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Ebola in the Public Sphere: A Comparison Between Mass Media and Social Networks

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Abstract

This study examines how Ebola is transformed from purely scientific knowledge to public's thinking through media communication, using Spain as a case study. To do so, this research carried out a lexical analysis in both classic media communication and social network communication (Twitter). The results showed that traditional news used a reified discourse pattern prescribing the discourse of scientists and authorities. Tweets, in contrast, adhered to a consensual pattern of discourse, characterized by heterogeneity of representation and intensive symbolic ideas. The implications of this familiarization of knowledge about science via media communication and the effect of social networks on how we should face future epidemics are considered.

Keywords

communication, Ebola, mass media, social representations, Twitter

The 2014 Ebola outbreak was the most widespread Ebola epidemic in history and it struck particularly hard in several West African countries, undermining their already fragile health care systems (Laverack & Manoncourt, 2016).

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With increased globalization, the likelihood that infectious diseases appearing in one country will spread rapidly to another has increased (Smith, 2006). Consequently, leaders worldwide, health organizations (such as the World Health Organization), scientists, and governments became alarmed by this epidemic due to the possibility of it spreading and also because of its particularly high mortality rate. The international media, therefore, gave the Ebola outbreak extensive coverage, even in countries where the disease had not appeared (Wallis & Nerlich, 2005), and there was a high degree of social awareness of it. A reflection of that awareness was the impact of social networks, which are becoming essential in understanding and managing emerging infectious diseases (EIDs; Keeling & Eames, 2005).

This article focuses on how knowledge about Ebola was transformed from scientific knowledge diffused by traditional media to lay people's thinking as reflected on electronic social networks. We will analyze this process from the perspective of social representations theory (SRT), examining contents about Ebola in newspapers and on Twitter. Spain, as the first European country with an Ebola infection during the 2014 outbreak, was used as the focus of this case study.

The Process: Why Are Mass Media and Social Networks Important in Terms of Becoming Familiar With Scientific Knowledge About Ebola?

Social representations theory describes how people understand phenomena in their daily lives (Moscovici, 1984). Social representations are the systems of beliefs, meanings, attitudes, and images through which people organize and give meaning to the world they know. Within the social representational approach, beliefs about and behavior connected with health are constructed against a background of continual social interaction and negotiations (Jovchelovitch & Gervais, 1999), and this premise is a crucial factor when analyzing the influence of media communication in general and of social media in particular.

A key concern within SRT is how knowledge about a phenomenon, such as an EID like Ebola, moves from the more reified or scientific universe into common understanding or a consensual universe (Joffe, 2003). Within social representations research, "science" and "medicine," for instance, are often presented as clear examples of the reified universe of knowledge that can be transformed into the consensual universe (Wagner, Duveen, Themel, & Verma, 1999). Moscovici introduced the concept of social representation as a tool to explore the familiarization or transformation of scientific knowledge in the course of its diffusion, and to examine common understanding that arises in its wake (see Moscovici, 1998). However, social representation

research has also explored (though less often) how science can be seen as commonsense made unfamiliar (Moscovici, 1984), or more critically, how dominant social representations sometimes penetrate the structures and contents of science (Duveen & Lloyd, 1990; Potter & Edwards, 1999).

Consensual and reified universes are also described as two different communicative formats—reification and consensualization—and, as such, are used for examining communication between the lay and expert spheres, and for analyzing their impact on power relations and social change (Batel & Castro, 2009). Reification arguments are usually more monological, directed, and prescribed from high prestige sources or expert spheres, while the use of consensualization ideas has a more clear potential for achieving more dialogical understandings. Moreover, reification-like communication is expressed in establishing prescriptions for representations (imposed on the public dominant representations), presupposing inequality between different spheres, and establishing prescriptions for action. Consensualization as a communicative format implies discourses revealing heterogeneity or multiple voices in representations and action.

The traditional mass media plays a leading role in this familiarization of scientific knowledge (Joffe, 2003). So the public's first contact with a potential risk, such as an EID, is often through the media, and it is the media that attempts to connect such events to scientific evidence (Corbett & Durfee, 2004). The media tries to offer the public experts' discourse about EID, which is part of the reification communicative process. However, simply sharing scientific information in a unidirectional fashion is not an appropriate means for increasing scientific knowledge or changing attitudes about science (Hart & Nisbet, 2012; Sturgis & Allum, 2004). Because scientific and environmental issues affect citizens, science communication models should work toward integrating public relations theories and relevant ideas to form more effective communication strategies (Lee & VanDyke, 2015). In this context, in the new digital era information dissemination goes further and reaches social networks, the place where expert discourse diffused via traditional media and the consensual universe interact. On social networks the debate about any new risk becomes visible and familiar to the public.

Twitter is a free social networking and microblogging service that enables its millions of users to send and read messages. The service had more than 500 million registered users and processed more than 17 million tweets per minute since June 2015. Through their coverage in the "Twitter Stream," many recent news events have been documented in real time (Signorini, Segre, & Polgreen, 2011). Several recent studies have also suggested that analyzing Twitter content can be productive for studying how the public shares information concerning health and health care (McLaughlin et al.,

2016; McCarroll et al., 2014). So, with Twitter's increasing popularity, it has also become a space for the informal sharing of health information and advice (Schultz, Utz, & Göritz, 2011; Utz, Schultz, & Glocka, 2013), as well as for dissemination of that information in a more informal communicative sphere (Scanfeld, Scanfeld, & Larson, 2010).

Several studies have found that for recent EIDs, people used Twitter primarily to disseminate information from sources deemed credible (such as traditional newspaper websites or institutional organizations; Chew & Eysenbach, 2010). Therefore, several Twitter activity peaks took place at the same time as major news stories about EID carried in the traditional media. Moreover, several studies have pointed out that these traditional organizations' communication on Twitter focuses on one-way communication in disseminating their messages during health crises and not on interacting with users (Chew & Eysenbach, 2010; Muralidharan, Rasmussen, Patterson, & Shin, 2011; Waters & Jamal, 2011; Waters & Williams, 2011). In other words, traditional institutional sources use new media platforms for information dissemination rather than engagement (Lee & VanDyke, 2015). Because of that, previous research into EID communication on social media has mainly analyzed the nature of these sources' crisis communication (such as traditional mass media or institutional organizations) and its effectiveness in reducing uncertainty (Dalrymple, Young, &Tully, 2016; Firmstone & Coleman, 2015).

In our view, however, this only examines one part of social media communication. Therefore, we have chosen to focus on SRT, which enables us to research how people actively construct the meaning of an EID in their everyday thinking. In other words, SRT points out that even though these sources can use a reification communication style within the social media, the communication format on Twitter is much wider because, as mentioned above, Twitter can make the content of the traditional mass media more widely known, while others collectively create and construct a new communicative perspective on that content. In fact, recent studies have underlined that, in contrast to the traditional media, most popular Tweets are emotionally evocative and humorous, and concern individual-level causes (So et al., 2016). Moreover, it has also been argued that the social networks influence moral reasoning by creating similarity within groups (Horstink, 2011). However, comparison between those two communication styles with regard to EIDs has still not been sufficiently researched (Schultz et al., 2011).

Content: Social Representations About Ebola

The social representations perspective (Wagner & Hayes, 2005) emphasizes the symbolic aspects of dealing with the threat of a disease through

interpersonal and media communication. Therefore, extensive research has analyzed how the mass media frame EIDs in general, and Ebola above all, from the SRT perspective.

In particular, media coverage and British people's responses to media coverage of the 1995 Ebola outbreak in Africa was analyzed (Joffe & Haarhoff, 2002; Ungar, 1998). The nature of social representations of Ebola and what shaped them was examined. It was found that the media first created a "hot crisis" of maximum panic about the epidemic, but soon linked the epidemic to Africans, in a process of othering, creating a large gap between the risk for Africa and the risk for the West (Ungar, 1998). In other words, the mass media mainly linked Ebola to African people and culture (Joffe & Haarhoff, 2002), representing Africa as a continent plagued by diseases (Kitzinger, 1998) that only Westerners could eradicate. So the British distanced the epidemic in order to protect their own identity, and took Ebola to be inherently African, "the others" (the Africans), having to deal with the problem (Joffe & Haarhoff, 2002).

It should be noted that other articles about epidemics also deal with the idea of otherness (Joffe & Bettega, 2003; Joffe & Haarhoff, 2002; Joffe & Lee, 2004; Washer, 2004), relying on the notion that conditions in the poorest countries may be a seedbed for future epidemics (Cooke, 1996). In other words, outbreaks of disease around the world have been viewed as having originated among low-status out-groups, "the others" (Wagner-Egger et al., 2011). This pattern of blaming out-groups is called "downward blame." In fact, these lower status out-groups have been represented as being at fault and accountable for dirty practices, or engaging in immoral behavior (Joffe & Staerklé, 2007), or as being responsible for intentional, malevolent plotting to spread the disease (Joffe, 1999).

However, "the others," or out-groups, are not the only source of responsibility blamed for EIDs. When the threat becomes global and people like "ourselves" start to be affected by the new disease, new blaming patterns appear. First, people may blame the authorities or high-status spheres for allowing the disease to escalate in order to advance their own agendas (Dickson 1984, Joffe, 2009; Nelkin, 1995). This is called "upward blame." Second, there are also "outward blame" patterns toward derogated groups or low-status subgroups of our in-group (i.e., directed at marginalized groups within the host society or infected people in one's own country; Joffe, 2009). Therefore, blame for an EID can be directed either downward (Africans, represented in Europe as a far away and lower status outgroup), outward (at infected fellow citizens), or upward (at a powerful elite high-status groups). Among those elites, the government, mass media, and industry are usually blamed not only for the emergence of the new threat to human health but also, worse still, for

the corruption and concealment of the problem that facilitated the spread of the disease (Washer, 2006).

Therefore, the investigations carried out about epidemics from SRT particularly highlight the fact that, in connection with an EID, there is a societal response of first distancing the disease from the self; second, of blaming particular entities and elites; and third, of stigmatizing those who have contracted it, or who are said to have helped it to spread (Joffe, 2009). So these discourses about EIDs in general and Ebola in particular may be used to construct a symbolic representation that enables laypeople to make sense (Wagner, Kronberger, & Seifert, 2002) of the conflicting and discordant pieces of the scientific discourse spread by the media and remarked on in everyday conversations or, nowadays, on electronic social networks as well.

Objectives and Research Questions

Although Ebola was not a new phenomenon in the world, Spain (the first European country with an Ebola infection during the 2014 outbreak) became aware of the first Ebola infection in Europe during the 2014 outbreak. The public heard about Ebola for the first time, an epidemic it had been unaware of, and which neither the public nor the government had any experience of. In this context, scientific information concerning Ebola was broadcast by the media and people learnt about it through the news, while it also became a trending topic on Twitter.

The objective of this research was to study how forms of knowledge about Ebola broadcast by the media are adopted by the public and how the public becomes familiar with them, inserting this new, unfamiliar information into its everyday thinking.

This process was studied by analyzing contents of social representations in the media and on Twitter. Lexical analysis of the media permits us to examine how information produced by World Health Organization and other scientific institutions was disseminated to the public. Lexical analysis of Twitter helps provide an account of how the public made sense of the new information by inserting it into previous schema and making it significant by associating it with symbols and emotions.

Therefore, the present study anticipated identifying certain similarities in the content patterns in both media. Additionally, differences were expected to be found in the discursive patterns in both media, suggesting contrasting ways in which lay and expert spheres of communication are constructed.

In line with previous research (Joffe, 2009; Joffe & Haarhoff, 2002; Ungar, 1998), Ebola is expected to be particularly linked with Africa, dissociating the Western world from the threatening disease. However, even though the

2014 Ebola epidemic emerged outside Spanish and even European borders, its spread had global consequences; in this outbreak, therefore, the global facet of the disease, too, becomes prominent, as in other recent studies (Washer, 2006, 2010). Furthermore, we predicted that Ebola coverage would create blame patterns: downward blame toward Africa and Africans, outward blame toward people infected (i.e., repatriated and suspicious cases), and, especially, upward blame toward the authorities because of their failure to prevent and stop the disease in Spain.

Regarding the content of social representations specifically developed by newspapers, we wondered how information created in the reified universe of science was disseminated to the public. The diffusion of information by newspapers was expected to have a rather monological and hierarchical pattern of information communication. In fact, its discourse was likely to be prescriptive, that is, relying mainly on sources such as scientists, experts, ministers, and other highly privileged stakeholders.

Twitter communication, as a whole, was expected to be closer to a consensual universe of social representations, and more likely to be characterized by dialogical communication. In this case, social representations of Ebola were likely to be negotiated in social interaction with different kinds of sources, such as high sphere sources, and also with other stakeholders. In this discourse, multiple voices were likely to appear in the debate, probably characterized by a heterogeneous discourse consisting of the construction of symbolic meaning systems associated with Ebola. Both emotional and moral debates were likely to appear in this communication network.

Method

To proceed with analysis of social representations of Ebola that appeared in Spanish news and Tweets, we carried out a lexical analysis. Specifically, 700 articles from the *El País* newspaper (the newspaper in Spain with the highest circulation) and 28,760 Tweets written in Spain between March 22, 2014 (when the first news about this Ebola outbreak was published), and November 15, 2014, were analyzed. We decided to analyze a single Spanish newspaper because studies have indicated that in previous coverage of health crises, there was mimicry between all Spanish newspapers, often offering very similar headlines and information (Camacho, 2009; Costa, 2011; López, 2012). To gather articles for our sample, we chose all the articles from *El País* newspaper that mentioned the word Ebola over that period of time. And to create the Twitter sample, we tracked and picked up by streaming API all Tweets written in Spain and in Spanish that mentioned the word Ebola during that period of time. The authors decided to analyze written media instead of

broadcast media because scientific information is usually expressed in greater detail in newspapers, which are also of greater prestige than other kinds of media such as television.

In line with previous research, we used Alceste software for lexical analysis (Reinert, 1983, 1990) for analyzing the news and Tweets corpus (Ratinaud, 2014). Previous studies have shown that lexical analysis technique is useful in order to analyze social representations content (Lahlou, 1996), concluding that the results obtained are consistent with those proposed by classic research in this area. Lexical analysis examines associations or joint appearances of words in a text and specifies lexical universes that consistently appear in discourse. Therefore, it is remarkably useful when studying collective thinking. In other words, its object of study is not the semantic meaning of the text but, rather, the analysis of language or discourse as a shared representation (Allum, 1998).

First, the software creates a dictionary. Alceste analyses "whole words" (nouns, verbs, adjectives, adverbs), while "tool" words (articles, pronouns, conjunctions) are excluded from analysis. The initial corpus is broken down into Elementary Contextual Units (ECUs), which have the approximate length of a sentence or two (30-50 words; Kronberger & Wagner, 2000). With regard to Twitter, the whole corpus retrieved from tweets was analyzed. The analysis is carried out on large sets of unconstrained text in order to focus on collective discourse rather than on individual responses (Ratinaud & Smyrnaios, 2016).

Then the corpus is analyzed in terms of the presence of whole words in ECUs. ECUs and reduced forms are used to create a contingency table, which shows the distribution of vocabulary per ECU. From this contingency table, the program creates a squared distances matrix, implying that two ECUs are close if they share some of the words analyzed (Reinert, 1996).

Subsequently, Alceste performs a descending hierarchical cluster analysis on this distance table, which yields classes of ECUs that best differentiate vocabulary. In so doing, this software aids text interpretation. It extracts sets of words called classes, which co-occur and that are best differentiated from other classes.

Following previous research using Alceste (Vizeu & Bousfield, 2009), raw material was introduced in the Alceste software, and the most significant vocabulary in each class was selected under three criteria: (a) an expected value of the word greater than 5; (b) proof of association of chi-square tested against the class ($\chi^2 \geq 3.89$ [$p = .05$]; $df = 1$); and (c) the word is mainly in a class with a frequency of 50% or more.

In this way, the analyst obtains a series of classes and statistical cues in the form of typical words and typical ECUs. This provides the basis for "interpreting" classes as lexical worlds. Operations in Alceste are statistical,

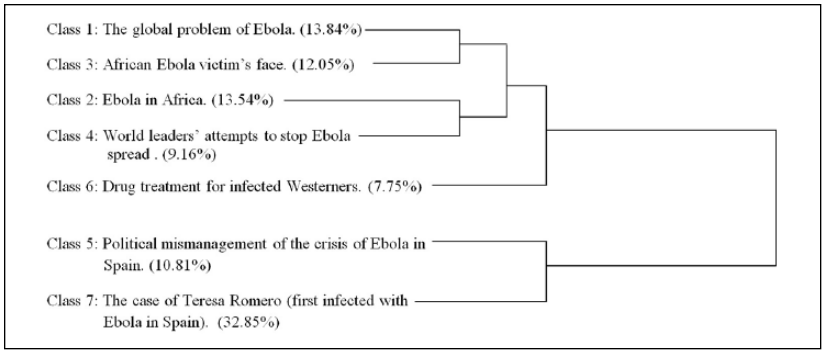

Figure 1. The hierarchical clustering dendrogram for *El País*.

transparent, and reproducible, until the final moment of interpretation, when the analyst assigns a label to each set of specific vocabulary that was identified as a lexical world by the software on the basis of co-occurrences and distribution patterns (Schonhardt-Bailey, 2013). Data were analyzed in Spanish. The results have been translated into English for publishing purposes by two trained researchers, and corrected by a professional editor.

Results

A lexical analysis using Alceste software was carried out in order to study the social representations of Ebola, first in the press and then on Twitter.

Text Analysis of the Press

The full corpus was made up of 483,138 words, of which 23,649 were unique words. Specifically, the descending hierarchical cluster analysis divided the corpus into 7,933 ECUs. All of them were analyzed and 7 kinds of classes with specific weights were extracted from the most significant vocabulary in each class. Results of the analysis can be seen in Figures 1 and 2.

The results showed two main clusters, the first concerning the international dimension of Ebola (Classes 1, 3, 2, 4, and 6) and the second regarding the repercussion of Ebola in Spain (Classes 5 and 7). Following the division of cluster analysis, and in the first main cluster, it can be seen that classes 1 and 3 are linked. Both classes are connected with the consequences of Ebola, which is defined as a problem that is affecting many victims. In "The global problem of Ebola" the epidemic is defined as worldwide, as we can see from the most closely related ECUs: "A global problem. The West should intervene

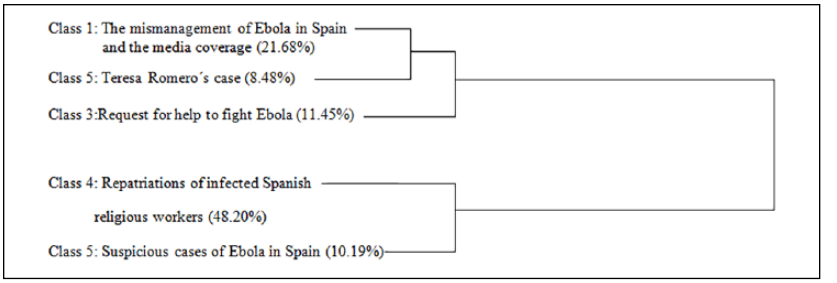

Figure 2. The hierarchical clustering dendrogram for *El País*, with the most frequent words and the words with greatest association, $\chi^2(1)$, $p < .001$.

not only out of solidarity but also because of global security" (ECU3314). People also feel that global security is at risk: "It is the only realistic way to address this global threat, which may endanger the lives of everyone on the planet" (ECU4100). Moreover, the "African Ebola victim's face" is focused on this epidemic's African victims, their daily life, and how they fight against this virus. This class has the most intense human interest frame because it tries to explain the daily fight of infected people in Africa to its audience, as can be seen in the most closely related ECU: "When, the following day, the medical team entered the isolation room, they found little Augustine lying beside Mariana. The young mother had just lost her only remaining son, victim of this senseless epidemic" (ECU1819).

In the same main cluster, classes connected with the consequences of Ebola are linked with Classes 2 and 4, both concerning the location of Ebola. The "Ebola in Africa" class is connected with Ebola in African countries, and also to victims, such as in the ECUs: "According to the latest report, the most seriously affected country is still Liberia, followed by Sierra Leone and Guinea. The WHO had already warned about the threat in those countries" (ECU5650). In contrast, the "World leaders' attempts to stop Ebola spread" class has a global view and shows that world leaders consider that the African authorities do not have the capacity to stop it by themselves, as suggested in the most closely related ECUs: "The EU proposes checks against Ebola at airports. Ministers are studying the possibility of implementing temperature tests at borders" (ECU5030). As we can see from this class, countries all over the world are worried about the spread of the epidemic:

> Governments of at least 28 countries are collaborating. This week, the UN General Secretary, Ban Ki Moon, named Cuba, Venezuela, China, United

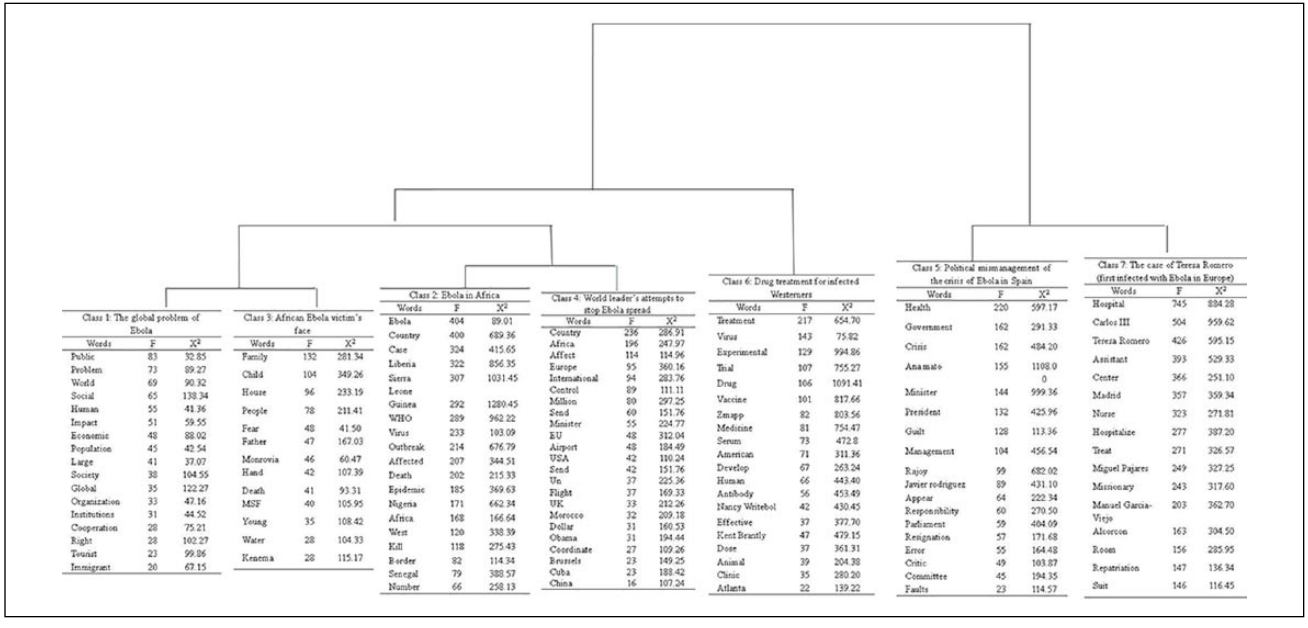

Figure 3. The hierarchical clustering dendrogram for Twitter.

> States, France and the UK as some of the states that have shown their solidarity in the fight against Ebola. (ECU5836)

The last class that emerges in the first main cluster is the "Drug treatment for infected Westerners" class. An illustration of this class is the most closely related ECU: "The two Americans who were repatriated from Liberia to the United States, Kent Brantly and Nancy Writebol, have been treated with an experimental serum called ZMapp, according to CNN" (ECU513).

To sum up, this first cluster defines the magnitude of the problem of Ebola. In a way, Ebola is still linked to Africa and to African victims, but it is also seen today as a global problem, a pandemic that could spread all over the world. In fact, the other classes (Classes 5 and 7) are examples of the spread of Ebola to Western countries.

The second main cluster is made up of the "Political mismanagement of the crisis of Ebola in Spain" (Class 5) and "The case of Teresa Romero" (Class 7) classes. Both these concern the case of the first Ebola infection in Spain (and Europe), that of Teresa Romero. Romero's case is mentioned in a descriptive way in the seventh class, as can be seen in the most closely related ECUs: "Teresa Romero leaves the insulation room because her fluid analyses are negative. Nursing assistant Teresa Romero got infected with Ebola while she was looking after repatriated missionary Manuel Garcia Viejo in Carlos III Hospital in Madrid" (ECU7299). The fifth class denounces the political management of the crisis of Ebola in Spain because of not being transparent, as in the following ECUs:

> Political responsibility must be accepted, the Health Minister must be asked to appear in Congress and, in some cases, her resignation for her responsibility in the Ebola crisis must be sought. Everyone criticizes the government's political management and lack of explanations. (ECU3334)

Text Analysis of Twitter

The full corpus was made up of 378,586 words, of which 18,336 were unique words. Specifically, the descending hierarchical cluster analysis divided the corpus into 7,360 ECUs, all of which were subjected to analysis, while 5 kinds of classes were extracted (see Figure 3) from the most significant vocabulary in each class (see Figure 4).

In the cluster analysis, two main clusters emerge. The first cluster is made up of the first and fifth classes, both connected with Ebola in Spain and Teresa Romero's case (the first person to have Ebola in Europe).

"The mismanagement of Ebola in Spain and media coverage" class describes the management of the Ebola by Spanish authorities and the mass

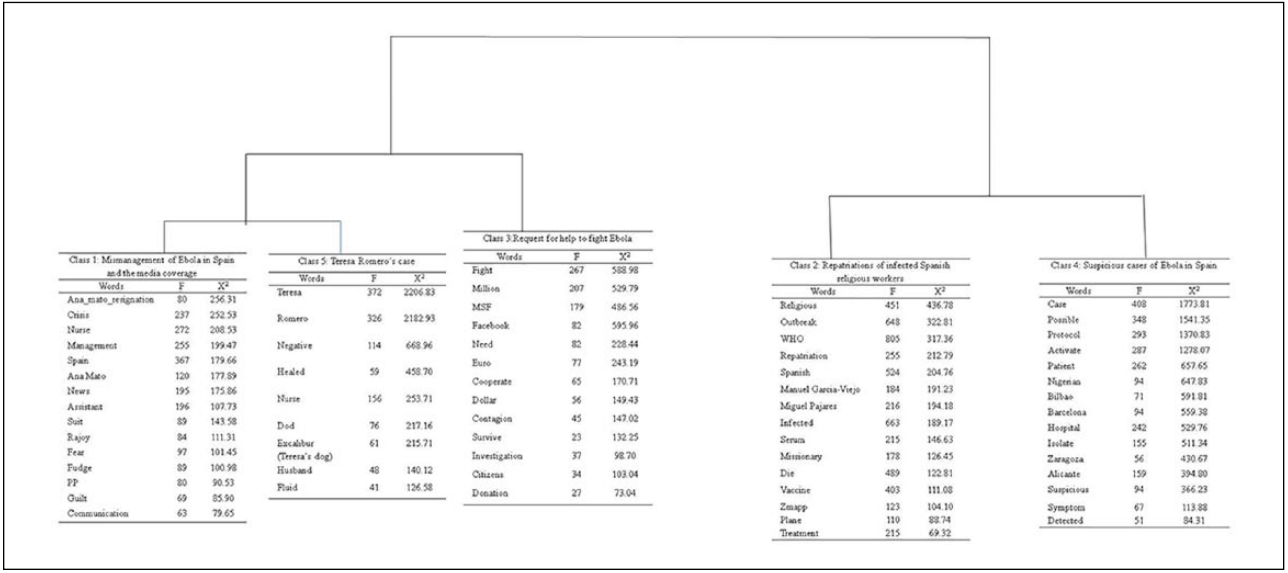

Figure 4. The hierarchical clustering dendrogram for Twitter with the most frequent words and the words with greatest association, $\chi^2(1)$, $p < .001$.

media. In fact, the Spanish government's mismanagement of this crisis is emphasized, which is why most of the Tweets connected demand the resignation of the health minister (Ana Mato) or that politicians in the government be held responsible. Some of the most closely related ECUs in this class include the following: "Ana Mato is more dangerous as a minister than a dog with Ebola. Ana Mato, Resign!" (ECU5017), "Europe is freaking out about Spain! The Ebola protocol has failed from start to finish! This is fraud!" (ECU 4345).

The way the media covered this issue was also quite controversial because part of the media was accused of not being professional enough in its reporting of it. This idea is emphasized in the other most closely related ECUs: "Why did this news not come out in the media? Teresa's husband: I will prove in court that the management of Ebola in Spain was a terrible fudge" (ECU6161); "Ebola? Better not, you already have television for that and, no matter what the channel is, they all give the same reasons for you to be afraid" (ECU 5447); "Journalism in times of Ebola, a virus that infects headlines depending on the patient's nation" (ECU 8257); "On the subject of Ebola, journalism has failed "(ECU 8001).

The fifth class describes the case of Teresa Romero, a Spanish nurse who caught Ebola while working looking after a missionary who had been flown back to Spain. The most significant ECUs in this class are the following: "Teresa Romero leaves insulation with no signs of Ebola, and now she can go home, but nobody investigates what happened (ECU 6536); "Ebola has not been detected in her fluids! Congratulations Teresa! You have defeated Ebola! Now we need to get justice for you!" (ECU 6543). This demand for justice may also be an example of heterogeneity of action.

In connection with Ebola in the host country (in Spain, for Spanish Twitter users), there is a third class, which seeks social action. Specifically, in the "Request for help to fight Ebola" class, the messages are addressed to the general public, asking for help. In this class, there are tweets disseminated by nongovernmental organizations such as MSF (Doctors Without Borders) asking for economic help to stop the spread of Ebola: "Médecins Sans Frontières, please help. We need you!" (ECU7889); "Google and MSF denounce international passivity and ask 11 million citizens to fight Ebola" (ECU 6349). In other words, associations such as MSF used Twitter to get help from the public to fight Ebola because there was insufficient involvement from international authorities.

The second cluster is made up of the second and fourth classes. The "Repatriations of infected Spanish religious workers" class describes the cases of the two repatriated missionaries (Manuel Garcia-Viejo and Miguel Pajares) who were brought from West Africa to Spain, as mentioned in the

following ECU: "The Hercules medical aircraft which is bringing sick missionary Manuel Garcia to Spain has taken off from Freetown" (ECU 3759). Some of these Tweets reflected a moral dilemma about these repatriations: "The government has not spent a single Euro on seeking a cure for Ebola, but it has brought home two priests with Ebola. In Spain, we only bring back infected people if they have our passport!" (ECU 3271); "The Archbishop says that it is wretched to blame the repatriated religious workers for Teresa Romero's infection" (ECU 4519).

Finally, the "Suspicious cases of Ebola in Spain" class fell into this second cluster. This class is connected with suspected cases of Ebola in various regions of Spain. These cases focused on people who had recently visited African countries. In each case the emergency protocol was activated, but in the end, none of them proved to be Ebola cases. However, all these people about whom there was alarm, as well as people travelling from West Africa, were seen as a threat by Twitter users, as can be seen in this ECU: "Oh God! A Nigerian person taken into to hospital in Majorca with a possible case of Ebola" (ECU3371).

Analysis of the text shows that the news and tweets have several facets in common in terms of contents, but also some differences. First of all, nurse Teresa Romero's case (the first local case of Ebola infection in Spain and Europe) is an extremely important issue for both types of media. Furthermore, both of them criticize the Spanish government's management of the case. With regard to the differences between news and Tweets, issues about "Ebola as an African disease" and "Ebola as a global problem" receive much more attention in the newspapers. In contrast, Twitter users focus their attention on the repercussion of Ebola in their own country, that is, in Spain. Another important difference is that newspapers see the world leaders as the only people who can stop Ebola, while Twitter also sees citizens as having an influence in that struggle.

Discussion

The objective of this study was to analyze the transformation of knowledge through the media about the 2014-2015 Ebola outbreak from the scientific or reified universe to the consensual universe. We focused on both the contents and the diffusion process of knowledge about Ebola on the public sphere (Jovchelovitch, 2007). SRT (Moscovici, 1984) allows us to explain how people engage with new phenomena such as Ebola and how knowledge about these phenomena penetrates the public sphere and becomes common sense. In the next sections, we discuss the contents of communication and the process of knowledge transformation in social communication of an Ebola outbreak in Spain.

The present study shows that even though some of the contents in both media are similar, their communication implications are quite different. This can be explained because these media had different communication purposes in this Ebola outbreak: reification and consensualization. In other words, the traditional mass media concentrated mainly on disseminating the discourse of scientists and the authorities, while Twitter was more focused on informally exchanging knowledge about Ebola, collectively constructed and based on everyday thinking, and thereby creating consensual universes and simplifying communication process risk (Dalrymple et al., 2016).

First, we discuss traditional media discourse. In the newspaper, the most recurrent discussions about Ebola presented in previous research (Joffe & Haarhoff, 2002; Ungar, 1998; Washer, 2006) emerged, for example, the African versus Global issue. In this regard, although Africa was undoubtedly considered the epicenter of the epidemic, the global threat perspective gained prominence. Fear of the virus spreading alarmed leaders all around the world, and medical treatment administered to infected Westerners created intense awareness. In the news, high-status actors such as world leaders became highly relevant and were considered the only people with the power to stop Ebola and provide solutions (e.g., medicine for infected Westerners). In fact, scientific development linked to medicine and pharmaceutical development was prescribed as the only solution for preventing the spread of Ebola.

Second, following analysis of newspaper contents, when the first Ebola infection in Europe (Teresa Romero) hit the headlines, an upward blaming discourse started, and the outrage of traditional media toward the authorities increased dramatically. The authorities were blamed for facilitating the spread of the disease (Washer, 2006) because of their failure to protect their citizens. This is an example of how news content, human drama, and other components of a "good story" play a part in bringing science topics to the news (Mazur & Lee, 1993). And it is also evidence of how news coverage is sometimes more influenced by a story's dramatic value than by any inherent risk (Greenberg, Sandman, Sachsman, & Salomone, 1989). In contrast with previous epidemics (Joffe & Haarhoff, 2002; Ungar, 1998), we did not find such a remarkable discourse of downward blaming toward Africa or Africans.

All this content is structured in discourse in line with the reification communication style. In fact, there are various examples that presuppose inequality between different spheres, establishing prescriptions for action (how they have to act) and prescriptions for representations (how they have to think; Batel & Castro, 2009) among typical ECUs. First, examples of the presumption of inequality between Africa and the West can be found in the second and fourth classes. Western leaders are described as the only ones who can solve the crisis, and the Africans are seen as being incapable of combatting Ebola.

Second, in the typical ECUs there are also different examples of action prescriptions. In the first class, for instance, "It is the only realistic way to address this global threat (. . .)" suggests a single way to address the issue. Or in the fifth class, the ECUs "Political responsibilities must (. . .), the Health Minister must (. . .)" also represent a marked reification communication style. Last, in the most typical ECUs in the fifth class, there is also an example of prescriptions of representation with sentences such as "Everyone agrees (. . .)". This kind of statement suggests that there is a single valid discourse for understanding this Ebola outbreak, which is that the one which high status voices broadcast via the mass media.

Twitter contents clearly reflect the interest and desires of their readers and threats toward them. First, the fear of Ebola spreading in their country created considerable awareness among Twitter users. Because of that, real cases of infection (Teresa Romero and the priest brought home) and also the mere suspicion of infection in Spain were trending topics on Twitter. Furthermore, on Twitter, as in the newspaper, there was a remarkable upward blaming discourse toward the authorities, but a blaming pattern toward the traditional mass media also emerged. In fact, the traditional media's single mindset discourse was strongly criticized. In other words, the predominance of a single mindset discourse in the coverage of Ebola was condemned, which led to particular indignation and an upward blaming discourse (people reproaching the media for being too sensationalist and for publishing only what the authorities asked them to).

Furthermore, moral debates were also reflected in Tweets, as happened in the second class, with regard to the risk of repatriating people. In fact, in association with the repatriations debate, outward blaming patterns (Joffe, 2009) also appeared, holding derogated in-groups (such as people infected who were brought home) responsible for the spread of Ebola in Spain with ECUs such as "it is shameful to blame the repatriated religious workers for Teresa Romero being infected." Meanwhile, Twitter is also a public space for denunciation, as can be seen from the following criticisms: of government management of the Ebola crisis, "The government is not spending a single Euro to seek a cure (. . .)"; of the stagnation of world political leaders, "Google and MSF denounce international passivity (. . .)"; and of coverage in the traditional mass media "(. . .) journalism has failed," and so on.

As the Twitter communication process is more dialogical (not only between high spheres and laypeople, but also as a collective construction), it has a particularly consensual style. Indeed, there are various examples of heterogeneity in terms of representations and heterogeneity of action (Batel & Castro, 2009) among typical ECUs. First, tweets criticizing the single mindset discourse of the traditional media in the coverage or Ebola have a

clearly consensual communication style as they seek heterogeneity in discourse and representations, which is something that the traditional mass media do not provide. Second, on Twitter there are informative and objective ECUs (similar to those found in the newspapers), and also more emotional ECUs reflecting the heterogeneity of representations: "Congratulations Teresa! You have defeated Ebola!" or "Oh God! Nigerian admitted to a hospital (. . .)." In fact, this emotional communication is one of Twitter's main characteristics (Myrick, Holton, Himelboim, & Love, 2016; So et al., 2016), and it highlights the importance of symbols on this social network. Third, heterogeneity of action can also be observed in the third class, in which requesting help is adapted to the context and to social networks.

Likewise, going in-depth into the implications of reification and consensual communication, we first have to point out that in the traditional mass media information is communicated to the audience, and on Twitter communication is constructed in conjunction with the audience. In other words, even though previous research has pointed out that with regard to EID Twitter usually uses the traditional media as its principal source (Cha, Hamed, Fabricio, & Krishna, 2010; Lee, Kwak, Park, & Moon, 2010), our results underline the fact that this social network is a far cry from constituting a mere repetition of traditional media communication. In other words, even though reification and consensual communication often has fuzzy boundaries (Batel & Castro, 2009; Moscovici, 1998, 1993), our research demonstrates that social network users have actively selected and familiarized reified traditional media and high spheres content in order to create consensual universes with regard to Ebola.

Therefore, our study has direct implications for health communication research. First, we must highlight the importance of the downward, upward, and outward blaming processes during EID periods as tools for protecting the self and in-group identities and for reducing social uncertainty with regard to the threat. Second, our research also emphasizes the importance of familiarization with or transformation of scientific knowledge into lay thinking. In fact, we stress that communication can never be reduced to the transmission of the original messages, or to the transfer of data that remains unchanged. In other words, communication differentiates, translates, and combines different types of knowledge, creating consensual universes (Moscovici, 1961), and Twitter is one of the components of this process.

Due to all of the above, our analysis from SRT perspective indicates that social media research should not be limited to the analysis of traditional elite sources' crisis communication (Chew & Eysenbach, 2010; Dalrymple et al., 2016; Muralidharan et al., 2011; Waters & Jamal, 2011; Waters & Williams, 2011), and that it must research the whole process of the construction of

everyday thinking about EIDs. Finally, on an applied level, the analysis of Twitter as creating a consensual universe may provide journalists with a tool with which to analyze the emotional, moral impact of their news items and to understand how the information that they have disseminated is actively constructed in everyday thinking.

The acquisition of an understanding, therefore, as to how scientific knowledge about EIDs is familiarized in the consensual universes of everyday thought, and what the implications of media communication in this process are, furnishes us with a tool enriched with added value for better management of future epidemics.

In modern societies, the public faces and will face the threat of successive emerging diseases such as Ebola. Therefore, knowing how scientific knowledge about them is familiarized into the consensual universes of everyday thinking, and elucidating on the implications of media communication in this process, provides us with a tool with added value that could serve to better manage future epidemics.

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