Inter-country Differences in Breaking News Coverage via Microblogging: Reporting on Terrorist Attacks in Europe from the USA, Germany and UK

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Abstract. The micro-blogging service Twitter proved to be a suitable social media platform for (breaking) news dissemination and commentary. Its immediate penetration and strong ability to spread such news was already investigated by several researchers. Breaking news themselves play an important role in the "24-hour news culture" we live in today. In less than two years several terrorist attacks stroke Europe. Twitter was one of the live reporting tools that kept people from all over the world in the loop on the attacks as well as on the proceeding investigations. Did news agencies from three different countries report in a similar manner on all these attacks? Did their follower disseminate the breaking news through re-tweets on the same scale? Are tweets on terrorist attacks more likely to be retweeted?

Keywords: Twitter · Breaking news · Terror attacks · News dissemination · Inter-country comparison · News services · Retweetability

1 Introduction

In less than two years, several terrorist attacks stroke the European society. Each time Twitter was one of the live reporting tools that kept the public in loop. How did news agencies from different countries report on these breaking events on Twitter? How did users react to such news?

Twitter is a micro-blogging service that allows its users to share tweets, messages of no more than 140 characters, with each other. After its launch on July 13, 2006, Twitter quickly became popular worldwide [1], also among older social media users [2]. The messages (tweets) are available to the public and are included in the tweet lists of the followers, who have subscribed to someone's Twitter stream [3–5]. With time, Twitter has become an instrument for dissemination and subsequent debate on news stories [6] as well as one of the top services used by semantic web researchers to spread information [7]. Bruns and Burgees [6] emphasize the dual nature of Twitter as a social networking site and an "ambient information stream."

Twitter's development from everyday communication and life-sharing towards a news dissemination and commentary tool is similar to the one of older social media

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platforms like, e.g. blogs, which has been established as first-hand reporting and follow-on commentary or discussion platforms [6, 8]. Now, they are widely applied for journalistic and quasi-journalistic activities [6, 9, 10] as well as follow-on discussion and, according to Bruns [11], the "gatewatching." Gatewatching is the "highlighting, sharing and evaluating relevant material released by other sources in order to develop a more comprehensive understanding" [6]. The "sharing" occurs through tweeting links to further sources or retweeting posts of other users. Ettema [12] identified Twitter and blogging as journalistic tools for the 21st century.

Twitter can be also considered as an awareness system, "intended to help people construct and maintain awareness of each other's activities, context or status, even when the participants are not co-located" [13, 14]. Twitter became "part of an ambient media system where users receive a flow of information from both established media and from each other" [13]. This "ambient" function of Twitter [13, 15] is best recognizable when a broad commentary on current events is being carried out. After breaking news spreads across Twitter, the "topical focus of incoming tweets" may make the user pay attention to this breaking story [6]. For example, Mendoza et al. [16] investigated the behavior of Twitter users under an emergency situation, namely the 2010 earthquake in Chile. They analyzed the Twitter activity in the hours and days following the disaster as well as certain social phenomena like the dissemination of false rumors and confirmed news.

Studies suggest that citizens are increasingly participating in the "observation, selection, filtering, distribution and interpretation of events" and that digital technologies increase the presence of ambient news [13]. Domingo et al. [17] speak of "participatory journalism." A study by Pew Internet in 2010 showed that news is becoming a social experience and "participatory activity" since users increasingly post their own stories as well as experiences and reactions to current events [13, 18].

In this study, the Twitter activity by news services from Germany, the USA and the UK, one week before and one week after the selected triggering events—the terrorist attacks in Paris on 7th of January 2015, in Paris on 13th of November 2015, and in Brussels on 22nd of March 2016, is being investigated. The aim of this investigation is to identify the differences between top news services from the different countries in breaking news coverage via Twitter as well as its further dissemination by users through retweets.

2 Methods

For the purpose of this study we applied methods known from similar investigations on Twitter activity. The importance of social networks was recognized by social scientists long time ago [19]. The modern communication, especially social media, enhanced the role of networks in marketing [20, 21], information dissemination [22, 23], search [24], and expertise discovery [25, 26]. Twitter has already proved to be a suitable social medium for investigation of news dissemination and commentary on breaking news. Gahran [27] emphasized Twitter's immediate penetration and strong ability to spread such news. According to Farhi [20], Twitter is a "tool with speed and brevity that are ideal for pushing scoops and breaking news to readers" [3]. Breaking news play an

important role in the "24-hour news culture" [28] and Twitter can provide users with this kind of news without them having to search for them on news' websites [5]. The breaking news that were chosen as triggering events for the current study are the terrorist attacks in January 2015 in Paris aimed primarily at the offices of the satirical weekly newspaper Charlie Hebdo, the series of coordinated terrorist attacks in November 2015 in Paris including suicide bombings and mass shootings outside the Stade de France, in Bataclan Theatre and several Cafes, and the terrorist attacks in March 2016 in Brussels that occurred at the Brussels airport and the Maalbeek metro station in the city center.

2.1 Applied Indicators

Despite sending messages, or "tweeting," Twitter enables users to "like" and "retweet" messages of (other) users. If users consider a tweet as interesting, they can forward it to their own followers by "retweeting" the original message [29]. The meaning of retweets (RTs) can vary [29]. Without RTs the original message would only reach limited number of users (namely, one's own followers). Despite spreading the original message through the network, a RT can be interpreted as an "endorsement for message and sender," or, when additional commentary is retweeted, more a commentary of current news rather than its dissemination [6]. Any retweeted tweet can be expected to reach an average of 1,000 Twitter users [9, 30]. Messages are usually retweeted when users find a message particularly interesting and worth sharing with others, therefore, RTs may reflect what "the Twitter community considers interesting on a global scale" [30].

Furthermore, a well-connected user with active followers is more likely to be retweeted [9, 30–32]. Other factors that may influence the amount of retweets (retweetability) are besides the number of followers and followees, the age of the account, the number of favorite tweets as well as the number and frequency of tweets [30, 32]. However, other studies contradicted the assumption that popular users with large numbers of followers have more influence on Twitter [33, 34]. According to Zhao et al. [35], Twitter users tweet less on world events, however, they do actively retweet such news. In our study, the retweetability of tweets on the triggering events posted by different news accounts is analyzed as an indicator of attention from the community.

While tweeting, an author can include links directed at other users by typing "@" and the respective user name. These directed links might represent "anything from intimate friendships to common interests, or even a passion for breaking news or celebrity gossip" [33]. During analysis of collected data, indicators were found that some of news agencies include directed links in their tweets. Some of these mentions are directed at accounts of celebrities that the news is about; other are directed at followers with whom the news agency is communicating. For this study, mentions indicating a "conversation" between the news account and users were included as variable.

2.2 News Accounts

Armstrong and Gao [3] examined how Twitter is used as a content dissemination tool by news agencies. In their study, they looked at tweets of nine news organizations during a 4-month period, in order to determine how individuals, links, news headlines and subject areas were employed within the 140-character limits. In our study the tweeting activity of 15 news services accounts from three different countries during a 2-week period was investigated. The focus is set on information dissemination of concrete breaking news and not on general characteristics of news distribution, therefore, a shorter observation time of two weeks appears sufficient.

The main Twitter accounts of most popular online news agencies from Germany [36], the USA [37] and UK [38] were investigated. The included German news services are *Bild*, *Frankfurter Allgemeine Zeitung*, *Süddeutsche Zeitung*, *Die Welt*, and *Zeit Online*. The investigated British news services are *Daily Express*, *Daily Mirror*, *The Guardian*, *Daily Mail* and *Telegraph News*. Finally, the investigated online news services from the USA are *CBS*, *CNN*, *NBC*, *USA Today*, and *Yahoo*.

The Twitter accounts were found either on the news organization's website or through a search on the Twitter website for the official account. From the respective news accounts, all tweets from the week preceding the investigated event ("triggering event") and all tweets from the week after the event, as well as from the day of the event, were retrieved. Hence, for Charlie Hebdo terrorist attacks (7th of January) there were retrieved tweets posted from 31st of December 2014 until 15th of January 2015. An example for an advanced Twitter search for the British news agency Daily Mail Online is: *from: MailOnline since: 2014-12-30 until: 2015-01-16*. For the second triggering event, the terrorist attacks in Paris (13th of November), the timespan was set from 6th to 20th of November 2015. For the last triggering event, the terrorist attacks in Brussels (22nd of March), the timespan was set from 15th to 29th of March 2016. For this study all "live" tweets were retrieved, which are all published tweets in real-time order, and not only the "top" tweets limited to the most popular ones.

2.3 Research Questions

Based on the retrieved tweets with focus on the three triggering events, this study aims at answering four main research questions:

RQ1: What are the differences between news services' accounts from Germany, the USA, and UK regarding (a) the number of tweets posted per day, (b) the average number of RTs per tweet, and (c) their distribution over the two weeks around the terrorist attacks?

RQ2: What are the differences between news services' accounts from Germany, the USA, and UK regarding (a) the ratio of tweets reporting on the terrorist attacks, (b) the average number of RTs that the news on terrorist attacks received, and (c) their distribution over the week after the terrorist attacks?

RQ3: What are the differences between news services' accounts from Germany, the USA, and UK regarding (a) the relationship between the topic of tweet being the terrorist attack and the number of RTs it gets, and (b) potential changes in this relationship during the week after the attack?

RQ4: Regarding all previous research questions, is there a noticeable difference in outcomes between the three investigated triggering events, i.e. is the breaking news coverage and its dissemination constant for all three attacks or is there a tendency of increasing or decreasing attention that they get?

2.4 Data Processing

All tweets were retrieved using the python application *tweepy* and the Twitter-API, as well as manually using Twitter's advanced search interface. The database structure included a unique ID, the tweet itself, the news service, publication date, country, number of likes, number of RTs, whether the tweet is topically related to the triggering event ("topic of interest"), and whether the tweet is only an interaction with users. The tweets were topic-coded by two independent researchers. After processing with SPSS, the consolidated database included average counts for each news agency and for each one of the 15 days per event—the average number of tweets and RTs (RQ1) as well as the ratio of tweets on the topic of interest (RQ2). Furthermore, for the week after the attacks, there was calculated the difference between daily average of RTs of tweets on the "topic of interest" and for tweets on different, non-related topics. This difference was normalized by setting it in relation to the mean number of RTs for all tweets (on topic of interest and on others). This way it was possible to compare all three countries, which are characterized by different amounts of tweets and RTs per tweet. This RT-ratio shows whether there is a positive or a negative tendency in retweeting news services' tweets reporting on the triggering event compared to tweets on other topics (RQ2):

$$RT\_ratio_{topic} = \frac{\emptyset RT_{topic} - \emptyset RT_{others}}{\emptyset RT_{all}} \times 100\%$$

The significance of the difference in retweetability between tweets on topic of interest and tweets on other topics was further examined with the Mann-Whitney U-test and the median RT-values (in contrast to the mean values, medians are not skewed by extreme values) for the both topic groups ("topic of interest" and "other topics"). The Mann-Whitney U-test was developed as a test of stochastic equality [39]. It is a rank-based nonparametric test that can be used to determine if there are differences between two groups on a continuous dependent variable [40], in this case the number of RTs.

For the analysis of the influence that the topic of a tweet ("topic of interest") can have on its further dissemination by users through RTs (RQ3), Pearson's point-biserial correlation coefficient (r_{pb}) was computed. This coefficient is used to determine the strength of a linear relationship between one continuous variable and one nominal dichotomous variable. The effect sizes of Pearson's correlation coefficient were defined by Cohen [41] as small, medium, and large and are reflected by the values 0.1, 0.3, and 0.5, respectively. These estimations were included in the analysis of the size of the effect that the topic of interest potentially has on the retweetability. Furthermore, the coefficient of determination (r^2_{pb}) was calculated in order to determine the proportion of

variance in one variable that can be explained by the other variable [42, 43]. The coefficient of determination was calculated as the percentage of variance in the number of RTs that can be explained by the variance in the topic of the tweet ($r^2_{pb} \times 100$).

3 Results

The dataset included 55,944 Tweets posted by 15 news services' Twitter accounts from three countries. There were 13,580 tweets from two weeks around the Charlie Hebdo terrorist attacks, 21,379 tweets from the period around the Paris terrorist attacks, and 20,987 tweets from the period around the terrorist attacks in Brussels. In general, there were 13,819 tweets from German, 30,801 from British, and 11,326 tweets from US-American news services' Twitter accounts. The differences between the accounts from different countries will be investigated while analyzing the data in context of the four research questions.

3.1 General Differences Between News Services' Twitter Activity

The first research question concerns the general differences between the news services' Twitter activity from the three investigated countries and for the three investigated triggering events. The observed Twitter activity enfold seven days before and seven days after each triggering event.

The first investigated triggering event are the Charlie Hebdo terrorist attacks (Fig. 1). As for the German news services, the average number of tweets per day

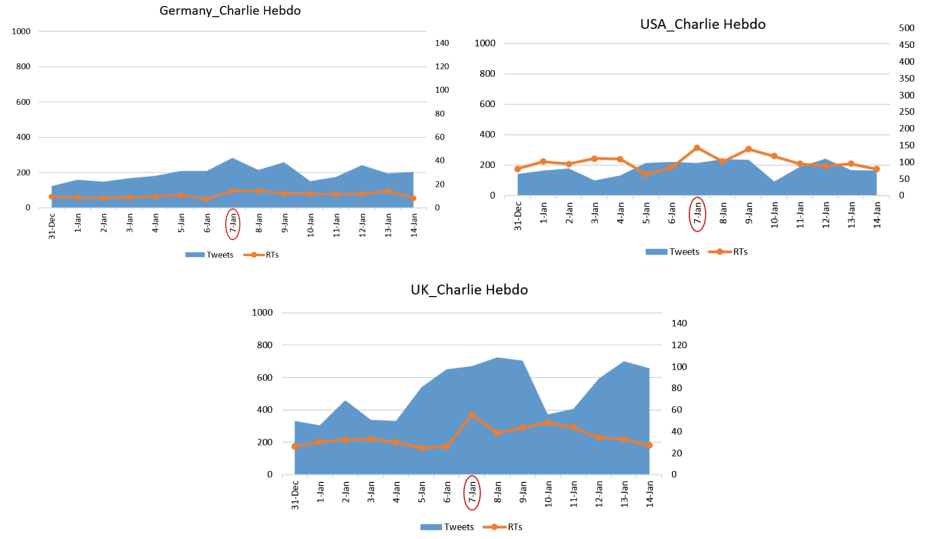

Fig. 1. Average number of tweets and of RTs per tweet within two weeks around the investigated triggering event *Charlie Hebdo* for German, USA and UK news services' Twitter accounts.

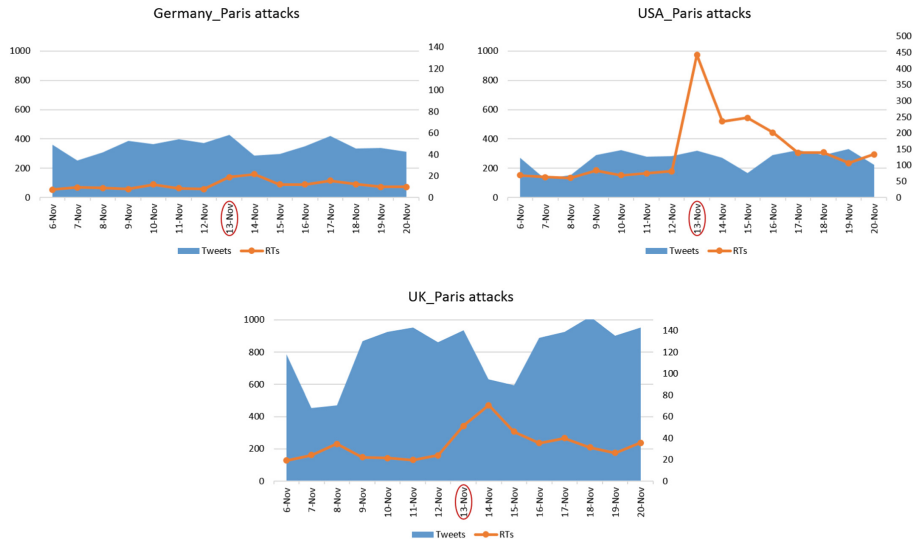

Fig. 2. Average number of tweets and of RTs per tweet within two weeks around the investigated triggering event *Paris attacks* for German, USA and UK news services' Twitter accounts.

ranged between 123 and 284 tweets, with a peak on the day of the event (7-Jan). Regarding the average retweetability, the number of RTs oscillated between 7.3 and 14.4 RTs/tweet with the highest value on the day after the event (8-Jan) and the day of the event (7-Jan) with 14.4 and 14.3 RTs/tweet respectively. As for the news services from the USA, they posted the least tweets. The average number of tweets per day ranged between 92 and 242 with a peak on 12-Jan (242 tweets) and on the day after the event (235 tweets). The lowest number of published tweets was given on Saturdays (3-Jan and 10-Jan) with 99 and 92 tweets respectively. However, the US-account have in average the highest number of RTs/tweet ranging between 63.6 and 143.33 RTs/tweet with a peak on the day of the event (7-Jan) with 143.3 RTs/tweet and two days after (9-Jan) with 138.8 RTs/tweet. The news account from UK published the highest average numbers of tweets per day, ranging between 305 and 724. There was a peak in number of published tweets on the two days following the event (8-Jan and 9-Jan) with 724 and 704 tweets respectively. The number of RTs/tweet ranged between 25 and 55.8, with a peak on the day of the event (7-Jan).

The Twitter activity and retweetability of news services around the time of Paris terrorist attacks is shown in Fig. 2. As for the news services from Germany, the average number of tweets per day increased when compared to the first triggering event, and ranged between 252 and 427 tweets per day. There was a peak in activity on the day of the event (13-Nov) and four days later (17-Nov) with 427 and 420 tweets respectively. The lowest numbers of tweets are given on 7-Nov and 14-Nov, which were Saturdays. The average number of RTs per tweet ranged between 7.24 and 21.7 with most RTs on the day after the event (14-Nov). Regarding the news services from the USA, the average number of tweets per day was between 126 and 331, which as well indicates an

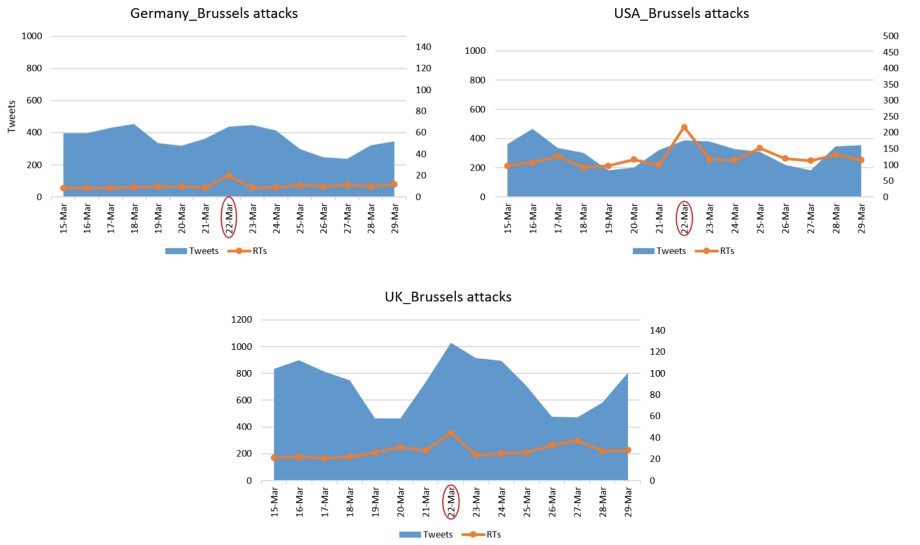

Fig. 3. Average number of tweets and of RTs per tweet within two weeks around the investigated triggering event *Brussels attacks* for German, USA and UK news services' Twitter accounts.

increase when compared to the first triggering event, with a peak on 19-Nov with 331 tweets, and lowest values on 7-Nov and 15-Nov (Saturday and Sunday). The numbers of RTs varied between 60.6 and 442.9 RTs/tweet with a very distinctive peak on the day of the event (13-Nov). Considering the news services from the UK, the average number of tweets per day was between 453 and 1,020 tweets, which is the highest from all investigated countries, with a peak on 18-Nov, and lowest values on 7-Nov and 8-Nov (Saturday and Sunday). The average number of RTs per tweet ranged between 19.2 and 70.7, with a peak on the day after the event (14-Nov) and the day of the event (13-Nov) with 70.7 and 51.4 RTs/tweets respectively.

Figure 3 depicts the Twitter activity and retweetability of news services' accounts around the time of Brussels terrorist attacks. As for the German news services, the average number of tweets was between 237 and 455, with peaks on 18-Mar and one day after the event (23-Mar) with 455 and 437 tweets respectively. The lowest average number of tweets per day was given on 26-Mar and 27-Mar (Saturday and Sunday). The average number of RTs ranged between 8.3 and 19.9 RTs/tweet, with a distinctive peak on the day of the event (22-Mar). The news services from the USA posted in average between 182 and 465 tweets per day, with a peak on 16-Mar and lowest values on 19-Mar, 20-Mar, 26-Mar and 27-Mar, which were the weekends. The average number of RTs ranged between 91.8 and 217.4 RTs/tweet, with a distinctive peak on the day of the event (22-Mar). As for the news services from UK, they published in average between 465 and 1,028 tweets/day, which is the highest number of all investigated countries and all three time periods. There was a peak in Twitter activity on the day of the event (22-Mar), whereas the lowest numbers of tweets were given for 19-Mar, 20-Mar and 26-Mar, 27-Mar. These were the weekends as well. The average

number of retweeability was between 20.8 and 44.4 RTs/tweet with a distinctive peak on the day of the event (22-Mar).

3.2 Differences Between News Services Regarding the Reporting on the Triggering Event and the Retweetability Levels

The second research question regards the differences between the investigated news services' accounts considering the ratio of tweets on the topic of interest as well as the differences in retweetability of tweets on topic and tweets on other topics. For better inter-country comparability the differences were normalized (set into relation to the mean number of RTs of all tweets). Figure 4 shows the differences for the first investigated triggering event, the Charlie Hebdo terrorist attacks.

As for the news services from Germany (Fig. 4), the ratio of tweets on topic of interest ('Toi_ratio') during the week after the triggering event ranged between 53.7% and 28.45% of all tweets. The highest value was given on the 6th day after the event (13-Jan), followed by the 2nd and 3rd day after the event (9-Jan and 10-Jan) with 46.51% and 41.59% respectively. On the day of the event the ratio amounted to 37.32%. The lowest ratio was given on the 4th day (11-Jan, with 28.45%). The average difference in retweetability (difference in RTs between tweets about the attacks and tweets on other topic relative to the combined RTs-mean) of tweets on topic oscillated between +166.44% and −38.42%, with the highest positive difference on 11-Jan, followed by the day of the event with +128.9%. The lowest and the only one negative value was given on 13-Jan (−38.2%). Regarding the news services from the USA, the

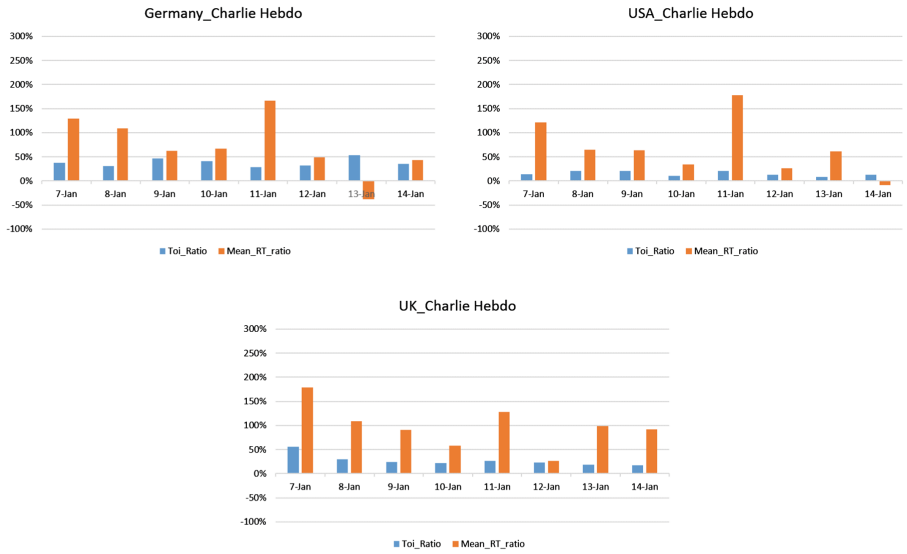

Fig. 4. The ratio of tweets on the triggering event ("toi") and the mean difference in retweeting tweets on topic of interest relative to the overall average number of RTs per tweet for the investigated triggering event *Charlie Hebdo* for German, USA and UK news services.

Fig. 5. The ratio of tweets on the triggering event ("toi") and the mean difference in retweeting tweets on topic of interest relative to the overall average number of RTs per tweet for the investigated triggering event *Paris attacks* for German, USA and UK news services.

topic of interest ratio ranged between 20.66% and 8.81% and was the lowest one of the three countries. There were peaks in the number of tweets on topic on two days after the event (8-Jan and 9-Jan) and on the 4th day (11-Jan), with slightly over 20%. The lowest ratio was given on 13-Jan. The mean difference in retweetability ranged between +177.8% and −8.54%. The highest positive difference in retweetability of tweets on topic of interest was given on the 4th day (11-Jan) and the day of the event (7-Jan), with +177.8% and +121.5% respectively. The lowest and only one negative value was given on 14-Jan (−8.54%). As for the news services from the UK, the topic of interest-ratio was between 55.32% and 17.4%, with the highest ratio on the day of the event (7-Jan), which then decreased over the week. The mean retweetability difference ranged between +179.4% and +26.1%, meaning that each day the tweets on topic got over-average number of RTs. The highest difference in retweetability was given on the day of the event (7-Jan) and on the 4th day (11-Jan) with +179.4% and +128.3% respectively.

Figure 5 shows the ratio of tweets on topic of interest and their retweetability for the second investigated triggering event, the Paris terrorist attacks. The German news services tweeted on this topic in around 66.7% to 20.2% of their tweets, with a peak between 3rd and 5th day after the event (16-Nov through 18-Nov). Surprisingly, the lowest ratio with 20.2% of tweets on topic was given on the first day after the event (14-Nov), followed by the day of the event (13-Nov) with 32.1%. The mean difference in retweetability of these tweets ranged between +181.8% and −18.5%, with highest positive difference on the day of the event (13-Nov) with +181.8% and two lowest, negative values on 17-Nov and 20-Nov with −18.5% and −1.42% respectively. As for

the news services from the USA, the ratio of tweets on topic of interest was between 33.9% and 7.4%, with highest values on the first day after the event (14-Nov) and the day of the event (13-Nov), with 33.9% and 27.1% respectively, and lowest values on 5th and 6th day (18-Nov and 19-Nov) with 7.4% and 8.6% respectively. The mean retweetability difference lied between +220.1% and +2.7%, meaning that the retweetability of tweets on topic was over-average during the whole week after the triggering event. The highest values were given on the day of the event (13-Nov) with +220.1% over average and on the 5th day after the event (18-Nov) with +87.9%. The lowest difference in retweetability was given on the 3rd day after the event (16-Nov), with +2.7%. Regarding the news services from the UK, the topic of interest ratio ranged between 64.7% and 20.1% with the highest value on the day of the event (13-Nov) and the 3rd day after the event (16-Nov) with the ratios reaching 64.7% and 43.9% respectively. The lowest ratio was given on the 7th day after the event (20-Nov) and reached 20.1%. The mean difference in retweetability ranged between +299.5% and +13.4%. Again, all the values were over-average. The highest retweetability values were given on the first two days (13-Nov and 14-Nov) with +299.5% and +71.6% respectively. The lowest difference was given on the 4th day after the event (17-Nov) and reached 13.4%.

Figure 6 depicts the ratios of tweets on topic of interest and the mean difference in their retweetability for the last investigated triggering event, the Brussels terrorist attacks. The German news services tweeted on the topic of interest in between 62.2% and 1.16% of their tweets, with highest value on the day of the event (22-Mar), which decreased steadily over the week and reach the lowest ratio on the 7th day after the event (29-Mar). The mean difference in retweetability ranged between +80%

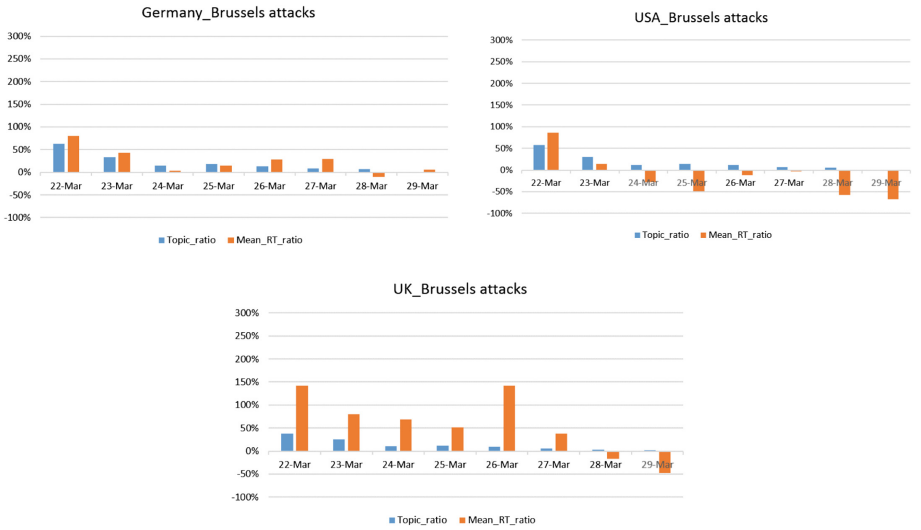

Fig. 6. The ratio of tweets on the triggering event ("toi") and the mean difference in retweeting tweets on topic of interest relative to the overall average number of RTs per tweet for the investigated triggering event *Brussels attacks* for German, USA and UK news services.

and −9.9%, with highest values on the first two days (22-Mar and 23-Mar) with 80% and 42.6% respectively, and the lowest, only one negative, value of −9.9% on the 6th day after the event (28-Mar). As for the news services from the USA, the ratio of tweets on topic of interest ranged between 58.1% and 0.9%, with highest value on the day of the event (22-Mar), decreasing over the week and reaching the lowest one on 29-Mar. The mean difference in retweetability ranged between +86.1% and −67.9%. The only over-average retweetability was given on the first two days (22-Mar and 23-Mar) with +86.1% and +14.2%. On the remaining days, the retweetability of tweets on topic was under-average. Considering the news services from the UK, the ratio of tweets on topic ranged between 37.8% and 1.4%, with the highest value during the first two days (22-Mar and 23-Mar), 37.8% and 25% respectively. The ratio decreased over the week after the event reaching the lowest value on 29-Mar. The mean difference in retweetability ranged between +142% and −47.9%. The highest value was given on the day of the event (22-Mar), steadily decreasing over the week and reaching negative values on 28-Mar (−16.6%) and 29-Mar (−47.9%).

The differences in retweetability of tweets on topic were further examined with the Mann-Whitney U-test (MWU). Tables 1 through 3 show the median number of RTs of tweets on topic of interest (toi_1) and of tweets on other non-related topics (toi_0), as well as the significance of these differences as computed with the MWU-test.

Table 1 presents the medians for each country and topic group as well as the significance outputs of the MWU-test for the first investigated triggering event, Charlie Hebdo terrorist attacks. Regarding the German news services accounts, for all investigated days, except for the 7th day, the differences in retweetability between tweets on topic of interest and of tweets on other topics were significant. The median of tweets on others topics oscillates between 4 and 6 RTs. The medians of tweets on topic were highest on the 1st and 5th day (16 RTs), and decreased on other days to 8.5–12 RTs. As for the news services from the USA, the differences were significant for the first three days and then again for the 5th and 6th day. For both topic groups the medians were the highest, compared to the other countries. The median number of tweets on other topics

Table 1. Difference in median retweetability of tweets on topic of interest (toi_1) and on other topics (toi_0) and their significance according to Mann-Whitney U-test for the triggering event *Charlie Hebdo*.

Charlie Hebdo	DE			USA			UK		
	toi_0	toi_1	Sig.	toi_0	toi_1	Sig.	toi_0	toi_1	Sig.
1st day	4	16	**	43	90	**	14	64	**
2nd day	4	12	**	32	67	**	15	43	**
3rd day	5	12	**	47	66	**	15	41	**
4th day	6	11	**	46	75.5	ns	22	41.5	**
5th day	4	16	**	27	77	*	20	50	**
6th day	6	10.5	**	34	48	**	17	30.5	**
7th day	5.5	8.5	ns	36	38.5	ns	15	30	**
8th day	4	10	**	37	55	ns	14	33.5	**

Table 2. Difference in median retweetability of tweets on topic of interest (toi_1) and on other topics (toi_0) and their significance according to Mann-Whitney U-test for the triggering event *Paris attacks*.

Paris attacks	DE			USA			UK		
	toi_0	toi_1	Sig.	toi_0	toi_1	Sig.	toi_0	toi_1	Sig.
1st day	5	34	**	37	388	**	11	110	**
2nd day	8	16	**	48	144	**	21	46.5	**
3rd day	6	10	**	76	110	*	20	38	**
4th day	6	9	**	53	93	**	15.5	21.5	**
5th day	9	11	ns	44	106	**	19.5	23.5	*
6th day	8	12	**	44	73	**	14.5	23	**
7th day	7	11	**	53.5	73	*	12	21	**
8th day	7	7	ns	53.5	122.5	**	15	27.5	**

was around 27 to 43 RTs, whereas for tweets on topic of interest between 38.5 and 90 RTs. Regarding news services from the UK, all differences between the both topic groups were significant, the medians of RTs for tweets on other topics were between 14 and 22 RTs, whereas for tweets on topic of interest between 30 and 64 RTs. For all countries, the medians for tweets on topic of interest were higher than for tweets on other topics through the whole week after the triggering event, however, they decreased at the end of the week.

Table 2 shows the outcomes for the second investigated triggering event, the Paris terrorist attacks. Regarding the German news services, the differences in retweetability between the two topic-groups were highly significant, except for the 5th and 8th day. Again, the retweetability medians of tweets on other topics were lower (between 5 and 9 RTs) than for tweets on topic of interest (between 7 and 34 RTs), however, they decreased to the end of the week. As for the USA, all differences were significant and the medians for tweets on topic of interest were even higher than for the first triggering event (between 73 and 388 RTs), tweets on other topics exhibited retweetability medians between 37 and 76 RTs. Regarding the news services from the UK, all differences were significant as well. The medians for tweets on topic of interest were between 21 and 110 RTs, whereas for tweets on other topics between 11 and 21 RTs.

Table 3 presents the retweetability medians and significance outcomes for the last investigated triggering event, the Brussels terrorist attacks. Here, the outcomes of MWU-test are way less significant than for other investigated triggering events. For Germany, there were significant differences on the first two days and on the 4th through 6th day. Furthermore, the differences were less distinctive when compared to the other triggering events. Tweets on topic of interest achieved the median retweetability score between 8 and 18 RTs, whereas the tweets on other topics between 5 and 8 RTs. As for the USA, the differences in retweetability were only significant for the 1st, 5th and 7th day. The first difference was very distinctive, with a median retweetability score of 155.5 for tweets on topic and of 49 for tweets on other topics. On the 5th day this difference got less noticeable (63 and 45 RTs respectively). On the 7th day, with least significant difference, the tweets on topic achieved less RTs than tweets on different

Table 3. Difference in median retweetability of tweets on topic of interest (toi_1) and on other topics (toi_0) and their significance according to Mann-Whitney U-test for the triggering event *Brussels attacks*.

Brussels attacks	DE			USA			UK		
	toi_0	toi_1	Sig.	toi_0	toi_1	Sig.	toi_0	toi_1	Sig.
1st day	5	18	**	49	155.5	**	8	35	**
2nd day	5	8	**	60	60	ns	9	17	**
3rd day	6	7	ns	57	52	ns	9	23	**
4th day	7	9	*	66	53	ns	8	20.5	**
5th day	7	10.5	*	45	63	*	13	29	**
6th day	8	13	*	58	67	ns	18	17.5	ns
7th day	6.5	8	ns	60	32	*	12	12	ns
8th day	7	11.5	ns	52	32	ns	13	09	ns

topics (32 and 60 RTs respectively). As for the UK, the differences in retweetability for the first five days were significant. However, a decrease in median scores is recognizable when compared to the previous two investigated events. The median retweetability scores for tweets on topic of interest were between 9 and 35 RTs, whereas for tweets on other topics between 8 and 18 RTs.

3.3 Inter-country Differences and Differences Between All Triggering Events Regarding Correlation Between Tweet's Topic and Its Retweetability

The third research question regards the differences between the investigated news services' accounts considering the correlation between the topic of the tweet and its retweetability. The focus of the analysis is also set on the comparison of the three triggering events (fourth research question). For this purpose, the point-biserial correlation between the "topic of interest" variable (coded as a binary variable) and the number of RTs (interval scaled variable) was computed. This correlation shows, whether the topic of the tweet (terrorist attacks) had influence on the number of received RTs and, if it did, how strong this effect was.

Regarding the first triggering event, Charlie Hebdo terrorist attacks, and the German news services, all values of point-biserial correlation between topic of the tweet and its retweetability are significant, except for the last two days. The effect sizes are medium on the 1st and 5th day, and small otherwise. As for the new services from the UK, the correlation is significant for all days except for the 6th day. The effect sizes are medium on the first two days and on the 5th day, and otherwise small. Regarding the new services from the USA, two significant correlations are given for the first three days and then for the 5th day. The effect sizes are medium only on the 5th day, and otherwise small.

For the second investigated triggering event, the Paris terrorist attacks, there are less significant values than for the first triggering event. As for the German news accounts, the correlation outcomes are significant for the first four days and for the 7th day. The

Table 4. Correlation between RTs and "topic of interest" computed with point-biserial correlation (r_{pb}) for the three triggering events. The thresholds for effect sizes: small (0.1), medium (0.3), and large (0.5), are color-coded (light-gray, medium-gray and dark-gray respectively).

	Charlie Hebdo			Paris Attacks			Brussels Attacks		
	DE	UK	USA	DE	UK	USA	DE	UK	USA
1st	.364**	.353**	.292**	.578**	.509**	.433**	.299**	.310**	.239**
2nd	.225**	.319**	.155*	.211**	.161**	.176**	.184**	.214**	.047
3rd	.282**	.228**	.159*	.234**	.177**	.073	.011	.123**	-.068
4th	.215**	.111*	.089	.129*	.103**	.004	.050	.085*	-.050
5th	.384**	.366**	.311**	-.048	.033	.166**	.101	.251**	-.019
6th	.132*	.048	.037	.099	.148**	.148*	.080	.049	-.005
7th	-.074	.119**	.098	.169**	.153**	.086	-.023	-.015	-.090
8th	.101	.187**	-.021	-.004	.045	.114	.004	-.021	-.037

correlation on the first day is of a large effect size. However, the correlations on the remaining days have only small effects. There is a very similar tendency for the news services from the UK. There is a significant correlation with large effect size on the first day and, after, there are significant correlations until the 4th day as well as on the 6th and 7th day with a small effect size. Regarding the news services from the USA, the correlations are significant on the first two days and on the 5th and 6th day. The correlation on the first day has a medium effect size, whereas on the remaining days only small one.

The last investigated triggering event, the Brussels terrorist attacks, exhibits the least significant correlations. For German accounts, the only significant correlations are given on the first two days, both of small effect sizes. As for the news services from the UK, the significant correlations are given for the first five days. The correlation on the first day is of a medium effect size, whereas on the remaining days of small one. The correlation on the 4th day does not even fall within the threshold of a small effect size (coefficient smaller than 0.1). Regarding the news services from the USA, there is only one significant correlation on the first day, with a small effect size.

Table 5 summarizes only the significant outcomes of the point-biserial correlations and includes the coefficients of determination (r^2_{pb}). These are the percentage values (square of the correlation r_{pb} multiplied by 100) that show what variance in the number of RTs can be explained by the variance in the topic of the tweet. For the first investigated event, the coefficient of determination was highest on the 5th day with 14.75% (Germany), 13.40% (UK) and 9.67% (USA), and on the first day with 13.25% (Germany), 12.46% (UK) and 8.53% (USA). As for the second investigated triggering event, there were less values with significance level under 0.05. The coefficient of determination was the highest for all three countries on the first day: 33.41% (Germany), 25.91% (UK) and 18.75% (USA). These values are also the highest for all three

Table 5. Coefficients of determination (r^2_{pb}) expressed as percentage values. Only significant values ($p < .05$) were used for the calculation (see Table 4).

	Charlie Hebdo			Paris Attacks			Brussels Attacks		
	DE	UK	USA	DE	UK	USA	DE	UK	USA
1sts	13.25%	12.46%	8.53%	33.41%	25.91%	18.75%	8.94%	9.61%	5.71%
2nd	5.06%	10.18%	2.40%	4.45%	2.59%	3.10%	3.39%	4.58%	
3rd	7.95%	5.20%	2.53%	5.48%	3.13%			1.51%	
4th	4.62%	1.23%		1.66%	1.06%			0.72%	
5th	14.75%	13.40%	9.67%			2.76%		6.30%	
6th	1.74%				2.19%	2.19%			
7th		1.42%		2.86%	2.34%				
8th		3.50%							

investigated triggering events. As for the third triggering event, the most significant values are given for UK, followed by Germany with two significant values, and USA with only one. Here, the first day was marked with the highest coefficients of determination as well: 8.94% (Germany), 9.61% (UK) and 5.71% (the only one for the USA). These were, however, the lowest values compared to the other investigated triggering events.

3.4 Results in a Nutshell

The first research question concerned the general differences in Twitter activity between news services from Germany, UK and the USA. Indeed, it appears that the news services from the UK tweet the most, however, the most RTs per tweet are received by news services from the USA. As for Germany, the number of tweets per day was similar to the one of news accounts from the USA, but with a much lower number of RTs/tweet. In general, there was mostly a peak in Twitter activity on the day of the triggering event or on the day after, and a peak in RTs/tweet on the day of the triggering event for all countries. The lowest Twitter activity was usually observed on the weekends.

The second research question concerned the difference between countries in the amount of tweets on topic of interest as well as in their retweetability. From the three investigated countries, the news services from the USA posted in average the least tweets on the triggering event. The chronologically last triggering event, the Brussels terrorist attacks, got the lowest coverage when compared to the other two events. Regarding the retweetability of tweets on topic, it was again the lowest for the Brussels attacks. The differences in median retweetability were the highest and most significant after the Charlie Hebdo attacks, decreased after the Paris attacks, and were the lowest for the Brussels attacks. This indicates that with the time the differences in retweetability of tweets on topic of interest got minor and less significant.

The third research question regarded the differences between the three countries in the correlation between the topic of the tweet and its retweetability. This was also a further indicator for differences between the three triggering events (fourth research question). The observed tendency was similar to the analyses for the second research question. For the first triggering event, Charlie Hebdo terrorist attacks, the coefficients of determination were high on two separate days for all three countries. It was marked with significant correlations over several days with a medium or small effect sizes. For the second triggering event, the Paris terrorist attacks, there were fewer significant correlations with smaller effect sizes. The highest significant difference in retweetability was given on the day of the attacks. The last triggering event, the Brussels terrorist attacks, was marked with least correlations and relevant effect sizes only on the day of the attacks. For the USA the only significant correlation was given on the day of the attack and the coefficient of determination was smaller than after the other two triggering events. This tendency was recognizable for all three countries, but especially distinct for the news services from the USA. There appears to be a tendency of decreasing retweetability of tweets on triggering events being terrorist attacks. This is especially given for non-European news services (USA), but also recognizable for European news services (Germany and UK). The retweeting tendency moved from medium effects of tweet's topic on its retweetability over several days (first triggering event), to medium or large effects only on the day of the event followed by small effects on other days (second triggering event), and lastly, to small effects on the first day or first few days only (third triggering event).

4 Conclusion and Limitations

In this study we investigated news services' Twitter accounts from three countries and their Twitter activity around three terrorist attacks in Europe. Although there are differences in Twitter activity between the three countries regarding the average tweets posted per day and average number of RTs per tweet, there are some similarities regarding reporting on terrorist attacks and the reaction of the users. The relative number of tweets reporting on the terrorist attacks gets smaller with the time, it is especially distinctive for the last investigated event (Brussels attacks). The retweetability of such tweets gets lower with the time as well. The difference between tweets on concerned topic and other tweets fades. Even though there was a strong correlation between tweets on terrorist attacks for Charlie Hebdo over several days, there is almost no correlation for the last investigated event, Brussels attacks. This could indicate not only declining volume of reporting on such events, but also the lessening attention they get from the Twitter community.

In this study we considered only few variables (number of tweets, their categorization, and the number of RTs). Further research should consider other factors possibly influencing the Twitter activity, like the number of followers or the time since when the accounts are active. A multi-factor analysis could reveal further aspects influencing the retweetability of certain tweets. Furthermore, a more detailed topic analysis of tweets could reveal further differences between the countries as well as the investigated triggering vents. The fact that the news accounts from USA tweeted

(relatively) least tweets on the event, however, that these tweets were mostly retweeted compared to other countries, requires a deeper analysis. Furthermore, the results indicate a deadening of the (Twitter) society towards news on terrorist attacks, which could by analyzed from a psychological perspective. Even though for the first terrorist attacks there was a continual attention in form of RTs over several days, for the latest ones there was just a minor reaction. After 24 h these were in fact no more than yesterday's news.

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