced by gender, while Internet was perceived as more useful by males (Spence *et al.,* 2006).

3.2. The Katrina Hurricane

Albeit Katrina Hurricane is deemed to be a tremendous failure of Institutional Disaster Communication, it also provided a fertile field and huge amount of relevant insights for both scholars and practitioners (Cole and Fellows, 2008). In particular, the poor response capacity of both media and governmental agencies triggered an increased attention of researchers to

the way (common) people faced the collapse of communication infrastructure, thus reinventing the way traditional and digital media have been utilised. ICTs played a pivotal role: as an example, they have been successfully used to find out people and to restore connection with displaced ones within the little community of New Orleans musicians, overcoming mobile phones call failures: people quickly realized that text messaging on their phones worked, and along with e-mail, blogs and other interactive service they can get information, find out friends and co-work and restore the sense of their little, fragmented community (Shklovski *et al.*, 2010).

Burnside *et al.* (2007) found that sources of information are relevant predictors of people willingness to evacuate in case of an event, along with risk perception and previous experience of similar events. More in particular data shown that media and public officials are often the first source people seek: media effectiveness as a predictor of evacuation has not emerged immediately, but after a closer examination of data about visual images of damages. In other words, media become actually relevant only when capable to convey images that may help people to assess the seriousness of disaster consequences.

The lack of appropriate information on the self-effective measures to be undertaken in case of an event is as a critical issue in disaster communication. An analysis on 293 emergency-related news stories on 119 local television news websites shown that although almost all the selected sources provided information on disasters (96%), "mobilizing information" with directions on proper behaviors to adopt was present just in less than half of the online news stories (44%), a poor way to foster behavioral changes (Tanner *et al.*, 2009). Anthony and Sellnow (2011) investigated media usage, arguments and information sources perceived as most credible by coastal Mississippi residents hit by Hurricane Katrina. The research revealed a strong preference for local sources fostering message convergence versus those messages that generated divergence, thus resulting in a clear preference for local media sources and strong discontent for National media, held to be unethical for having reported inaccurate and sensationalistic account of death tolls and overly personalized stories. Such a research advocates for the relevance of perceived quality of information and people's need to have a fair coverage of the events they're involved in.

3.3. The Great East Japan earthquake and tsunami

The 2001 great East Japan earthquake and tsunami, along with the following Fukushima nuclear disaster have represented a major turning point in disaster communication research, once again triggering researcher attention on the way communication was approached and personalized by people, that resulted in the publication of important papers. A research team challenged the alleged clear-cut distinction of mass media and ICT roles, where the first ones broadcast verified messages and information from few sources to passive audience (one-way model), while second ones would enable users to actively create and share their own content over the Internet acting as gatekeepers within their horizontal networks. Data shown that using of both ICT and mass media is linked to some positive effects use in the post-disaster recovery, but at the same time audiences are also passively subjected to influences from different media (Cheng *et al.*, 2015).

Another study shown that the intention to share news about an ongoing event on social media is influenced by different types of gratifications, as status seeking to attain popularity among peers, and prior experience in sharing news in their social platforms (Lee and Ma, 2012).

Jung scrutinized social media uses in the aftermath the Great East Japan Earthquake, finding two major reasons to use: communicating with others and understand what was going on. Not surprisingly, although Twitter was the most important social media for almost two people on five (39,1%), Facebook was the most used platform to get in touch with friends and relatives (35,5%), whereas Twitter was most used to get information (31,3%). Jung also provided an analysis of media used to get information on the evolution of Fukushima nuclear plant accident, showing that TV was the first source (> 75%) both for social media user and non-users. The main difference concerned ICTs non-user, printed newspaper received much more attention by such non-user (42,5%) compared with user 11.9, while radio had a penetration rate of 12,5% in non user and only 1,2% for users (Jung, 2012).

In another study on three catastrophic disaster occurred in Australia, New Zealand and Japan (including the Japanese earthquake and the tsunami) authors found that social media, namely Facebook was seen as an alternative channel to engage with others after phone and power lines malfunctions, still remaining accessible through mobile phones. People used phones to post messages, sourcing information and responding to requests for help, thus resulting as a relevant resource to facilitate positive conversations, to develop trust-based relationships, and to engage with communities (Howell and Taylor, 2011).

Digital media may also provide an opportunity to express emotions and grievance for losses, facilitating the process of overcoming crisis and public trauma. After the disaster people were used to use their mobile phone (*keitai*) to help ease the pain and support new forms of mediated intimacy, also providing occasions to self-isolate to avoid suffering (Hjorth and Kim, 2011).

Different media uses were also found to be related to different levels of concerns for the disaster. A research on a sample of 1560 residents of Soma city, in the Fukushima prefecture jointly investigated media consumption and people's attitude toward the nuclear disaster. Summarizing the results of the multiple regression analysis, three main factors emerged: fear for social disruption, fear for the future and fears for radiation health. The first factor was associated with hearing radio news, the second with reading national and regional newspaper and heightened levels of fear and anxiety were related to local newspapers consumption (Sugimoto *et al.*, 2013).

4. The disaster communication cycle (a preliminary conclusion)

In the aftermath of a disaster, media channels along with ICTs and interpersonal source play different and complementary roles, performing different functions in response to arising social demands. Such social and psychological functions are differently arranged at each stage of the process and span from disseminating early warning messages to setting a public space for policy debates on mitigation measures. Social functions and individual needs appear to be mutually connected, to the extent which both they depend on shared social definitions of reality, which normative power lies in the society itself. The co-creation of shared social definition of disaster reality provides symbolic means deemed necessary to face disasters and foster a quick return to normalcy.

Levy and Windhal (1984) focused on the communication sequence, defined through three temporally ordered stages: before, during and after the media experience, providing a meaningful typology of goal-oriented uses and gratification that can be respectively chosen and obtained through the media at each stage. First, selective exposure to media results from prior experience, so that daily uses of media is likely to predetermine the channels that will be used in fulfilling primary cognitive needs. Second, during the exposure phase, meaning will emerge as a result of both collective and individual information processing, along with an assessment and a deeper understanding of available messages. Third, after the exposure, once gratifications are obtained, contents are used both as to orient purposive

action and as a "coin of exchange" to interact with others and to enhance personal influence within their social networks.

We can therefore try to identify and characterise the ongoing disasters communication cycle by splitting it into four discrete stages. Given a certain arrangement of social need and individual gratifications, people differently engage with media, ICTs and interpersonal channels at any stages, using and combining available information to build a comprehensive idea of what's going on and what's next. In addition, people also try to express their feelings, to address the relevance of the event, also with regard to the emotional / physical "closeness" of the disaster (Correa *et al.*, 2016).

Such functions are performed through different channels in different moments, as to provide new knowledge about life, conversational material and advice on how to behave in a certain social situation. Both information and entertainment contents can be helpful to relief the stress; to cope with uncertainty, indeterminacy and ambiguity and to restore a comprehensive structure of perceived reality (Atkin, 1985).

The whole cycle may be summarized in four discrete moments: 1) first information (getting the early information about the event); 2) reality check (seeking information to understand whether information is true or false and collect additional information about event's features); 3) relaying information / social interaction across individual social networks as to disseminate information or being advised through interpersonal channels (Interpersonal Network Diffusion) to and 4) frame building, by which shared definitions of the disaster are built within the feedback loops between media and public, providing the big picture of the event as to enable purposive action, to overcome ambiguity and confusion and bring order into the disrupted reality.

4.1. 9/11: broadcast media as first source

Although it should go without saying, disaster communication cycles are initially triggered by single information, reaching individuals through different channels. In the immediate aftermath of the event, people are mainly concerned to quickly receive the first information, and to get a preliminary idea about what's going on. Disasters response effectiveness, along with community resilience, lean on the ability of media and institutional sources to timely respond to information demand and to satisfy people's cognitive needs, thus minimizing the informational gap between the curve of demands arising from the public and the response curve, that

measures the amount of information made available by institutional sources (Lombardi, 2005).

Source prominence and credibility are first related to their ability to make information available in a timely manner, whatever people are doing at that moment, even if driving, working or staying at home. Hence, source selection and effectiveness depend on a pre-established pattern of media usage within the contextual situation, on the basis of channels' exposure during daily activities and slow / sudden disaster's onset.

The effectiveness of disaster communication is enhanced by message redundancy through multiple channels, since individuals have other things to do than continuously monitoring media, since they are engaged in many different collective activities in different places (Dynes, 2006). Both media and interpersonal sources are more likely to get used as first information source when available, spatially closer to the recipients and / or easy to access: early knowers might be already listening a media source or having a device at the hand (Morcellini, 2002; Rogers and Seidel, 2002; Kanihan and Gale, 2003).

Interpersonal communication may occur both through simple word-of-mouth and technologically mediated channel (phone, mobiles, web application). It is still recognized as a primary source along with broadcast media, even though people may switch to other channel once received first information. Once received the first information, whatever the first source was, people are very likely to turn to broadcast media to validate and better understand what they have just knew, also to find out more about the ongoing crisis (Greenberg, 1964; Greenberg et al., 2002; Kanihan and Gale, 2003).

The Internet and the social media triggered a radical and irreversible transformation of the whole mediascape: since their availability to an increasing number of people and Internet, social media and micro-blogging platforms are more and more likely to play a crucial role as first information sources (Greenberg *et al.*, 2002; Lindell *et al.*, 2005; Comunello *et al.*, 2016).

Unfortunately, 9/11 disaster also proves that a generalizable account of the roles of single media ability to provide the first information appears to be a quite remote possibility rather than an empirical reality. Same events can indeed result in a very different usage of the available channel according contingent factors such as time zones and related media consumption patterns, that will be obviously influenced from the activities being carried out at that time: being asleep, driving on the way to work, lying on the couch in front of the TV set rather than being at work (Cohen *et al.*, 2003; Roger and Seidel, 2002; Reuband, 2010). Anyway, radio is still nowadays a

primary and supplemental source in disaster, as it is "still one of the more prominent means through which at-risk populations receives vital information regarding the disaster" (Andersen and Spitzberg, 2009: 217). Redundancy and differentiation of channels are still at once effective and indispensable means to spread first information at best.

4.2. Information seeking: searching for a verification

Once received the first news, people are likely to collect information from any available source to satisfy their essential cognitive needs and to inform their decision about how to cope with disaster (Sorensen and Sorensen, 2007; Sutton *et al.*, 2008). Whatever was the first source, people are also likely to switch to broadcast media and ICTs to validate and better understand what they get, also finding out more about the ongoing crisis (Scanlon, 2011). The consequences of disasters may be indeed amplified by the lack of additional information on certainty, severity, and immediacy of the threat, and on possible mitigation measures to be undertaken (Jungermann *et al.*, 1996; Seeger, 2002; Lindell and Perry, 2012).

Credible sources are more likely to promote compliance to warnings, whereas messages from less credible sources tend to prompt further information seeking (Mayhorn and McLaughlin, 2014). The relevance of source's credibility and reputation results appears prominent whatever the channel is: broadcast media (Mileti and Fitzpatrick, 1992) Internet (Taylor and Perry, 2005) and social media (Westerman *et al.*, 2014).

Source credibility and trustworthiness are relevant at this stage, strictly depending on perceived consistence of messages issued. In such a sense, verification process is aimed at checking whether media and Institutional channels can confirm the event, as to reduce uncertainty through contents' comparison across different channels and sources. In the verification phase messages are more likely to be considered trustworthy when they are redundant and consistent across diverse sources and channels (Anthony and Sellnow, 2011).

The media also play an institutional role in disaster governing process, for their inherent capacity to gather and relay information and to provide a place to display information, countering the inherent fragmentation of institutional context (Miller and Goidel, 2009).

4.3. Are media and interpersonal sources complementary?

Individuals play a pro-active role in the whole emergency communication process, by selecting, gathering and relaying information through their interpersonal communication networks, disseminating messages to relatives, friends, neighbours and significant others, in order to be ensured about others' safety and to seek for further information about the ongoing event.

The will to get in touch with others satisfies the primary need to cope with the frustration from feeling powerless, as well as to give a helpful hand to others. It is not by chance that Disaster Reduction Management is nowadays attempting to fully embed both interpersonal communication and social media within their Emergency Management strategies (Veil *et al.*, 2011).

It is also believed that digital volunteers will play an increasing role in gathering, organising and making information available to improve rescuers' situational awareness and their ability to allocate scarce resources such as water, drugs, temporary shelters (Starbird and Palen, 2011), to foster and channel convergence process of citizens and information at disaster sites (Schmidt *et al.*, 2017), to draw live participative crisis maps through Facebook and Twitter, providing a similar or improved accuracy with respect to authoritative sources (Whittaker *et al*., 2015), as well as to create Virtual Operations Support Team as to monitor social media communication, engage public, and handle tasks that can be performed remotely through digital media (Denis, Hughes and Palen, 2012).

4.4. Framing the event

Media are called upon to fulfil relevant and complex symbolic functions, including gathering information, promoting social exchange, providing emotional support, evoking past experiences of similar situations and provide causal explanations of the ongoing events (Stallings, 1990; Massey 1995; Perez Lugo, 2004; Miles, Morse 2007). Disasters challenge people to face uncertainty and ambiguity: assessing their potential impact on their lives, household and properties could be very uneasy and uncomfortable, thus feeding a genuine appetite for information about the ongoing events (Miller and Goidel, 2009; Koopmans and Vliegenthart, 2010; Wein *et al.*, 2015; Correa *et al.*, 2016). To get a comprehensive idea of a disaster, the concept of frame has a primary role, as it is a "a central organizing idea or story line that provides meaning to an unfolding strip of events" (Gamson

and Modigliani, 1987: 143). Frame building is influenced by a number of communication players and media play a primary role, providing an institutional arena where relevant issues are defined as a result of a competition for publics' attention: different players contenddifferent definitions of disaster's reality, including both causal explanations and assignment of responsibilities (Hilgartner and Bosk, 1988).

Frames are likely to change as a consequence of the way such players are able to impose their definitions of reality. In the aftermath of two recent earthquake disasters occurred in Italy in 2012 and 2016, media partially changed their way to approach scientific issues, giving more room to prevention (e.g. retrofitting) with respect to the analysis of ongoing physical phenomena (seismogenic mechanisms, intensity of aftershocks or fault location), thus anticipating and addressing political decisions which would have followed the recovery phase (Cerase, 2017).

Media have a prominent role in frame building, as a consequence of their ability in disseminating messages to a vast public.

Nonetheless, framing also entails the possibility of erroneous, misleading or biased narratives, as it happened for an exaggerated coverage of both rumours and fake news, being circulated to inflate unfounded news, support conspiracy theories, "troll" others by baiting and provoking on-line, to make fun or outwit journalist, but first and foremost to blame or attack individuals or groups (minorities, scientists, government officers and so on).

These "dysfunctional" approaches to communication are very likely to occur in a disaster situation. Stories such as the alleged looting incidents, on steps being taken to prevent it, and, on how unusual was not to be preyed on by looters in the aftermath of Hurricane Katrina (Tierney et al. 2006). A similar "looting frame" has been used by Italian media after the Amatrice Earthquake of August 2016, although the news of the alleged Roma looters has been subsequently demonstrated to be unfounded (Cerase and Santoro, 2018). During the Hurricane Sandy researchers observed a proliferation of fake images of the event, including manipulated images of storm cells and sharks allegedly swimming in the inundated streets of New Jersey (Gupta *et al.*, 2013).

Italian seismologists are not immune to miscommunication: social media have played a crucial role in spreading a false prediction about an impending earthquake in Rome, later covered also by traditional media (Nostro *et al.*, 2011) and a number of gratuitous allegations about purported manipulation of magnitude data (La Longa *et al.*, 2014).

This analysis provides some relevant suggestion for communication strategist and officers to improve disaster communication usefulness and effectiveness. First, publics' needs and ways to engage with media and

communication should be put at the first place, along with evidence from research on possible uses and gratifications people expect after being engaged in disaster communication. Second, it is recommended to provide timely information through multiple channels, also considering the way and the reasons why recipients use different channel at different stage of disaster. Even though people are not expecting such messages, remind that everybody has the right to get information can save lives and properties, regardless of who is the receiver, where is staying and what is doing at that moment.

Assume that whatever the source is, people will immediately turn on media or Institutional sources to confirm first information and to make a first, temporary idea about what's next. Consider any possible limitation of channels, including communication infrastructure collapse, languages or technological issues that may prevent people to get such information.

Always keep an eye on feedbacks and information sharing and always consider the potential of social network and micro-blogging as relevant sources on the ongoing situation as well as potential threats. Consider people's need to get a comprehensive view of the event and its consequences, rather than flooding them with useless messages. Improve contents structure; prioritize messages and quality of visual information to viewers. Be always present and respond to people's need of information and clarification and become a towering presence among the voices talking about disaster.

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