

# User Behavior in the Twittersphere: Content Analysis of Tweets on *Charlie Hebdo* Attacks

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## Abstract

The 7<sup>th</sup> January 2015 is coined by the attacks on *Charlie Hebdo* in Paris. A lot of people all over the world showed their solidarity and their emotions by publishing tweets with the hashtag #JeSuisCharlie and #CharlieHebdo. This study aims at answering, among others, the following questions: What do Twitter users share and whom do they mention while commenting on terrorist attacks? What are the most frequently used hashtags? Based on the literature review, the count of retweets can be influenced by different aspects. This research investigates factors influencing retweeting of tweets on *Charlie Hebdo* attacks. Furthermore, it sets a first step into the content analysis of tweets on *Charlie Hebdo* attacks and gives a preliminary impression about the user behavior on Twitter.

**Keywords:** social media; Twitter; terrorist attacks; content analysis; user behavior

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## 1 Introduction

The web 2.0 and social media has become an important channel for people to share information (Lerman & Ghosh, 2010). Everything started in 2006 since Twitter gets online (Farhi, 2009). The first user of Twitter “answered the question on Twitter’s online interface: What are you doing right now?” (Chen, 2011 p. 755). With time, it became a “microphone”- platform, where millions of users constantly post their opinions, comments and thoughts – Twitter, the microblogging service.

Herrera-Viedma, Bernabé-Moreno, Gallego, and Sánchez (2015, p. 8) describe the variety of social media as a “living document of our culture.” With the upcoming of social media users get the chance to express for example emotions and opinions about different things. “Users literally post everything going through their minds in an almost unconscious manner, making the [social media] stream facts-reach but also feelings-intensive at the same time” (Herrera-Viedma et al., 2015, p. 8).

Users have exactly 140 characters to express what they feel, what they do and what they think. They are not limited to posting the so-called “tweets,” but due to Twitter’s hybrid nature, can make use of the push and pull service. They can search for tweets, they are interested in by using hashtag (#) or user accounts, they can also follow other users and news channels in order to be up to date (Kaplan & Haenlein, 2011 p. 107). Letierce, Passant, Decker, and Breslin (2010, p. 1) categorized Twitter user into subcategories “from experts to amateurs by participants, media and so on” there are no limits – everyone can use Twitter. Traditional news and media agencies keep their audience informed by covering variety of topics, facts, and breaking news.

But what about the audience’s opinion on the current events? With the possibility to tweet their own opinions, news and comments, there exists a new way to get recipients attention. According to Mano and Milton (2016), the user-generated content on breaking news or events is a key factor of citizen journalism. What does “citizen journalism” mean? Niekamp (2009, p. 45) defines it as “the involvement of non-journalists in gathering, writing and disseminating information.” It could be understood as “an active role in the process of collecting reporting, analyzing and disseminating news and information” (Bowman & Willis, 2003). According to Lerman and Ghosh (2010), one big advantage is that the information is shared in real-time. People do not want to only passively consume content

provided by others, they want to produce own tweets. Java et al. (2007) present reasons for which interactions on Twitter take place. They categorized these reasons into “daily chatter”, “conversations”, “sharing information/URLs” and “reporting news”.

According to Schwarz (2011) and Gortner and Pennebaker (2003) social media is traditionally characterized as a medium for news spreading in a fast way. But Herrera-Viedma et al. (2015, p. 10) point out that that social media is more than a platform for spreading information. It “support[s] cognitive and personality aspects, such as the need to manifest and express the own identity.” Bruns (2012, p. 98) explains in his study that, “journalists and news organizations no longer operate solely on their own terms, as they do on their own websites.” Today they can use the driving force, in that case the other users. Organizations and journalists “gain and maintain prominence in network and reach for their messages only in concert with other users” (Bruns, 2012, p. 100). Additionally, Twitter closes a gap between researchers and a broader general audience (Letierce, Passant, Decker & Breslin, 2010). For real-time occurrences, such as the earthquake in Chile 2010, citizen journalism can provide first evidence on what happened, when in such emergency situations users directly report the status via tweets. Mendoza, Poblete, and Castillo (2010) investigated the behavior of these “reporting” users and the differences between dissemination of false rumors and confirmed news. Twitter is labeled as an awareness system (Markopolus, 2009). Markopolus (2009) defines such systems as “computer-mediated communication systems intended to help people construct and maintain awareness of each others’ activities, context or status, even when the participants are not co-located”.

This was also the case during the *Charlie Hebdo* attacks. All over the world, people sorrowed for victims and their family members by using Twitter. The redaction of *Charlie Hebdo* was attacked by terrorists in Paris, France on the 7<sup>th</sup> of January 2015. The arising of the first tweet was followed by news agencies report, by YouTube videos and for example by global reactions of the community (Salovaara-Moring, 2015, p. 106).

In very short time, the introduced hashtag became a symbol for solidarity with the victims and unity against terror. Salovaara-Moring (2015, p. 103) explains the *#JeSuisCharlie* as followed: “These three words became a metaphor for organizing news flows, opinions, affects and participatory events in the digital media ecosystem. It became a global slogan adopted by supporters of the freedom of expression.”

An et al. (2016, p. 2) clearly articulate that the “hashtags *#CharlieHebdo* and *#JeSuisCharlie* (*I am Charlie*) became an explicit endorsement of freedom of expression and freedom of the press, and travelled fast and wide in Twitter.” According to Salovaara-Moring (2015, p. 110), the *#JeSuisCharlie* became besides other aspects “a global network organiser of information flows.” The main aim of this study is the investigation of user behavior on Twitter during the week after the *Charlie Hebdo* terrorist attacks. The analysis encompasses identification of the content and frequency of links shared by users. Furthermore, the coherence between the amount of received retweets (RTs) and Likes, and the content of the tweet, for example, multimedia related to the attack on *Charlie Hebdo*, will be examined. Finally, the usage of hashtags will be analyzed.

## 2 Methods

The research on social media is varied, as it is confirmed that this new kind of modern communication improves not only the role of networks in marketing (Kempe, Kleinberg & Tardos, 2003; Fahri, 2009) but also the information dissemination (Gruhl & Liben-Nowell, 2004; Wu, Huberman, Adamic, & Tyler, 2004).

The main investigated indicators, beside the tweets, are the amount of likes and retweets they got from other users.

Hashtags are an essential aspect of Twitter. According to Bruns and Burgess (2012, p. 803), hashtags have different tasks; they “can be used to mark tweets as relevant to specific known themes and topics” or characterize “vastly different events taking place simultaneously”. Hashtags sometimes emerge ad hoc and non-supervised in the Twittersphere (Bruns & Burgees, 2012).

According to Boyd et al. (2010), the retweet function has the potential to lead to an interaction between users. “Retweeting brings new people into a particular thread, inviting them to engage without directly addressing them” (Boyd et al, 2010, p. 1). Bruns and Burgees (2012, p. 803) explain that “[r]etweeting users may even see themselves as information brokers.” Boyd et al. (2010) point out that without retweeting the original tweet would only reach a small number of users. The retweeted tweets could reach on average thousand twitter users (Kwak, Park, Moon, 2010; Naveed, Gottron, Kunegis & Alhadi, 2011). Furthermore, according to Boyd et al. (2010, p. 1), “retweeting can be understood both as a form of information diffusion and as a means of participating in a diffuse conversation.”

What is the trigger that makes user retweet someone else’s content? Boyd et al. (2010) investigated what exactly is being retweeted. They found out that users preferably retweet breaking news and post links to articles in media sources. Users retweet a tweet, when it awakes their attention, meets their needs, and is simply worth sharing with other users. Retweets do not only represent what themes are currently popular or important, they have also a positive impact on news channels, as Kwak, Lee, Park, and Moon (2010) find out in their study. “There are mainstream news media that rise in ranking by the retweets” (Kwak et al., 2010, p. 596).

What about topics? Are topics in mainstream news media similar to the topic trends in Twitter? According to Kwak et al. (2010) the answer is no. Twitter is not only a bridge between old and new media channels, it could also be seen as a new form of news channels. Regarding the amount of RTs of tweets there are different aspects that have an influence on their count. Besides the number of followers (Hong, Dan & Davidson, 2011; Kwak, Lee, Park & Moon, 2010; Naveed, Gottron, Kunegis & Alhadi, 2011; Suh, Hong, Pirulli & Chi, 2010), for example, the age of the account is one possible aspect influencing the count of RTs (Lewis and Cushion, 2009; Naveed, Gottron, Kunegis & Alhadi, 2011). Furthermore, Zhao et al. (2011) explain that Twitter users tend to retweet tweets of news related to a world event rather than creating an own tweet.

Furthermore, the use of directed tweets using “@” could be understood as attracting attention of someone special or simply as addressing this person/an account (Honeycutt and Herring). Boyd et al. (2010) called the @-functions the “attention-seeking” function. It might represent “anything from intimate friendships to common interest, or even a passion for breaking news or celebrity gossip” (Cha, Haddadi, Benevenuto & Gummadi, 2010, p. 9). In this study we take a look at the addressees of these direct @ tweets — are these the news agencies, individual journalist, or other users? Furthermore, a study by Armstrong and Gao (2010, p. 224) analyze what kinds of links were employed in news organizations’ Twitter feeds. They investigate “how news organizations – both print and broadcast – employ Twitter as a vehicle for disseminating information and attracting consumers” (Armstrong & Gao, 2010, p. 224).

## 2.1 Data Collecting and Preparation

Collecting tweets to breaking news as a trigger event for a vast discussion on Twitter requires accurate timing, search and selection of hashtag. The focus of this study is set on news dissemination and commentary in view of a specific triggering event and not on general characteristics of news distribution, therefore, an observation time of 1 week appears sufficient. The terrorist attack on *Charlie Hebdo* happened on January 7, 2015. The accurate point of trigger time is hereof from the January 7, 2015 until January 13, 2015. We have used hashtags that were most popular at that time for tweets regarding this event. The tweets were collected with the help of python application tweepy and Twitter-API as well as manually using Twitter’s advanced search interface. The syntax for advanced search on Twitter was formulated as follows: `#charliehebdo OR #jesuischarlie lang:de since:2015-01-06 until:2015-01-14`. Furthermore, Twitter differentiates between “top” and “live” tweets. For this study we collected around 1000 “top” tweets per day. Contrary to the “live” tweets, these are the most popular tweets, according to Twitter. At the end, our dataset included around 7127 “top” tweets that were saved into a database in Excel. The database structure includes a unique ID, the tweet itself, date, account name, number of likes, number of RTs, @, hashtag, links and multimedia. The automatic extraction of hashtag and direct

@-tweets was conducted with the help with an own python code. Furthermore, it was necessary to sum up synonymous hashtags.

The data was further processed with Excel and SPSS. The amount of RTs and likes are measured on an interval scale. The variables link, mentioned (@) and multimedia are nominal categorical variables. These three variables are coded with 0 (does not exist) and 1 (does exist). This differentiation is necessary as for different types of data different statistical approaches are necessary. One possible measurement is eta (Janssen & Laatz, 2013), which is applied for nominal variables. In this study, the variables link, @ and multimedia are the independent variables, whereas the depended variables measured on an interval scale are RTs and likes (Janssen & Laatz, 2013). To calculate the degree of association between the nominal variable and the interval scaled variable the correlation ratio eta ( $\eta$ ) is used (Richardson, 2011).

Since the eta squared measure does not give any information about the direction of the association and it only enables the measuring of the proportion of the variation in the depended variable (Richardson, 2011), additionally the point-biserial correlation (Pearson) was computed. The point-biserial correlation it is computed for nominal dichotomous variables and interval scaled variables (Laerd Statistics, 2016). In order to evaluate the partial eta-squared values the categorization by Cohen (1988) was used. According to Cohen, the effects reflected by eta squared values can be divided into three categories, small, medium and large effects. These effect sizes are given for the values .0099, .0588, and .1379 respectively (Cohen, 1969; Richardson, 2011). To evaluate the coherence between the nominal variables mentioned @, multimedia and link the chi-squared test was used. The chi-squared test includes the 0-hypothesis that express the statement that between the two observed variables does not exist any coherence. If the p-value is smaller than 0.05, the 0-hypothesis is not accepted and the evidence is given, that there is a significant coherence between the two variables.

## 2.2 Research Questions

This study examines the behavior of Twitter users after the *Charlie Hebdo* terrorist attacks in terms of the usage of links, multimedia and @-function. The investigation is based on the six research questions (RQ):

- **RQ1:** How is the frequency of embedding links, @'s and multimedia in the week after the attack?
- **RQ2:** What kinds of links are being embedded in the tweets during the week after the triggering event?
- **RQ3:** How does the used links of different sources change during one week after the triggering event?
- **RQ4:** Does the embedding of links, multimedia and @ influence the amount of received retweets (RTs) and likes?
- **RQ5:** Does the embedding of @ influence the amount of multimedia and links? Who are the top-10 user addressed with @?
- **RQ6:** What are the most frequent hashtags used in tweets related to the terrorist attack on *Charlie Hebdo*?

## 3 Results

The dataset included 7.127 tweets from 07-Jan-2015 until 13-Jan-2015.

### Research questions 1:

Figure 1 shows that 44% of the 7127 tweets include a link, 27% of them mentioned someone and 31% include multimedia content (e.g. pictures and videos). In fact, the most users integrate in their tweets different kinds of links followed by multimedia.

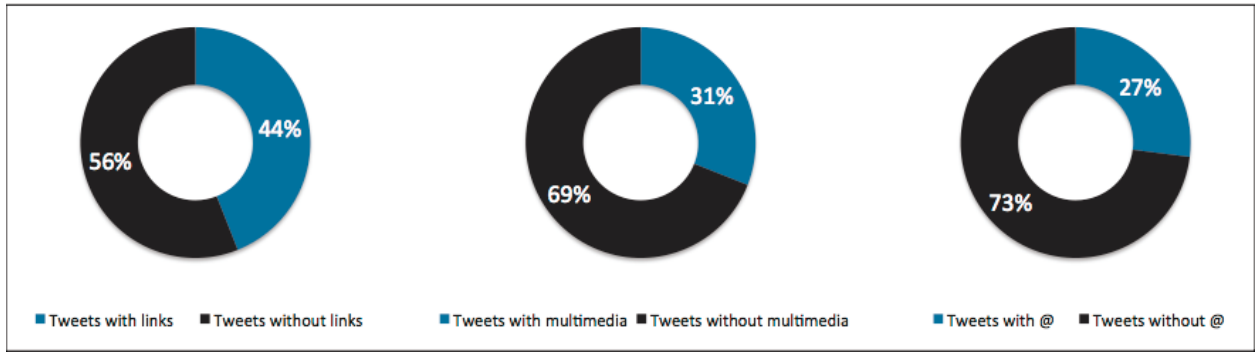


Figure 1. Content Analysis of the collected tweets referred to *Charlie Hebdo*

**Research questions 2:**

Considering the fact that 44% of the tweets include a link, the next question concentrates on the kind of link. All links retrieved from the tweets were categorized into five categories (news, social media, satire/magazine, blogs/personal website and others). The categorization shows that half of the links go to diverse news sites and the second most links go to social media channels. Figure 2 shows that 51% of 3109 links are from the category news.

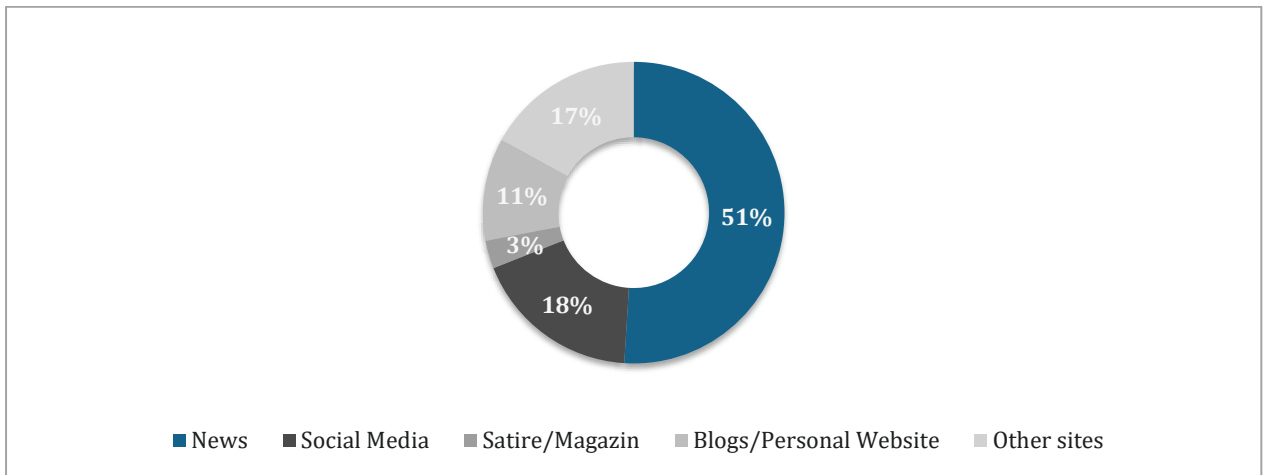


Figure 2. Categorization of the links that are embedded into the tweets

Figure 3 shows a detailed overview of the social media channels linked in the tweets. Interestingly, the mostly linked social media channel is YouTube followed by Facebook. Furthermore, it is recognizable that after the triggering day (07-Jan-2015) the next two following days the embedding of YouTube and Facebook contents arises. 30 tweets of 1001 tweets on the 07-Jan-2015 are including YouTube links whereas the two days after the triggering event the frequency of YouTube links is around 50. Moreover, starting from 11-Jan-2015 the count of links decreases related to the social media channels YouTube and Facebook.

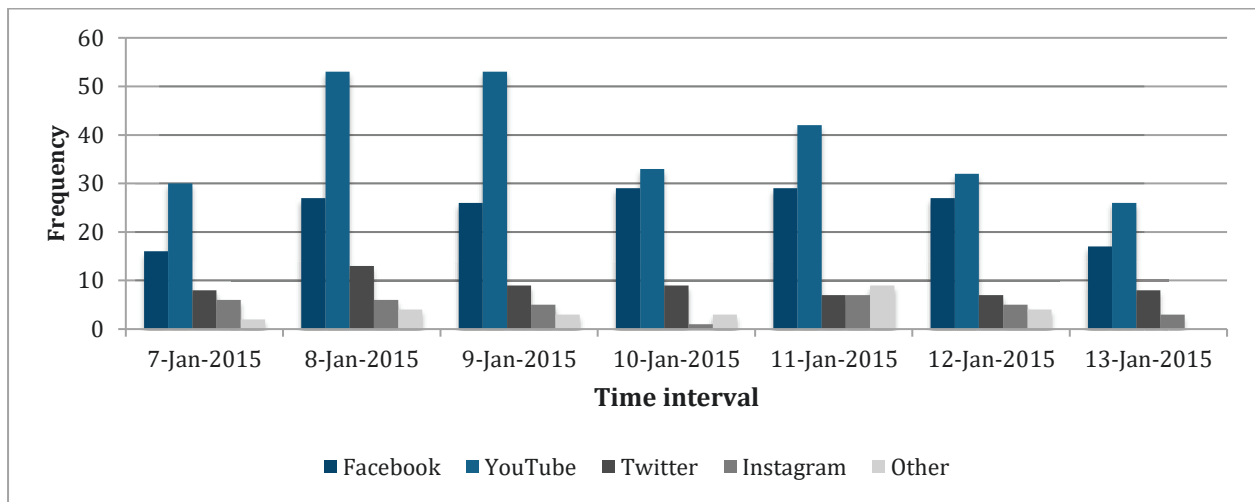


Figure 3. Distribution of social media links in the collected tweets

**Research questions 3:**

Figure 4 shows, if there are any changes in the frequency of embedding certain kinds of links. The amount of links to news sites rises from 09-Jan-2015 to 10-Jan-2015 and at the same time, the amount of links to social media content declines. In contrary, the next day behaves different related to the links. Whereas there are more social media links, the count of tweeting news rapidly subsides. Considering the last two days it is recognizable that users refer more often to news than to social media content. This shows that the users are not using all possible sources in an equal manner, but rather choose one favorite source to share.

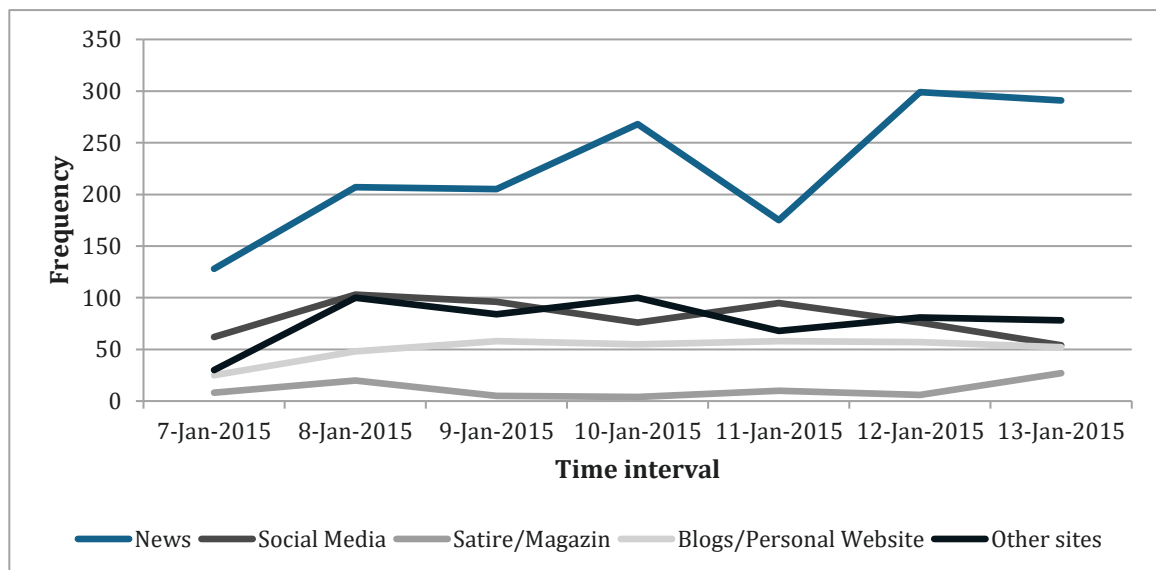


Figure 4. Distribution of links (news, social media, satire/magazine, blogs/personal website, other sites)

**Research question 4:**

Next research question concerns the correlation between of the embedding of links, multimedia and @ and the amount of received RTs and likes. Table 1 shows that only on the 11-Jan-2015 there is no notable effect size between RTs and Multimedia. On other days, the effect size even a small one, but significant. After the day of the attack (07-Jan-2015) the effect size is getting weaker until the increase on the 4<sup>th</sup> day. The noticeable small effect is given on the 12-Jan-2015 with +0.040705. In evidence, the last two days of the time interval have a higher small effect than the first two days.

Table 1 shows that for each investigated day there is a highly significant positive correlation between RTs and multimedia. Furthermore, the data shows that there is no significant correlation between RTs and @. That implies that there is no significant relationship between the amount of RTs and the use of @ in tweets related to *Charlie Hebdo*. Similar to this cognition, there is only one significant negative correlation on the 10-Jan-2015 between link and RTs, implying that tweets with embedded links were less often retweeted.

		Retweets (RTs)					
Date		Link		@		Multimedia (Picture or Video)	
		$\eta_p^2$	$r_{pb}$	$\eta_p^2$	$r_{pb}$	$\eta_p^2$	$r_{pb}$
1 <sup>st</sup> day	07-Jan-2015	.000054	+.007	.003111	+.056	.021196***	+.146***
2 <sup>nd</sup> day	08-Jan-2015	.000749	+.027	.000205	-.014	.019469***	+.140***
3 <sup>rd</sup> day	09-Jan-2015	.000569	+.024	.001070	-.033	.015912***	+.126***
4 <sup>th</sup> day	10-Jan-2015	.006845**	-.083**	.003056	+.055	.019096***	+.138***
5 <sup>th</sup> day	11-Jan-2015	.000043	-.007	.000464	-.022	.003846*	+.062*
6 <sup>th</sup> day	12-Jan-2015	.002630	-.051	.002274	-.048	.040705***	+.202***
7 <sup>th</sup> day	13-Jan-2015	.000822	-.029	.001456	+.038	.023049***	+.152***

Table 1. **Effect size** between RTs and link, multimedia and @ computed with **partial eta-squared** ( $\eta_p^2$ ) and are color-coded; small (0.0099), medium (0.0588), and large (0.1379) and **Point-Biserial Correlation coefficient** ( $r_{pb}$ ) between RTs and links, multimedia and @; \*:  $p < 0.05$ ; \*\*:  $p < 0.01$ ; \*\*\*:  $p < 0.001$ ; all other: not significant

Table 2 shows the calculated effect sizes between likes and the three aspects. The data shows that, if an effect size is given, it is a small one. Whereas the small effect size between RTs and multimedia is given for six days, the small effect size between likes and multimedia is only given for four days. The highest small effect size is recognizable on the 6<sup>th</sup> day (12-Jan-2015). Furthermore, in contrary to outcome for RTs in Table 1, a small effect size between likes and links is given on the fourth and sixth day. The relationship between the amount of likes and the embedding of link, multimedia and @. It is evident that the significant correlation is getting weaker. Therefore, the embedding of multimedia has a higher influence on the amount of RTs than on the amount of likes. Table 2 shows that there are weak correlations on the 07-Jan-2015, 10-Jan-2015, 12-Jan-2015 and 13-Jan-2015 between likes and multimedia. There also are highly significant negative correlations between links and the amount of likes.

		Likes					
Date		Link		@		Multimedia (Picture or Video)	
		$\eta_p^2$	$r_{pb}$	$\eta_p^2$	$r_{pb}$	$\eta_p^2$	$r_{pb}$
1 <sup>st</sup> day	07-Jan-2015	.000959	-.031	.000843	+.029	.010723***	+.104***
2 <sup>nd</sup> day	08-Jan-2015	.001541	-.039	.001473	-.038	.002347	+.048
3 <sup>rd</sup> day	09-Jan-2015	.003633	-.060	.001038	-.032	.000214	+.015
4 <sup>th</sup> day	10-Jan-2015	.011588** *	-.108***	.003653	+.060	.012815***	+.113***
5 <sup>th</sup> day	11-Jan-2015	.001184	-.034	.000363	-.019	.000006	-.002
6 <sup>th</sup> day	12-Jan-2015	.009636**	-.098**	.002301	-.048	.030815***	+.176***
7 <sup>th</sup> day	13-Jan-2015	.007397**	-.086**	.001127	+.034	.023751***	+.154***

Table 2. **Effect size** between likes and link, multimedia and @ computed with partial eta-squared ( $\eta_p^2$ ) and are color-coded; small (0.0099), medium (0.0588), and large (0.1379) and **Point-Biserial Correlation ( $r_{pb}$ )** between likes and links, multimedia and @; \*:  $p < 0.05$ ; \*\*:  $p < 0.01$ ; \*\*\*:  $p < 0.001$ ; all other: not significant

**Research question 5:**

The @ function of Twitter enables the user to mention or rather to response to someone. Could it also be possible, related to the attacks on *Charlie Hebdo* that the user mentioned someone and also attached a multimedia data or a link? Table 3 shows the distribution between the cases that a user mentioned someone and added a picture/video. It shows that there is only one day (13-Jan-2015) where no significant relationship is recognizable for both aspects (link and multimedia). On the first day of the attack (07-Jan-2015) there is a significant correlation between @ and multimedia. The 0-hypothesis (there is no significant correlation) between @ and link is declined as p is smaller than 0.05. The correlation between @ and multimedia on the triggering day (07-Jan-2015) reflects a weak, but significant, correlation. This one is the highest significant correlation. Furthermore, on the next two following days, the significant correlation between @ and multimedia decreases and then again increases on the fourth day (10-Jan-2015). On the second and third day the correlations between @ and link, and @ and multimedia is significant. On these two days, the significant correlation between @ and link is a little bit higher than between multimedia and @.

	07-Jan-2015	08-Jan-2015	09-Jan-2015	10-Jan-2015	11-Jan-2015	12-Jan-2015	13-Jan-2015
Link	+0.041	<b>+0.175***</b>	<b>+0.160***</b>	+0.062	<b>+0.074*</b>	<b>+0.108***</b>	+0.043
Multimedia	<b>+0.198***</b>	<b>+0.118***</b>	<b>+0.096**</b>	<b>+0.123***</b>	+0.020	+0.019	+0.057

Table 3. Computed symmetric measure Phi related to @ and link, and @ and multimedia; \*:  $p < 0.05$ ; \*\*:  $p < 0.01$ ; \*\*\*:  $p < 0.001$ ; all other: not significant.

From tweets that include '@' on the triggering day (315 tweets), 46.7% include multimedia and 53.3% do not. The data from the day after the triggering event (08-Jan-2015) shows that the use of @ and the use of link or multimedia have a weak significant correlation. Table 4 shows that 60.1% of the tweets included a @ and a link, and 39.9% of the tweets with @ do not have any link. In consideration to the day before, the count of using links with @ increases. It is obvious that tweets with @ rather do not include additional multimedia data. On the third day after the attack (09-Jan-2015), the amount of tweets with '@' and multimedia decreases (36.8%). Interestingly, tweets with '@' and a link decrease on the third day too, but the frequency of tweets with @ and a link is higher (57.5%) than in case of tweets without a link (42.5%). Table 5 shows that 60.9% of 307 tweets with '@' do not have a picture or video. Considering the significant but weak correlation between link and @ (Table 3) in all applicable cases the frequency of tweets with @ and link is higher than without links (Table 4). Only on one day (11-Jan-2015) the count of tweets with @ and no link is higher (54.3%) than with link (45.7%).

	07-Jan-2015		08-Jan-2015		09-Jan-2015		10-Jan-2015		11-Jan-2015		12-Jan-2015		13-Jan-2015	
	link <sub>no</sub>	link <sub>yes</sub>	link <sub>no</sub>	link <sub>yes</sub>	link <sub>no</sub>	link <sub>yes</sub>	link <sub>no</sub>	link <sub>yes</sub>	link <sub>no</sub>	link <sub>yes</sub>	link <sub>no</sub>	link <sub>yes</sub>	link <sub>no</sub>	link <sub>yes</sub>
@ <sub>no</sub>	569	179	402	283	434	287	360	333	462	277	414	377	430	372
	76.1%	23.9%	58.7%	41.3%	60.2%	39.8%	51.9%	48.1%	62.5%	37.5%	52.3%	47.4%	53.6%	46.4%
@ <sub>yes</sub>	188	73	126	190	119	161	139	168	144	121	100	152	130	137
	72.0%	28.0%	39.9%	60.1%	42.5%	57.5%	45.3%	54.7%	54.3%	45.7%	39.7%	60.3%	48.7%	51.3%

Table 4. Cross-Table between @ and link

	07-Jan-2015		08-Jan-2015		09-Jan-2015		10-Jan-2015		11-Jan-2015		12-Jan-2015		13-Jan-2015	
	mm <sub>no</sub>	mm <sub>yes</sub>	mm <sub>no</sub>	mm <sub>yes</sub>	mm <sub>no</sub>	mm <sub>yes</sub>	mm <sub>no</sub>	mm <sub>yes</sub>	mm <sub>no</sub>	mm <sub>yes</sub>	mm <sub>no</sub>	mm <sub>yes</sub>	mm <sub>no</sub>	mm <sub>yes</sub>
@ <sub>no</sub>	555	139	457	228	526	195	507	186	534	205	571	220	543	259



	74.2%	25.8%	66.7%	33.3%	73.0%	27.0%	73.2%	26.8%	72.3%	27.7%	72.2%	27.8%	67.7%	32.3%
@yes	193	122	172	144	177	103	187	120	186	79	177	75	164	103
	53.3%	46.7%	54.4%	45.6%	63.2%	36.8%	60.9%	39.1%	70.2%	29.8%	70.2%	29.8%	61.4%	38.6%

Table 5. Cross-Table between @ and multimedia (mm)

As the collected tweets to the *Charlie Hebdo* attack include @ (27%) Figure 5 represents the top 10 twitter users that were mentioned. Campact is a platform for citizens to distribute their opinion about social changes. YouTube is not only the mostly used social media channel in the collected tweets, it is also the second most @ ‘user’. Users as *welt*, *SZ*, *SPIEGELONLINE*, *BILD*, *tagesschau* and *zeitonline* are German news agencies. *Twitalk* is a live talk show on Twitter. Obviously, Twitter users mostly mentioned or answered to news agencies or accounts for discussing opinions. The top 10 @ ‘user’ does not include ‘normal’ twitter users. News agencies published information about the *Charlie Hebdo* attacks on Twitter. Therefore, user could use the @ function to disseminate information of the news agencies or to respond to their tweets.

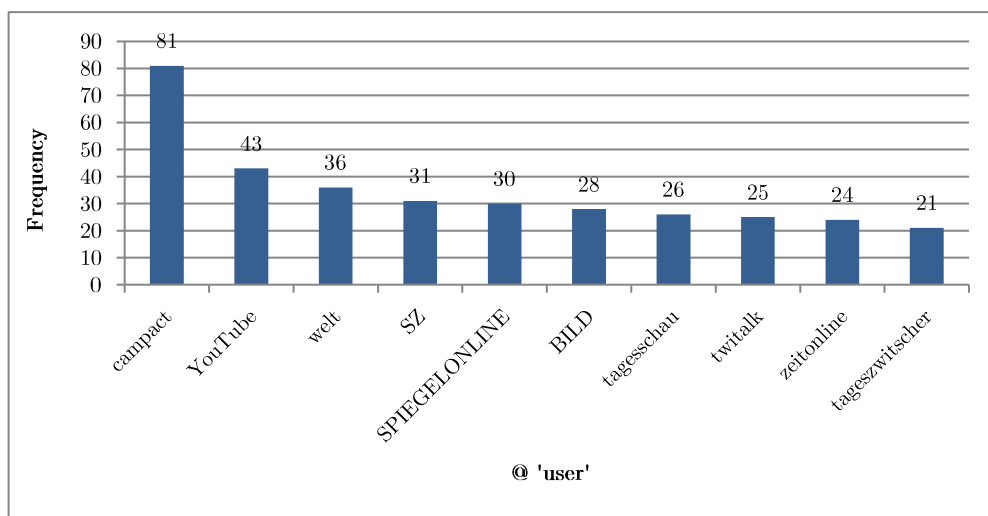


Figure 5. Top 10 of @ ‘user’

**Research question 6:**

The last research question concentrates on the frequencies of the hashtags (#) used during the seven days after the attacks (07 – 13-Jan-2015). As the collected tweets were in German, the hashtags were translated into English. Figure 6 shows that the most used hashtags are *#CharlieHebdo*, *#JeSuisCharlie* and *#Pegida*. Pegida is a German anti-islam movement. The next two hashtags are not recognizable in Figure 6, as their frequency is too low. These hashtags are *#Freedomofpress* and *#Freedomofopinion*. They are less frequently used, but express the emotions and opinions related to the attacks on *Charlie Hebdo*. Figure 6 shows that the users show solidarity with the killed Muslim police officer by using the hashtag *#JeSuisAhmed*. Furthermore, besides the solidarity with the killed police officer Ahmed, the hsshtag *#JeSuisJuif* arises attention. This hashtag refers to the hostage situation in a Jewish supermarket. Furthermore, since the attack is defined as an Islamic attack, the hashtag *#Islam* is an often discussed, controversial topic. Furthermore, besides *#Pegida*, the contrary movement is also represented on some days (*#Nopegida*). The collected data includes not only the typical hashtags (*#CharlieHebdo* and *#JeSuisCharlie*), but also others representing solidarity (*#JeSuisAhmed*) as well as expressing opinions and emotions such as clannishness (*#Togetherforeachother*).

Furthermore, according to Herrera-Viedma et al. (2015) with the use of ‘we’ or the name of cities, “people want to add an identity to the supporting messages” (p. 12). The collected tweets also include hashtags like *#paris*. Furthermore, with the use of hashtags in the own language, in this case German, it should express the “local identity to the global trend” and “foster the spread in country specific communities” (Herrera-Viedma et al., 2015, p. 12).



Figure 6. Word cloud calculated by the sum of the top 10 hashtags from the first day till the last day (07–13-Jan-2015)

#### 4 Discussion

With this study we link to the investigations on the Twittersphere and set a first step into the content analysis of tweets related to the terrorist attack on *Charlie Hebdo* on the 7<sup>th</sup> of January 2015 in Paris.

The research tries to give a first impression about the user behavior on Twitter after a terrorist attack. The fact that Twitter is a suitable tool to share the own opinion or attitude was also confirmed by this research. Besides the *#CharlieHebdo* and *#JeSuisCharlie* the research shows that the analyzed tweets are also equipped with hashtags expressing solidarity with the victims (citizens or police officer) as well as the importance of clannishness, and not only focusing on general topics. This investigation confirms that, related to incidents like terrorist attacks, the flow of information and information diffusion (or news dissemination) is evident, since 44% of the 7127 collected tweets include a link, whereas 51% of them are links to news agencies. One most often distributed picture was the one with a white quote ‘Je Suis Charlie’ on a black background. Therefore, it is hardly surprising that 31% of all collected tweets included multimedia. For a lot of people pictures like that also represent solidarity and empathy, as one picture says more than 1000 words. It could be possible, that pictures (or rather multimedia) enable in a simple way the expression of feelings.

The @ function was the one aspect that is used less within the tweets related to *Charlie Hebdo* and if it was, the users linked news agencies or other platforms but not other common twitter users (as the top 10 ranking showed). Therefore, the research indicates that the effect of dissemination of links (44%) is higher than the use of @ (27%). The frequent mentioning of news agencies, however, could either indicate referencing a news source “cited” in the tweet or commenting/discussing on the news tweets posted by the news agencies.

Furthermore, the behavior of users changes with time. While the number of tweets with a link to YouTube was 30 on the first day, two days after the attacks the amount of YouTube links increased. Not only the frequency of embedding the social media links changed, the kind of embedded links (news, social media, and so on) changed as well. To the end of the week the count of news links increased, whereas the use of social media links decreased. Furthermore, it is obvious that during a triggering event, such as *Charlie Hebdo*, links to news agencies/platforms spread faster than links to social media or other sites. This case study shows that the analyzed Twitter user applies Twitter to repost information of news agencies/portals and to inform other Twitter user of real-time information related to the terror attacks. During the week after the event, the frequency of embedding links to news agencies doubled (from 150 to 300), whereas the amount of links to social media oscillated between 50 and 100. Personal websites and blogs were linked even less frequently, around 50 times, which remained constant over the whole week.

The amount of RTs rises when the tweet includes multimedia. The hypothesis that the frequency of RTs rises when a link is embedded was not confirmed in this case. In fact, the posting of

a tweet with a link does not trigger a chain reaction of distributing the tweet by other twitter users. While the @ function does not have any significant influence on the frequency of RTs, the research shows that tweets with @ have a more significant relationship with multimedia than with links. It could indicate that users embedding multimedia want to either draw someone's attention to them with the mention (@), or indicate the original creator of the tweeted picture or video with mention (@) being a kind of reference.

In future research a comparison between German and in English tweets could be interesting as there could be cultural differences in user behavior. Furthermore, a more detailed content analysis, especially in form of topic overview could be interesting. Based on information journalism a content analysis considering the comparison between own information publishing and reposting information of news agencies should be considered and analyzed.

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